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1. INTRODUCTION

The PESTEL analysis of the EU context has identified and explained the political, economic, social, technological, environmental and legal conditions functioning on the EU level and having an impact on the emergence and development of energy citizenship (ENCI) in the European countries (see Debourdeau et al, 2023). Having acquired a good understanding of the larger picture, the EnergyPROSPECTS team proceeded to investigate how these conditions play out in different EU members states – in particular the nine countries involved in the project (Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, The Netherlands, and Spain).

In addition to the study of the national level, the teams also looked for interesting examples from the subnational level (municipalities, cities, towns, villages, counties, regions, federal states, etc.). The local examples provided a wider and more diverse picture about the energy citizenship situation in the nine countries, highlighting the variety of approaches towards energy citizenship even within the same country.

Each national team has written an analytical report, which is included in this deliverable as an individual chapter. The reports describe the political, economic, social, technological, environmental and legal conditions and explains their impact on the energy citizenship in the nine countries.

The concluding section of this document draws out the main commonalities and differences across the nine countries, outlines the most impactful conditions that either support or hinder the development of active energy citizenship and juxtaposes the national contexts against the common EU frame.

2. METHODOLOGY FOR THE PESTEL ANALYSIS OF NATIONAL AND LOCAL CONTEXTS

Emergence and development of energy citizenship (ENCI) depend on a variety of factors. Many of them can be considered as internal – the type of actors involved in a particular energy citizenship case; the roles, motivation and goals of the actors; dynamics over time (changes in number and type of actors involved, in funding mechanisms, in impact achieved, in goals and objectives, etc.); available resources and capabilities. The other important set of factors are the external factors, i.e. the ones that have the influence on the energy citizenship case, but are largely beyond the control of the actors involved in the case.

PESTEL analysis is a methodological tool well-suited for investigating external conditions and situations that have an influence over the given topic of interest - in the case of EnergyPROSPECTS, the energy citizenship. PESTEL stands for Political, Economic, Social, Technological, Environmental and Legal factors.

PESTEL analysis was originally known as PEST, before environmental and legal dimensions were added in the 1980s. Its origin is usually considered to be the methodology developed by Fahey and Narayanan (1986) for analysing the business environment from a macro-environmental perspective. Macro-environmental analysis identifies and describes the potential opportunities and hazards that might impact the business. In the following decades, PESTEL analysis found useful and practical application in different other fields as well. The methodology is equally applicable on a smaller scale (for example within one

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organisation or even a project, service or product) or on a larger scale (such as an entire economy sector or even a country).

In the EnergyPROSPECTS project, we applied PESTEL analysis to identify and describe the external factors, which are either conducive or unfavourable to the emergence and development of energy citizenship. This enabled a fairly comprehensive and realistic overview of the ENCI situation in the nine investigated countries, and allowed the research teams to identify the opportunities for supporting energy citizenship, as well as the threats or barriers that hinder it.

Limitations of the PESTEL analysis of the national and local contexts

The national PESTEL analysis covered a considerable number of issues and topics. In order to make the findings of the analysis manageable and readable, the research could not go into substantial analytical depths, but was employed to provide a realistic snapshot of the current situation. Although the research teams tried to identify and describe all relevant circumstances that have an impact on the emergence and development of energy citizenship, inevitably some important factors slipped through the net or remained insufficiently examined. The PESTEL analysis of local and national contexts therefore had neither the ambition to provide an in-depth examination of ENCI-related factors, nor did it have the purpose to measure and compare the factors and their influence.

While the focus of the PESTEL analysis was clearly on the current moment in time, the researchers also considered the developments from the recent past, if their impact remained relevant today, or is expected to become such in the future. PESTEL teams also noted the relevant developments that have already started to take shape or were likely to occur in the (very) near future.

Finally, it needs to be noted that the assessments of different factors might not be completely comparable across countries due to the fact that they were done by different teams. Despite the best effort to be as objective as possible, inevitably different teams and researchers have distinct criteria and may have assessed the factors and their impact in a dissimilar way.

Collecting and analysing the information

The PESTEL analysis was conducted in the form of a desk research, as most of the needed information was available online. In some cases, all research teams took advantage of the same resources – for example different types of statistical information, EU-wide opinion polls and surveys, EU datasets, etc. More often, the researchers collected and examined a variety of national sources – from government strategies, programmes and legislation, to scholarly articles and media publications.

The analysis of the documentation focused on information that enabled the researchers to answer two main research questions:

- How is the factor manifested in the country?
- How the factor influences ENCI?

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Based on the answers to these two questions, the researchers evaluated the factors and categorised them using the following scale:

- High-impact context factor hindering ENCI
- Middle-impact context factor hindering ENCI
- Low-impact context factor hindering ENCI
- High-impact context factor supporting ENCI
- Middle-impact context factor supporting ENCI
- Low-impact context factor supporting ENCI

Selection of factors for the national PESTEL analysis

The preliminary list of factors for the national PESTEL analysis was based on the factors and subfactors identified and described in the EU PESTEL analysis. During the EU analysis, 25 factors (or factor clusters) and 97 subfactors were reviewed. This immense work was only possible because each involved team examined only one PESTEL letter (one group of factors). Such a task could not be replicated in the national analysis, where each team had to cover the entire PESTEL framework.

For this reason, it was inevitable to reduce the number of factors and subfactors. Many subfactors from the EU level were modified or grouped together into new factors to make them more appropriate for the examination of circumstances that shape the energy citizenship in the nine partner countries. Some EU level subfactors remained unchanged and were included as factors in the preliminary list of factors for the country level analysis.

Despite the reduction of the number of factors, the preliminary list was still too extensive. All EnergyPROSPECTS teams were asked to express their preferences for the selection of factors that should be analysed. The teams were instructed to vote by giving two points to five most relevant factors per each PESTEL letter, one point to less important factors, and zero points to those that could be left out. The voting result delivered the final list of the factors for the national PESTEL analysis. To take national differences into consideration, in addition to the four factors (five in the case of the political and economic sections) that were common and obligatory for all nine countries, each country team was able to select and examine one additional factor, which was deemed to be very relevant for the particular national context.

Selection of factors – an overview

Table 2.1: PESTEL factors

	EU level analysis	National analysis - preliminary list	National analysis - final list
Political factors	5 factors 18 subfactors	14 factors	5 common factors + 1 factor selected by each team
Economic factors	5 factors 19 subfactors	11 factors	5 common factors + 1 factor selected by each team

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Social factors	4 factors 15 subfactors	11 factors	4 common factors + 1 factor selected by each team
Technological factors	4 factors 17 subfactors	8 factors	4 common factors + 1 factor selected by each team
Environmental factors	3 factors 14 subfactors	8 factors	4 common factors + 1 factor selected by each team
Legal factors	4 factors 14 subfactors	11 factors	4 common factors + 1 factor selected by each team
Total	25 factors 97 subfactors	63 factors	32 factors

Energy citizenship (ENCI) ideal types

In the EnergyPROSPECTS project, we have developed a conceptual typology of energy citizenship (ENCI), grouping the ENCI manifestations into ten ideal types. They are presented and discussed in detail in D2.2 Conceptual Typology (Debourdeau et al, 2021). This innovative conceptual typology captures the breadth of energy citizenship in terms of conceptual forms, thus encompassing both existing and possible types. The PESTEL analysis highlights which ideal ENCI types are particularly affected by a certain external condition (factor). For the convenience of the readers, the table briefly presenting the ENCI types is included below.

Table 2.2: ENCI ideal types

OUTCOME-ORIENTATION	AGENCY				
	Individual			Collective	
	Private	Organisationally embedded (e.g. workplace)	Public	Citizen-based and hybrid	Social movements
	Manifest and latent forms can be differentiated				
REFORMATIVE Incremental socio-technical change Low energy democracy Shallow environmental sustainability	**1. DO THEIR BIT (in the household)** Complying with the green energy transition	**3. DO THEIR BIT (within organisations)** Energy citizenship within organisations	**5. MAKE THEIR VOICE HEARD** Participating in societal energy discussions	**7. DO THEIR SHARE** Joining green energy projects	**9. DO THE JOB** Facilitating the energy transition through alignment activities
TRANSFORMATIVE Radical socio-technical change High energy democracy Deep environmental sustainability	**2. DO THEIR OWN (in the household)** The change-making energy citizen	**4. DO IT THEIR WAY (within organisations)** The energy-related change maker in organisations	**6. MAKE THEIR VOTE COUNT** Mobilising votes for energy transition	**8. GO AHEAD** Building, expanding and linking citizen-based organisational forms	**10. MAKE THEIR CLAIMS** Protesting against the current energy system

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3. NATIONAL ENERGY SYSTEMS AND THE ROLE OF CITIZENS

This section summarises the most important information about the nine national energy systems (the main focus of the national energy policy, short- and long-term goals, data about the current energy mix and energy governance) and the role that states have envisaged for their citizens within the energy system.

Before discussing the features of the national energy systems, the diversity of countries participating in the EnergyPROSPECTS project needs to be noted. Belgium, Germany and Spain are highly decentralised, consisting of federal or autonomous entities. Others, in contrast, are very centralised. Some are way ahead in terms of liberalisation of their energy markets, others are laggards. Some have a long history of active citizen engagement in the affairs of the state, including energy-related matters, others (especially the former communist countries) are experiencing high levels of citizen passivity and disengagement. There is also the issue of size, which inevitably influences the energy needs and consequently energy policies of a country. The nine countries under scrutiny include 3 out of 4 most populous EU member states (Germany, France and Spain), and also some of the smaller ones (Ireland and Latvia).

Current focus of the national energy policy and 2030 energy targets

The National Energy and Climate Plans outline how the EU countries intend to address the five dimensions of the energy union: decarbonisation, energy efficiency, energy security, internal energy market, and research, innovation and competitiveness. All National Plans are available on https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en.

Table 3.1: Greenhouse gas (GHG) emission reduction targets

GHG emission reduction target	
Belgium	-35% by 2030 (compared to 2005)
Bulgaria	-0% by 2030 (compared to 2005)
France	-40% by 2030 (compared to 1990)
Germany	-55% by 2030
Hungary	-40% by 2030 (compared to 1990)
Ireland	-30% by 2030 (compared to 2005), -51% by 2030 (compared to 2018),
Latvia	-6% by 2030 (compared to 2005)
The Netherlands	-55% by 2030 (compared to 1990)
Spain	-23% by 2030 (compared to 1990)

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Table 3.2: Renewable energy sources

National target for the share of RES in final energy consumption by 2030								
Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
17.5%	27.1%	32%	30%	21%	34%	50%	27%	42%

Table 3.3: Energy efficiency

The 2030 targets to reduce the final energy consumption								
Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
-12%	-31.7%	-20%	-30%	-0%	-32.5%	-11%	N/A	-32.5%

Table 3.4: Security of energy supplies

The domestic energy production and energy imports	
Belgium	Domestic energy production covers 30% of the total primary energy consumption. Nuclear energy accounts for 74% of the domestic energy production, the other 26% are renewable fuels and waste. There is a heavy dependency on other countries for fossil fuels.
Bulgaria	Bulgaria's dependence on energy import is low in comparison to other Member States, with about 60% of energy needs covered by domestic production. Bulgaria is a net exporter of electricity (mainly to neighbouring countries), but a net importer of liquid fuels.
France	France imports almost all of the gas, oil and coal it uses as sources of energy (less than 1% is produced in France). 55% of energy consumption is covered by domestic production, of which nuclear is the largest source (75% of domestically produced energy), and thereafter different types of renewable energy.
Germany	Until the start of the Russian war in Ukraine, Germany imported a large share of fossil energies from Russia. Russian coal used to account for around 50% of German consumption, and the share of Russian gas was about 55%. By the second half of 2022, these shares practically fell to zero.
Hungary	Hungary has substantial lignite reserves, but imports about 90% of oil (from diverse sources) and 80% of natural gas (mostly Russia). Hungary imports about one third of electricity it consumes.
Ireland	Ireland is a net exporter of electricity, but overall is energy dependent on imports. Import dependency varied between 85% and 90% in the 2006-2016 period and then fell to 67% in 2018. The energy dependency on imported fuels increased dramatically after the decline in indigenous natural gas production and decreasing peat production.

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Latvia	Share of imports in gross national energy consumption is 44%, which is a considerable decrease in energy dependency compared to 1990. This has been achieved through the increase in the use of renewable energy sources , and by the opening up of the electricity and gas market. Latvia imports 88.5% of solid fossil fuels, and 100% of petrol products and natural gas.
The Netherlands	The Netherlands is an importer of electricity. The country has substantial stocks of natural gas that have not only covered the domestic gas demand but were also exported. However, due to the planned end of gas extraction from the Groningen gas field (the largest in the country) by 2030, the Netherlands will have to become a net gas importer. The Netherlands has large coal reserves and is one of the top ten coal exporters worldwide (mainly to other European countries).
Spain	Spain is characterised by a high energy dependency - 73%, well above the EU average (54%). The reason is the prevalence of fossil fuels in the national energy system. On the positive side, Spain has one of the highest levels of diversification of gas and oil suppliers in Europe.

Energy governance and ownership

This section summarises the information from the introductory parts of the country chapters about the governance structures, main actors and regulation of the energy markets.

- The three regions of **Belgium** (Wallonia, Flanders and Brussels) have competences for issues such as energy efficiency, the promotion of renewable energy, public transport, transport infrastructure, urban/rural spatial planning, agriculture policy, and waste management. Meanwhile, the federal government safeguards the national energy security, and is in charge of policies concerning nuclear energy, territorial waters (including offshore wind energy), public buildings, and the railways. Belgium has a liberalised energy market. Electricity market has been fully open to competition since 2007. It has independent regulators, responsibilities being divided between the federal regulator, the Commission for Electricity and Gas Regulation (CREG), and the three regional regulators: the VREG in Flanders, the CWaPE in Wallonia and the Brugel in the Brussels-Capital Region. These regulatory authorities have responsibilities for the electricity transmission system, including approval of transmission tariffs, they advise federal/regional governments on gas and electricity markets, ensure compliance with regional public service obligations, and monitor market competition. Both wholesale and retail market are characterised by rather high degrees of market concentration.
- The **Bulgarian** energy market has still not been fully liberalised and is dominated by state-owned players. Bulgarian Energy Holding (BEH) manages the most important companies in the energy sector, including the Kozloduy nuclear power plant, the largest coal power plant, and the largest natural gas distribution company. The electricity market is highly regulated and dominated by a few major players (three large supply companies, each covering a part of the country – West Bulgaria, South-East Bulgaria, and North-East Bulgaria). The Energy and Water Regulatory Commission (EWRC) is a state body, which regulates retail prices in the gas and electricity markets and issues licenses for electricity generation, electricity trading, transmission and distribution. The regulated prices for all final consumers should be phased out by the end of 2025.

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- The energy governance structure in **France** is highly centralised. The central government controls energy market regulation, price setting, and support schemes for renewable energy and energy efficiency. The energy system is dominated by nuclear power (more than half of all nuclear reactors in the EU are in France) along with the large state-led projects and strong national utilities. Nevertheless, the liberalisation of energy markets has enabled a limited involvement of local authorities and actors. In terms of governance, the regional and sub-regional levels are bound by the 2015 Law of Decentralisation to implement their own climate and energy transition goals aligned with the overarching national framework.
- The energy governance in **Germany** is shared by the Federal Government and governments of the Länder, as they all cooperate in setting the priorities and goals of the energy transition. On federal level, the Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (BNetzA) serves as the most important regulatory authority for overseeing the regulation of transmission and distribution networks. Regulatory authorities also exist at state level. They mainly deal with smaller electricity networks that fall outside the scope of BNetzA. The Federal Office for Economic Affairs and Export Control (BAFA) promotes the efficient and economical use of energy, and the further expansion of renewable energy. The Federal Cartel Office is the competent authority regarding merger control in the electricity sector and competition law infringements. Only a few companies are involved in the generation of electricity from fossil fuels, but the growing renewables segment is much more fragmented. German peculiarity is the increasing role played by the municipalities through the re-municipalisation process.
- The energy system in **Hungary** is highly centralised, with current government showing limited interest in decentralisation. Policymakers in the highest echelons of government dictate the energy policy, and other actors have very limited powers to question, contradict, or substantially shape the government objectives. This is a considerable barrier for renewable energy utilisation and community energy. In the recent years, the government has actually been gradually re-centralising the energy system rather than decentralising it, despite the explicit goal outlined in the National Energy Strategy 2030 "to put the consumer in the centre." Most of the energy utility companies have been bought up by state owned companies thus further centralising the energy system of Hungary.
- In **Ireland**, decision-making power on energy policy is strongly centralised with the national level holding key competencies. Nevertheless, subnational governments, especially the 26 counties, still play an important role in energy governance through their functions in spatial planning, community development and in implementing national policies.

  The Irish Government's current long-term energy policy White Paper, spanning 2015-2030, lays out their vision for the Irish energy system to become increasingly decentralised while shifting traditional assumptions about energy supply. Such a shift will necessitate a change in the mindsets of individual consumers, businesses, agencies and utility companies. This Energy White Paper highlights the role of all citizens as "energy citizens", and the active role that they will play in increasing energy efficiency and renewable energy projects. The Commission for Regulation of Utilities is Ireland's independent regulator of energy and water utilities. It works to ensure safe, sustainable and secure energy at a reasonable price for households and businesses nationally, with a commitment to working towards delivering a secure, low carbon future at least cost. Liberalisation of the energy market is driven by the

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support to homeowners and businesses to generate their own renewable energy (grants for Solar PV installation and remuneration for any excess energy fed back into the grid).

- In **Latvia**, several ministries share different responsibilities related to the energy system, but the central body in charge of the energy and climate policies development and implementation is the new Ministry of Climate and Energy. The state support programmes are supervised by several state authorities, depending on the source of financing – JSC "Development Finance Institution Altum", the Central Finance and Contracting Agency, Latvian Environmental Investment Fund, and Latvia's Rural Support Service. Since 2015, all households could participate in a deregulated power market. However, the general framework for energy communities has been adopted only in July 2022 and the adoption process of governmental follow-up regulations still continues. Development of municipal-level energy-climate action plans is voluntary; however, they have been elaborated (for the main part or whole area) by more than half of 43 Latvian municipalities.
- In the **Netherlands**, generation and retail of electricity was liberalised in 1998, but transmission and distribution remain centralised and operated by the systems operator (TenneT) and utility companies, which have a monopoly position in the energy market. These actors are regulated by the Authority for Consumers and Markets, in order to ensure consumer/business rights are protected. The Dutch Climate Agreement (2019) sets out a non-legally binding aim of 50% local ownership of renewable energy on land by 2030. Overall, governance of the energy transition in the Netherlands features negotiation of the Dutch government with other stakeholders and interest groups such as trade unions, energy suppliers and environmental organisations. Additionally, new forms of citizen participation are a core element of energy governance in the Netherlands. The Dutch electricity market is highly integrated into the European market. The retail energy market is described as open and competitive, although a high concentration of market share among energy suppliers has been noted. There are still barriers to the development of innovative energy services by active consumers and energy communities.
- **Spain** is a decentralised country, consisting of 17 autonomous regions, which have their own parliament. Each autonomous region is in charge of the energy sector – it can authorise certain power plants and energy networks, and provide relevant political, economic and infrastructural conditions for the development of different ENCI types. Local governments and municipalities can work directly with the end users to foster the changes in energy consumption and transport, which necessary leads to regional differences. The Spanish energy market, specifically the electricity and natural gas market have been liberalised, which broke up the monopoly model. In fact, the Spanish and Portuguese governments established an integrated electricity and natural gas market for both countries – Iberian Electricity Market (MIBEL) and Iberian Gas Market (MIBGAS). In the same vein, the market regulations for the renewable energy in Spain allow the self- and collective consumption. This decentralised structure, with local governments creating relevant political background both for individual and collective consumption, promotes the renewable energy transition.

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The role of citizens in relation to energy use

Belgium:

- The government recognises the role that citizens and collectives play in reaching the country's targets for the energy transition. This is acknowledged by the policies in place regarding energy poverty, but also from the particular attention to citizen-led renovation. In addition, an important indication of this is the extensive consultation process with participation of citizens, organised to inform the energy policy strategy.
- Belgium has an extensive 'Third sector' (community centres, semi-governmental organisations and housing corporations allow for the typically small-scale, neighbourhood ENCI initiatives).
- The inclusion and empowerment policies, especially with regard to energy poverty, are well developed.
- The energy literacy is increasing, enhanced through a broad range of governmental, semi-governmental and private sector initiatives that inform citizens about energy saving.
- The levels of citizen engagement are generally high (extensive institutional landscape of social enterprises, neighbourhood organisations, citizen associations, and semi-governmental intermediaries), but in terms of individual environmental-energy conscious choices and responsibility, the citizen engagement tends to be somewhat less pronounced.

Bulgaria:

- The Integrated National Energy and Climate Plan of the Republic of Bulgaria until 2030 acknowledges that citizens should have an active role in the energy system in Bulgaria, however specific measures that support such a role have yet to be developed.
- The democratic culture is rather low, and the majority of citizens are passive and refrain from involvement in public causes. Distrust towards state institutions is prevalent and most citizens are sceptic that something can change through their participation. This inevitably shapes the attitudes regarding involvement in public activities, including creating or joining an energy community and other forms of energy citizenship.
- The civic sector often lacks resources (material and human) and expert capacity for active participation in the energy governance. Another considerable obstacle is the inability (or reluctance) of institutions to engage in dialogue with citizens.
- There are expectations that the digitalisation of the energy system (smart grids deployment, smart metering, smart mobility and other ICT solutions) could enhance citizen participation in the energy markets, but the roll-out of these technologies is still rather slow.
- Marginalised groups and vulnerable consumers are practically excluded from active participation in the energy system. There are no targeted policies, dealing with energy poverty and protection of vulnerable people, apart from social welfare programmes.

France:

- The energy citizenship mostly relies on the individual capacity to act. There is a lack of collective action and public services in France that would favour inclusive participation of all. Important barriers remain

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for the scale-up and access to energy communities, renewables self-consumption, and overall deployment of renewable energy.
- During the energy price crisis, households, businesses and organisations have been encouraged by the government to adopt energy sufficiency measures. This is likely to continue in the coming years as sufficiency is becoming increasingly accepted as an important climate mitigation strategy.
- While support systems such as the energy check and financial support for low-income households for energy renovations exist, overall, vulnerable groups remain more marginalised in the energy transition compared to the average or wealthier citizens.
- The 2021 energy barometer shows that knowledge of citizens about the energy market remains low.
- France has a very dynamic civil society, which has been active in embracing the climate struggle in recent years. Numerous collective and coordinated NGOs actions have been set up over the years for different ENCI-related issues.
- The new law on the Acceleration of Renewable Energy Deployment that was adopted in the beginning of 2023 does not sufficiently consider the citizen dimension of renewables deployment.

Germany:

- The new Renewable Energy Sources Act 2023 provides a relevant framework to enhance the development of cooperatives and communities, and therefore the various forms of ENCI, notably by ensuring their democratic content and the related citizen control.
- Many recent policy measures are clearly considering the role played by the citizens in the energy transition, by stating that each inhabitant of Germany should be able to “do their bit” toward the achievement of carbon neutrality.
- Citizen participation is seen by the authorities as an instrument to strengthen citizens' trust in politics and administration. The Federal Ministry for the Environment has launched a series of participation processes in which citizens were able to voice their demands and views regarding energy and climate.
- The energy literacy is quite high and there is a relatively high level of willingness to behave in an environmentally friendly manner.
- The energy poverty is barely addressed in the new German regulations, which could prove to be a major barrier for part of the German citizens.
- Some progress has been realised to extend the scope of the possible forms of ENCI, notably through tenant energy, which allows tenants to become more active in the energy transition, though they are not owning a roof on which they can install solar panels.

Hungary:

- One of the goals of the National Energy Strategy is to put the citizens/consumers in the focus by supporting decentralised energy production, widening their freedom of choice in certain areas, and developing programmes for improving situation of vulnerable users.
- Despite this stated goal, the rather centralised nature of the Hungarian systems (energy, governance, education, etc.) remains a considerable obstacle to the active citizenship. There are very few measures in place to encourage citizens to act about energy efficiency, decarbonisation, etc.
- Hungary has a rather passive society and there are only a very few examples when citizens take the

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initiative. Non-governmental organisations hardly ever take political stands. Most good practices have been undertaken as part of the EU funded projects. Civic participation in public affairs is low. The same is true for solidarity and tendency of being a member of organisations.
- The National Energy Strategy pays special attention to the vulnerable groups but needs to be supplemented by additional policies from other fields. Presently, there is no official definition of energy poverty in the national legislation.
- There is lack of knowledge about community energy and operation of the energy market, which makes it harder for individuals and local authorities to create energy communities.

Ireland:

- Despite lacking a political culture that strongly supports citizen-led energy efficiency or generation, the Irish Government has been increasingly recognisant of the importance of citizen participation and energy citizenship in recent years. Citizen and community engagement in climate action and the decarbonising of the energy sector is cornerstone of the national Climate Action Plan (2021).
- The energy policy White Paper, spanning 2015-2030, highlights the role of all citizens as “energy citizens”, and the active role that they will play in increasing energy efficiency and renewable energy projects.
- When it comes to political/democratic culture overall, 45% of Irish citizens state that they are confident that they have a say in government decision-making, representing an average value among the Organisation for Economic Cooperation and Development countries (OECD, 2023).
- The Irish Government is committed to ensuring a fair, equitable, just and inclusive transition to carbon-neutrality. This committal is reflected in several key climate and energy policies and measures aimed at engagement of vulnerable communities in ENCI through offering additional financial, educational, and technological support.
- A newly established National Dialogue for Climate Action (NDCA) aims to improve climate literacy through creating awareness about Climate Change and to enhance public understanding of it.

Latvia:

- The National Energy and Climate Plan for 2021-2030 includes the action line “Promoting economically justified energy self-production and self-consumption (Public involvement in energy production)”, which could be perceived as a recognition of citizen role in the energy system transition.
- Latvian legislation incorporates a strong foundation for civil society participation in the decision-making process at all levels, which is supported by a range of instruments and methods (working groups and consultative advisory councils, public consultations, discussion groups, forums, public opinion polls, delegation of the implementation of certain public administration tasks to private persons, including NGOs).
- Several civil society organisations, NGOs, local leader groups, umbrella associations, and other organisations perform mediating functions, facilitating the government's dialogue with citizens.
- The approach to the prevention of energy poverty is mainly though social assistance. According to data from the Central Statistical Bureau, the energy poverty has gradually decreased over the past years.
- Latvia has one of the lowest ratings for climate change awareness in the EU. The majority of citizens

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believe that they cannot help solving the problems caused by climate change. The EU is seen as the main player in the fight against climate change, while national institutions are not required to address the issue.

The Netherlands:

- The policy and legal environment in the Netherlands is supportive for the participation of citizens in energy communities. The democratic culture of the country is well established, ensuring a high level of citizen participation. The government supports the democratic culture of citizenship through various measures, forums, and organisations.
- Different policies aim at the assistance of economically vulnerable groups to help them engage in the energy transition. Energy poverty is relatively low in the Netherlands compared to other European countries.1
- A large majority of Dutch citizens feel a personal responsibility to act to limit climate change (10% above the EU average). Many citizens are (very) motivated to help mitigate climate change through action within their own living environment and are interested in becoming a member of an energy cooperative or community.
- The awareness of local energy initiatives in the Netherlands is high, but it seems that more could be done to further raise the general energy literacy of the citizens.

Spain:

- The democratic culture in Spain allows citizens to actively participate in decision-making process for the energy policy and tackling the climate change. Spanish Government maintains various channels to facilitate access to information and the informed participation of Spanish society in response to climate change.
- In recent decades there has been an increase in innovative business models that place the citizen at the centre of the energy transition process (e.g. energy communities, cooperatives, etc.). They are characterised by voluntary and open membership, the development of democratic control by members, economic participation and direct ownership with autonomy and independence, and a shared environmental concern.
- There are still numerous legal, administrative, and technological gaps that leave many people hesitant and not confident when it comes to investing in energy communities.
- Overall, the energy and climate literacy and awareness are quite high. Data from surveys point to a promising growth in the number of energy citizens, willing to act as long as legislation supports and protects their right to produce and consume self-generated energy and receive fair payment for it. However, some citizens stay passive when it comes to climate change actions, maybe due to a lack of support measures to carry out broad changes in living habits.
- Specific legal measures aimed at vulnerable consumers, energy poverty and social inclusion are in place. Vulnerable consumers are defined as “ electricity consumers who meet the determined social, consumption and purchasing power characteristics” and are entitled to a variety of support measures. The National Energy Poverty Strategy sets out the objectives for the reduction of energy poverty, establishing the appropriate legal regime with a series of measures for action.

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4. PESTEL FACTORS – AN OVERVIEW

Table 4.1: Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor P2. Agreed upon climate and energy policy targets with current strategic developments. Subfactor P2.1. Agreement on a binding objective of climate neutrality in the EU by 2050 and the recognition of citizens' roles. Subfactor P2.2. Agreement on a binding renewable energy target at the EU-level and recognition of citizens' roles. Subfactor P2.3. Agreement on an EU-level energy efficiency target and recognition of citizens' roles.
Short description	This factor includes the national policies and political objectives, targets and goals to reduce the net greenhouse gas emissions, to increase the share of renewable energy production and consummation, and to increase the energy efficiency and energy savings. All these aspects of energy transition should be considered from the perspective of the role played by the citizens and should acknowledge the involvement of citizens and communities in a variety of ways and capacities.
P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor P1. EU-level political unification in the energy sector. Subfactor P.1.1. Level of integration and functioning of multilevel governance.
Short description	This factor includes policies and measures aimed at decentralisation of the energy system, enabling (among others) development of decentralised and citizen-led renewable energy production.
P3. Political support for ENCI (mechanisms, networks, etc.)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor P3. Commitments to participative governance. Subfactor P3.1. Political priorities of the Commission towards increased participative governance. Subfactor P3.3. Inclusion of binding public participation and multi-level climate and energy dialogues in the preparation of the Integrated National Energy and Climate Plans.

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Short description	The factor refers to a broad set of procedures and modes of political interventions supporting different aspects of citizens' participation in the energy transition (energy efficiency, renewables, GHG emissions reductions and other aspects). These procedures may aim at ensuring that the public is given early and effective opportunities to participate in the preparation of the national energy and climate plans, at providing the citizens with the necessary information and enabling them to express their opinions, and at establishment of multilevel climate and energy dialogues with the local authorities, civil society organisations, business community, investors and other relevant stakeholders, as well as the general public.
P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor P4. Non-governmental initiative towards energy transition.
Short description	This factor covers the levels of 'participative governance' of citizens in the energy system (ways in which citizens can politically participate in the current system) and political commitments to energy d`1emocracy, but also looks into the more general manifestations of participatory and deliberative practices in policy. These can include various organisations of civil society (NGOs, churches, schools, sports associations etc.), semi-governmental organisations (utilities, housing corporations) and public-private partnerships. More generally, this factor indicates the initiatives towards energy transition coming from the hybrid institutional sphere.
P5. Inclusion and empowerment policies	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor P5. Empowerment policies. Subfactor P5.1. Recognition of energy poverty and vulnerable citizens as a political priority. Subfactor P5.2. Data gathering and mapping of energy poverty at the EU-level. Subfactor P5.3. Energy literacy and empowering programmes/projects targeting citizens in energy poverty Subfactor P5.4. Education/professional training programmes/projects.
Short description	The 'inclusion and empowerment policies' allow passive or not-yet-active energy citizens to become energy citizens that make certain achievements in terms of sustainability and energy democracy. The 'inclusion and empowerment policies' factor captures the range of governmental policies and non-state initiatives dedicated to the empowerment of vulnerable groups (those suffering from energy poverty, those marginalised through a lack of energy literacy, and those overlooked or underrepresented in decision-making on energy matters).

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P6. Public participation and multi-level climate and energy dialogues with non-political actors	
Analysed in:	Bulgaria
Corresponding EU level factors and subfactors	Subfactor P3.3. Inclusion of binding public participation and multi-level climate and energy dialogues.
Short description	The inclusion of binding public participation and multi-level climate and energy dialogues with non-political actors in the preparation of national energy and climate strategies has the potential to influence ENCI depending on the type of actors that are included and their roles and responsibilities in this process.

P7. Political vision on the future of the national energy system	
Analysed in:	France, Hungary
Corresponding EU level factors and subfactors	Subfactor P1.2. Consensus on citizens' role in the EU energy system. Subfactor P1.3. Consensus on the future EU energy system.
Short description	The vision on the future of the national energy system expresses the ambition of a country to actively contribute to the European energy transition to an integrated EU energy system defined by “energy flows between users and producers, reducing wasted resources and money” and an “Energy Union that speaks with one voice in global affairs”.

P8. Geo-political challenges (COVID, war in Ukraine, gas and oil supply…)	
Analysed in:	Germany, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor P1.4. EU responses to the energy price crisis and the war in Ukraine
Short description	Political responses to the recent challenges, such as energy price crisis and the war in Ukraine, especially if the consequences have been particularly important for the country, whether in terms of energy supply or in terms of political measures adopted to face the energy crisis.

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Table 4.2: Economic factors

EC1. General economic situation / Inflation rate and purchasing power	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor EC4. Economic growth. Subfactor EC1.4. Inflation rate and purchasing power.
Short description	Economic situation in the country is of obvious importance to ENCI. It sets constraints on the behaviours of individuals, households, enterprises and other possible actors enacting ENCI. It may also open up opportunities for investment. High levels of economic growth could for example bring the (financial) empowerment, the innovation and the optimism for individuals to become active energy citizens - yet it could also 'lull people back to sleep', i.e., into passive energy consumerism. Similarly ambiguous are the possible effects of low economic growth: It could stifle ENCI and leave people without material and immaterial means for empowerment. Yet it could also provide the societal context in which ENCI becomes needed, accepted, and normalised. The direct effect of inflation on citizens' purchasing power affects ENCI in deep yet not entirely straightforward ways. However strongly determined by energy prices, receding buying power is not only determined by energy. Whilst receding buying power poses immediate incentives towards saving, these savings can be sought in various elements of budgets with different significance to ENCI (e.g. holidays, dining outdoors, or showering habits). Still, this factor generally puts a premium on energy saving and energy citizenship.
EC2. Energy prices (incl. relative cost of renewables and fossil fuels)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor EC1. Energy prices. Subfactor EC1.1. Security of energy supply. Subfactor EC1.2. Security of supply of raw materials and other resources. Subfactor EC1.3. Relative cost of renewables and fossil fuels.
Short description	The direct effect of high energy prices is that they necessitate energy savings, increase the likelihood of energy poverty and make the socio-economic inequality more acutely felt and visible. This may induce a shift in the societal mood towards ENCI practices geared towards fostering energy justice and energy democracy. Very high prices are likely to be economically and socially disruptive and can generate collective action such as protests and social movements. The ensuing political tensions may work towards conscientious and altruistic ENCI behaviours, but may also work towards egocentric, competitive behaviours. Energy prices are influenced by different other circumstances, including security of energy supply and raw materials.

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EC3. Energy market (degree of liberalisation, existing decentralisation/ centralisation of the market)

Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor EC2. Steering the European economy through market intervention. Subfactor EC2.1. Integration and liberalisation of the EU electricity market.
Short description	Energy prices are usually regulated by governments through a range of instruments (subsidies, taxation, emissions trading) and for a range of reasons (energy security, environment, etc.). The liberalisation and decentralisation of the energy system in principle work as enablers of ENCI through the development of decentralised renewable energy production, notably citizen-led renewable energy communities. This factor can develop in different directions, however, considering the fundamental and far-reaching interventions in the energy market that EU member states are considering in their anticipation of the 2022/2023 Winter.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor EC2.2. Steering through EU fiscal policy. Subfactor EC2.3. State aid adapted to the European Green Deal. Subfactor EC2.5. Fossil fuel subsidies.
Short description	Energy taxation is one way to create price incentives for citizens and businesses to shift to clean energy sources. By making some types of energy sources more expensive, others become more profitable, thus possibly enabling ENCI, notably in terms of production and consumption of renewable energy. The state aid can also support ENCI in several ways. Renewable Energy Communities can benefit from aid without competitive bidding under certain conditions, as can different projects for energy efficiency measures related to buildings and mobility. Fossil fuel subsidies lower the economic burden on citizens and businesses for electricity and transport costs, but also support carbon-intensive and polluting fossil fuels.

EC5. Financing and investment opportunities contributing to a more sustainable energy system

Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor EC3. Design of and access to financing and investments. Subfactor EC3.1. EU funds and investment schemes that aim to contribute to a more sustainable EU. Subfactor EC3.2. Access to financing: technical assistance and capacity building.
Short description	This factor encompasses different funding programmes (grants, loans, guarantees, subsidies, trust funds prizes and procurements) with the potential to support ENCI in different ways. If these programmes are weakly developed, individuals and organisations struggle to materialise their ENCI ideals due to heavy financial risks. By contrast, if the factor is strongly developed, we see how the frontrunners are followed by a large group of late adopters - and how active forms

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	of ENCI become both normal as well as feasible and within reach for a broad range of people. This factor also influences the social distribution of ENCI, i.e., the degree to which ENCI is either mainstreamed or limited to particular privileged groups.
EC6. Security of energy supply and security of supply of raw materials and other resources	
Analysed in:	Bulgaria, France
Corresponding EU level factors and subfactors	Subfactor EC1.1. Security of energy supply. Subfactor EC1.2. Security of supply of raw materials and other resources.
Short description	Security of supply, for example of natural gas, oil and coal, but also biomass, and renewable energy production, has a direct impact on energy prices. The same condition applies also to the raw materials and resources.
EC7. Sub-national (regional, municipal, local, etc.) innovation systems: energy sharing	
Analysed in:	Germany
Corresponding EU level factors and subfactors	Factor EC5. Spatial distribution of economic activity. Subfactor EC5.2. Regional development plans Subfactor EC5.3. Regional innovation systems
Short description	The 'small is beautiful' philosophy - re-territorialisation should go hand in hand with the allocation of adequate financial resources and capacity to act, as well as ensuring equal access to decision-making and citizen participation. Another element of re-territorialisation is the development of regional innovation systems, and the formation of local economic clusters and business parks.
EC8. Green industry development and green job creation	
Analysed in:	Hungary, Latvia, Spain
Corresponding EU level factors and subfactors	Subfactor EC3.1. EU funds and investment schemes that aim to contribute to a more sustainable EU Subfactor EC4.1. Green industry development
Short description	The European Green Deal is Europe's ambitious strategy towards 'green growth'. To the extent that it succeeds in creating competitive 'green' industries that are able to meet the highest environmental standards, this new wave of European industrial development will ensure continued (or revitalised) economic growth. The overall shift towards green industry and green economy could come with a certain institutionalisation of (environmental) values associated with ENCI.

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EC9. Raw material and resource prices	
Analysed in:	Ireland
Corresponding EU level factors and subfactors	Subfactor EC1.2. Security of supply of raw materials and other resources
Short description	Apart from the energy prices themselves, various other costs also determine the scope for consumption and investment in the energy system (solar panel costs, costs of retrofitting or adaptations in the built environment, etc.). The prices for these secondary energy materials and resources can fluctuate considerably, and also have an effect on ENCI.
EC10. Grassroots innovation and 'short circuit' alternative economic activities	
Analysed in:	The Netherlands
Corresponding EU level factors and subfactors	Subfactor EC5.1. Grassroots innovation and 'short circuit' alternative economic activities.
Short description	The rise of circular economy principles has given an impulse to the 'bottom-up' movement towards local, small-scale forms of economic activities. There is a clear ideological-ethical convergence between these grassroots initiatives and the normative commitments associated with ENCI.

Table 4.3: Social factors

S1. Level of income / wealth disparity and energy poverty	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor S1.2. Level of income / Wealth disparity. Subfactor S1.3. Vulnerable energy consumers and the issue of energy poverty.
Short description	Welfare of citizens influences the concentration of energy community initiatives and determines whether citizens have the purchasing power and sufficient capital to cover such investments. Higher level of income allows for more investments in ENCI actions (RES installations, energy communities, improving energy efficiency, etc.), while low-income households typically cannot afford large investments, which will pay-off in the uncertain future. Wealth disparity among citizens in Europe is expected to grow due to inflation and rising energy bills.

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S2. Energy literacy, awareness and skills	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor S1.4. Energy literacy/awareness and the availability of information.
Short description	Literature describes the energy literacy concept as composed of four main aspects: literacy about energy devices, energy actions, energy finances and more general energy-related knowledge. The latter encompasses energy attitudes, values, understandings of energy production and consumption as well as energy-related behaviour. People who are more energy literate are supposedly more likely to start saving energy, to inspire people around them to be energy conscious, to join an energy community or even start one.
S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor S4.3 Active citizen engagement and empowerment towards energy transition.
Short description	An active and meaningful engagement of citizens in the energy transition process (such as participation in energy decision-making, community or individual ownership of energy production in the form of prosumerism, and participation in social movements or protests) depends on many factors, but one of the more decisive ones is the general level of citizen engagement/activity. In its essence, energy citizenship means that citizens are actively engaged in taking action towards energy transition and carbon neutrality. In contrast, the term 'passive energy citizen' would describe an individual who is unmotivated to act despite being aware of the need to take action. The passive energy citizen is not just a non-citizen or a 'deficient' citizen, however, as it also refers to vulnerable, disempowered and alienated individuals. Citizen engagement and empowerment are therefore at the core of the energy citizenship concept.
S4. Trust (or lack thereof) in institutions and collective endeavours	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor S3.5. Trust (or lack thereof) in institutions and collective endeavours (including cooperatives).
Short description	Lack of trust in energy-related initiatives due to mistrust of social, political and economic institutions is a prominent social phenomenon in many European countries and has the capacity to impede the energy transition. The perceived negative connotations associated with cooperatives and different institutionalised and collective forms of organisation in

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	general are especially relevant for Eastern European countries, where the mark left by the socialist regimes still influences the perceptions of citizens. Hence, the understanding of the terms “community energy” and “cooperative” can often be reminiscent of communism and therefore flatly rejected by some people. This is in contrast with some Western European and especially the Nordic countries, which have a strong tradition of social enterprises and community ownership. However, the cultural differences in the laggard countries may not necessarily be caused by distrust in social activity overall, but rather in the national and local political institutions.
S5. Age, gender, education and class as ENCI factors	
Analysed in:	Bulgaria
Corresponding EU level factors and subfactors	Factor S2. Demographic factors. Subfactor S2.1. Ageing population. Subfactor S2.2. Gender imbalance in energy initiatives. Subfactor S2.3 Generation and education gap.
Short description	Elderly people may be saving energy through consumer choices, but may also be inactive or not in a position to take up alternative energy forms or adopt energy-efficient behaviours. According to research, women are underrepresented as members of energy communities and are disproportionately often affected by energy poverty.
S6. Not-in-my-backyard syndrome	
Analysed in:	France
Corresponding EU level factors and subfactors	Subfactor S3.1. Attitudes towards energy-efficient products, services, technologies and appliances
Short description	While not necessarily positive and constructive, NIMBY (Not-in-my-backyard) can also be considered a manifestation of ENCI.
S7. Climate anxiety/depression (eco-anxiety)	
Analysed in:	Germany
Corresponding EU level factors and subfactors	Subfactor S4.1. Climate anxiety/depression (eco-anxiety)
Short description	Climate change is associated with increased frequency and severity of extreme weather events, this itself as well as its impacts such as on infrastructure is a source of stress and impacts mental health. Climate anxiety describes the more indirect impacts associated with perceptions about climate change, even among people who have not personally experienced any direct effects (Clayton 2020). Media exposure to climate change (indirect experiences) as

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	well as direct experiences of extreme weather events are associated with increasing climate anxiety. Climate change concerns can have an impact on the development of ENCIs from several directions. On one hand, concern can turn into action and drive forward the development. On the other hand, it can make action more difficult by creating a sense of powerlessness.
S8. Social norms, attitudes and perceptions towards energy-efficient products, services, technologies and appliances, and towards social innovation	
Analysed in:	Hungary, Ireland
Corresponding EU level factors and subfactors	Subfactor S3.3. Social norms towards energy awareness.
Short description	Attitude that technology is the ultimate solution for all energy and climate issues can easily lead to inaction and passivity. On the other hand, unreserved acceptance of all new technologies and innovations can result in public approval and support for procedures that are not justified from the sustainability perspective - such as cracking.
S9. Willingness to invest in the energy transition	
Analysed in:	Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor S3.4. Willingness to invest in energy transition - (not just financially but also in terms of effort, time, resources, etc.)
Short description	Willingness to invest does not mean just financially but also in terms of effort, time, resources, etc. Environmental consciousness and determination to contribute to the energy transition can be important motivational factors for making investments.

Table 4.4: Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor T1. EU technological choices towards the decarbonisation of the energy sector. Subfactor T1.1. Solar thermal and photovoltaic energy.

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	Subfactor T1.2. Offshore wind and ocean energy and related high voltage transportation infrastructures. Subfactor T1.3. Renewable hydrogen. Subfactor T.1.5. On-shore wind.
Short description	To be able to participate in the decarbonisation of the energy sector and produce their own renewable energy, citizens need to be able to access the necessary technologies. Solar photovoltaics (PV) and solar thermal technologies can be rolled-out rapidly and reward citizens and businesses with benefits in the form of financial savings, but also protection of the climate. Offshore wind and ocean energy are usually a rather centralised energy supply option, in which citizens are out of the scope, which might consequently foster citizen protests. Hydrogen is an important technology that contributes to the decarbonisation of the energy sector, but ENCI manifests mainly as consumers of such energy.
T2. Decentralised energy system and storage	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor T2.5. Decentralised energy system and storage.
Short description	Decentralised distribution networks are important preconditions for citizens to produce their own renewable energy and be able to distribute it.
T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor T4. Digitalisation of the Energy System Subfactor T2.1. Smart grids deployment. Subfactor T2.2. Demand response infrastructure deployment (smart-metering). Subfactor T3.1. Smart mobility. Subfactor T4.3. Availability of ICT solutions for peer-to-peer energy trading/virtual power plants.
Short description	Digitalisation of the energy system can be seen as a leverage to enhance citizen participation in the energy markets, to improve the feedback regarding consumption and raise awareness towards lower consumption. These measures include smart grids deployment (consumers are able to regulate their energy consumption), smart metering (empowerment of consumers through real-time feedback on their energy consumption), smart mobility (non-CO2 emitting transport) and different ICT solutions for enabling small scale citizen producers of renewable energy to trade it directly or indirectly with consumers.

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T4. Energy efficient buildings	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor T3.4. Energy efficient buildings.
Short description	Buildings account for 40% of total energy consumption in the EU. Buyers and tenants of houses should be informed about the energy performance of buildings to be able to take proper measures regarding building renovations.
T5. Smart mobility and green mobility	
Analysed in:	Bulgaria, France, Hungary, Ireland, Latvia
Corresponding EU level factors and subfactors	Subfactor T3.1. Smart mobility.
Short description	Sustainable mobility choices, increasingly driven by digitalisation and automation, should be made more accessible for all citizens.
T6. Energy labelling	
Analysed in:	The Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor T3.3. Energy Labelling
Short description	Energy labels help citizens to be more informed in what they buy and if it is energy saving or not. People should be able to make informed choices when buying energy-related products. Informative and understandable labels on energy efficient products can contribute to energy saving, reduce energy bills and promote innovation and investments into production of energy efficient products.

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Table 4.5: Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor EN1. Climate change and climatic conditions. Subfactor EN1.1. The impact of climate change as a global phenomenon. Subfactor EN1.2. Increased incidences of extreme weather events.
Short description	Climate change is one of the most basic motivations for the creation of ENCIs. Action against climate change, adaptation to it, and the attempt to create a liveable future are all driving the development of ENCIs. For comprehensive changes to take place, economic and political regulatory reform is essential, but the role of individuals, their everyday actions and decisions are becoming increasingly important, leading to the flourishing of ENCIs.
EN2. Availability of resources (geological challenges, geographical opportunities and limitations)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor EN2.1. Opportunities and threats of the necessary and potential renewable sources on the path to decarbonisation. Subfactor EN2.2. Differences and gaps in the existing renewable energy grid.
Short description	Availability of resources (including renewable energy potentials) differs considerably across countries, and as a result, different support schemes are operated at the national level. Transition to a greener lifestyle can be influenced by the possibility and openness to use existing renewable energy producers (e.g., if green electricity can be requested by consumers it could be a good start in lifestyle changing). In addition, an existing initiative can serve as an example for future ones (e.g., Renewable Energy Communities). Thus, the existing renewable energy production and system can also be a key factor in the life of ENCIs, and if the situation is not good enough, it can be a huge barrier.
EN3. Pollution (air, water, noise, visual pollution, waste management)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor EN3. Environmental damages (pollution, emission, threat to biodiversity). Subfactor EN3.1. Noise pollution connected to mobility developments. Subfactor EN3.2. Air pollution as a “red button”. Subfactor EN3.3. Visual pollution due to the installation of renewable energy (especially windmills). Subfactor EN3.4. Waste associated with energy production.

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Short description	Pollution caused by the energy sources currently used and the environmental conflicts that may arise during the energy transition are linked to our daily lives. Pollution can be of very different types. The noise pollution caused by the petrol and diesel cars can be a motivation to switch to more sustainable ways of transport (e.g., bike, electric cars), increasingly polluted air can act as an incentive to develop a range of green solutions from green energy production to more sustainable waste management and changes in mobility. In contract, the concept of "visual pollution", which includes the degradation of the landscape, arises in the context of newly developed renewable energy systems, especially wind farms. Waste associated with energy production concerns mostly photovoltaic panels and nuclear waste.
EN4. Conflicts and opportunities about land use connected to renewable energy	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor EN3.6. Conflicts and opportunities about land use connected to renewable energy.
Short description	Finding suitable land for renewable energy can lead to many conflicts, especially when the land in question is or can be used for agricultural purposes or is part of the protected area. On the other hand, in areas that have been previously used for industrial purposes, are polluted or of poor quality, the establishment of renewable energy systems linked to ENCIs can be a major benefit.
EN5. Biodiversity protection issues connected to renewable installations	
Analysed in:	Bulgaria, Germany, Latvia
Corresponding EU level factors and subfactors	Subfactor EN3.5. Biodiversity protection issues connected to renewable installations.
Short description	This factor encompasses questions that often arise when installing renewable resources include whether an environmentally ideal site is chosen and whether environmental vulnerability and biodiversity are taken into account.
EN6. The impact of water resources in energy production and the increasing scarcity of drinking water	
Analysed in:	France, Hungary
Corresponding EU level factors and subfactors	Subfactor EN2.4. The impact of water resources in energy production. Subfactor EN2.5. Increasing scarcity of drinking water

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Short description	Water is used in energy production in different ways – directly in hydropower plants, but also indirectly (e.g. cooling a nuclear power plant). Hydropower continues to be an important energy source. According to Eurostat, it accounted for 33% of the EU's renewable electricity production in 2020. The use of water in energy production exacerbates the emerging problem of scarcity of drinking water. About 30% of Europe's population is affected by water stress during an average year. The situation is expected to worsen as climate change is increasing the frequency, magnitude, and impact of droughts.
EN7. Impact of the use of existing non-renewable resources on the system	
Analysed in:	Ireland, the Netherlands
Corresponding EU level factors and subfactors	Subfactor EN2.3. Impact of the use of existing non-renewable resources on the system.
Short description	In 2020, the energy mix in the EU was mainly made up by five different sources: petroleum products (including crude oil) (35%), natural gas (24%), renewable energy (17%), nuclear energy (13%) and solid fossil fuels (12%). Despite progress towards the climate targets, a high percentage of energy production in the EU is still centralised and inflexible. Centralisation and inflexibility of the energy system can be a barrier to the development of ENCIs. In many cases, renewables are used as a replacement, so the scarcity of non-renewables can also be a motivation. This largely depends on the current coverage, the already developed and future renewable potential of each area or country.
EN8. Environmental disasters	
Analysed in:	Spain
Corresponding EU level factors and subfactors	Subfactor EN1.1. The impact of climate change as a global phenomenon.
Short description	Environmental hazards and disasters encourage collective ENCIs, as citizens often actively participate as volunteers to help with the recovery work. These events also raise public awareness, as well as generate debates and discussions. They can also lead to protests against causes of the accident, or negligence of responsible actors.

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Table 4.6: Legal factors

L1. Legal framings of ENCI forms	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor L1. Legal framings and specific enhancements of ENCI forms.
Short description	The legal framings of ENCI at the national level can be very diverse. They can include different forms of consultative and participative processes; giving a legal status to former "alternative" practices; acknowledging the citizen as consumer in the private sphere; improving legal security; simplification of regulatory processes; or simply a provision of information to citizens. Certain legal framings, however, might also limit the scope for action for ENCI.
L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion.
Short description	This factor covers different policy measures that deal with the issues related to energy poverty: dedicated policies to tackle energy poverty and vulnerable consumers, issues of accessibility of energy efficiency measures to vulnerable people and enabling the participation in the energy market of households that might otherwise not be able to participate.
L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (including rights for active participation of customers in the electricity markets)	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Subfactor L2.1. Rights relating to transparent information of users (billing, consumption, implementation of sub-metering - incl. cost allocation for heating, cooling and domestic hot water). Subfactor L2.2. Rights for active participation of customers in the electricity markets (through guaranteed grid access, remuneration for energy fed into the grid and demand response).
Short description	National regulatory frameworks that define the rights and duties of consumers, prosumers and new producers, and that define the rights of all consumers to become active in the electricity market. Such rights may include clear information on consumption and costs to enable the consumers to act accordingly (regulating their consumption, compare offers, switch supplier), individualisation of energy consumption in collective buildings (relevant for heating, cooling and hot water), easy grid access procedures, cost-covering remuneration for energy fed into the grid, etc.

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L4. Bureaucracy and red tape	
Analysed in:	Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, the Netherlands, Spain
Corresponding EU level factors and subfactors	Factor L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.) Subfactor L4.3. Simplification of bureaucracy for permits for renewable energy projects, manual of proceedings for transparency.
Short description	Lengthy administrative procedures constitute a major administrative barrier and are costly. The simplification of administrative permit granting processes, and clear time-limits for decisions to be taken by the authorities competent for issuing the authorisation for the electricity generation installation on the basis of a completed application, should stimulate a more efficient handling of procedures, thereby reducing administrative costs.
L5. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)	
Analysed in:	Bulgaria, Ireland, Spain
Corresponding EU level factors and subfactors	Factor L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.).
Short description	Gaps in the current legislation - exclusion of citizens from the energy-related legislation. Legal uncertainties deal with various aspects of the current body of law regarding the energy system and the way it is considering energy citizenship. Amongst them, the absence of the citizen in the mobility transition, the high expectations put on renewable energy communities and the more traditional bureaucratic barriers compose some of the most salient parts of this factor.
L6. Support schemes for renewable energy sources	
Analysed in:	France, Germany, Hungary, Latvia
Corresponding EU level factors and subfactors	Subfactor L1.5. Direct EU support for regional and local commitments to stimulating development of renewable energy and energy efficiency that are currently supported through networks
Short description	This factor relies on the legal regulation of various support schemes that might increase the access to energy citizenship. This factor encompasses for instance regulations displaying innovative models or forms of involvement extending the scope of energy citizenship. 'Support scheme' means any instrument, scheme or mechanism applied by a Member State that promotes the use of energy from renewable sources by reducing the cost of that energy, increasing the price at which it can be sold, or increasing, by means of a renewable energy obligation or otherwise, the volume of such energy purchased, including but not restricted to, investment aid, tax exemptions or reductions, tax refunds, renewable energy obligation support schemes including those using green certificates, and direct price support schemes including feed-in tariffs and sliding or fixed premium payments (Art. 1(5), RED 2018).

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L7. Information and empowerment of citizens to become active consumers on the energy market	
Analysed in:	The Netherlands
Corresponding EU level factors and subfactors	Subfactor L1.3. Information and empowerment of citizens to become active consumers on the energy market to be ensured by member states
Short description	Measures targeting the energy consumers, by raising awareness of energy consumption and enabling them to become active market actors. Such measures include providing suitable information, guidance or training programmes in order to inform citizens of how to exercise their rights as active customers, technical and financial aspects of assisting citizens to develop and use energy from renewable sources, independently or in the framework of renewable energy communities.

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5. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN BELGIUM

Author: Bonno Pel (Université libre de Bruxelles – ULB)

Introduction

An outstanding feature of Belgium is the strongly federalised institutional structure. The three regions Wallonia, Flanders and Brussels are federated entities, just as there are the three language communities: Flemish, French and German. A specificity of Belgian federalism is the absence of hierarchy between these governmental tiers. The competences are divided on an exclusive basis between the three political-administrative levels. At the middle and lowest political-administrative levels, we find respectively the provinces and the communes (municipalities) (Cf. Pel et al. 2022: 15/16). This complex multi-level governance is sometimes referred to as the 'institutional lasagne', and the ensuing difficulty to reach agreements and make binding decisions is often lamented:

This diversified/fragmented institutional structure might weaken federal-level, centralised governmental support for (certain forms of) ENCI. On the other hand, this does not mean that Belgium is an 'institutional void', an institutionally empty, impoverished context. The institutions for energy policy do exist, and abundantly so. The regions have competences for issues such as energy efficiency, the promotion of renewable energy, public transport, transport infrastructure, urban/rural spatial planning, agriculture policy, and waste management (PNEC 2019:3). Meanwhile, the federal level retains important competences such as fiscal policy, norms for products, the safeguarding of national energy security, nuclear energy, territorial waters (including offshore wind energy), public buildings, and the railways. The federal government can thus support regional-level policies with regard to climate, air quality, and energy. This potential for coherent multi-level governance is reinforced through three deliberation platforms: The coordination platform for energy policy CONCERE/ENOVER, the coordination committee of international environmental policies, and the national climate commission (CNC). The national Energy-Climate Plan (PNEC) has similarly been elaborated by a committee gathering representatives from the different governmental tiers.

In fact, this PESTEL analysis will, show that there is a range of governmental, semi-governmental, market, Third Sector and civic organisations that act as empowering 'intermediaries' for ENCI. This is illustrated in case studies on the institutionally hybrid initiative Hydroelectricity Ourthe and Sambre (HOSe) in Wallonia (Pel 2023a), and the Flemish initiative Energy Saving Pioneers (Pel 2023b).

Key quantitative data on the Belgian economy and its energy policy are the following (PNEC 2019: 4-8):

- **Population:** 11.398.589 inhabitants on 01/01/2018, which is 2.2% of the European population.
- **Population density** is high, 371 habitants/km^2 (2018), with still large differences across the 3 regions.
- **BNP (Belgium):** 459.6 billion €
- Average **BNP growth** 2005-2018: 1.4%
- **Greenhouse gas emissions:** Stabilised over (1990-2005), -19.7% in 2016 (also compared to 1990)
- **Total end consumption:** Petrol-based 43%, natural gas (27%), electricity (20%)
- Natural gas is the primary fuel in the industrial and housing sectors (38% and 40% respectively in 2015).

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The transportation sector is based on petrol-based fuels, for 93%.

- Belgium has limited energy resources; the domestic production amounts to about 30% of the total primary energy consumption. This implies a heavy dependency on other countries for fossil fuels.
- Nuclear energy accounts for 74% of the domestic energy production, the other 26% are renewable fuels and waste.
- In recent years, Belgium has made progress in renewable energy development. In 2016, this accounted for 8.65% of the total energy consumption.
- Energy poverty, counted as part of an overall 'material deprivation index' was 5.1% in 2017. The further analysis will bring out how it is actually a more pervasive problem, especially anno 2023.

Belgian national-level energy policy comprises the regular elements of GHG emission reduction, development of renewable energy, energy efficiency, energy security, internal market, and research, innovation and competition. The plan has set a 35% GHG emission reduction for 2030 (compared to 2005). This pertains to the non-ETS sectors. Adding up the results foreseen at the regional levels, the share of renewable energy could rise to 17.4% (EU aiming for 32%). Regarding energy efficiency, Belgium foresees 15% reduction in primary energy and 12% in final energy, as contribution to the European aim for 32.5%. Energy security is quite a pressing issue for Belgium, on both the short and the middle-long term. The provision of low-caloric gas from the Netherlands has been halted from 2022 onwards, and that comes with a major conversion towards the rich gas until 2029. Meanwhile, the planned phase-out of nuclear energy will call for a broad mix of measures that will be evaluated and fine-tuned on a continuous basis (PNEC 2019: 16). Belgium will intensify its efforts to fortify the transmission connections with France and the Netherlands, and study the scope for fortified connections with the UK and Germany as well (altogether aspiring to a 30% increase of connectivity by 2030). It will also seek to develop solutions towards more intelligent infrastructures, i.e. to respond more flexibly to fluctuations in supply and demand. Finally, the Belgian national energy plan indicates the commitment to dedicate about 3% of its BNP to R&D. Key areas of research are nuclear energy and hydrogen. The national plan, but also the regional plans, indicate a strong concern about the energy efficiency of companies – which should be urgently enhanced, if the national industry is to stay competitive.

Whilst seeking to cover the national level as much as possible, this report will also address the regional differences. Leaving the Brussels Capital Region largely aside (which is a region in the administrative sense, but its territory is only that of Brussels city), the analysis will elicit relevant differences between Flanders and Wallonia. For example, especially Flanders is struggling to reach the national and European targets. The recent reductions are in the order of 5% only, and the European Effort Sharing Regulation is called upon to avoid decarbonisation at excessive cost (PNEC 2019:18). Meanwhile, the share of renewable energies in gross final energy consumption in Wallonia is above the national average (9.9% in 2019), but it still remains below the European average (19.7% in 2019) (Eurostat, 2020a). The analysis will also point out relevant differences in geography, economic development, and social-political factors: The regions differ not only in their respective languages (Flemish/Dutch, and French, respectively), but also in economic structure and in political orientation.

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Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)

How is this factor manifested in Belgium: As indicated in the introduction, Belgium has managed to set up a national energy plan that covers the key objectives, targets and goals for the energy transition as outlined in the European Energy Union framework.

How the factor influences ENCI: The indicated agreements are significant and hard-fought feats. Even if not always elaborated into very detailed strategies and even if there are concerns about running behind in decarbonisation, these agreements and frameworks do support the emergence and development of ENCI in Belgium. The government recognises the role that citizens and collectives play in reaching the country's targets for the energy transition. This latter recognition speaks from the policies in place regarding energy poverty, but also from the particular attention to citizen-led renovation. In Flanders this is a key area of ENCI, as the building sector remains very difficult to decarbonize. Oxenaar (2021:6) calls attention to the LTRS: *"Flanders has submitted its Long-Term Renovation Strategy (LTRS) as part of its obligations under the Energy Performance of Buildings Directive (Article 2; Directive 2010/31/EU)11. The renovation strategy has also been brought in line with broader policy goals on housing and the environment such as alleviation of energy poverty, taking into account democratic trends, achieve high-quality, energy-efficient, and affordable housing for all, increasing supply of private and social rental housing, and improving spatial efficiency of the urban layout."*

Affected ENCI types: The aforementioned political agreements, policy frameworks, measures and support programmes are supportive for a very wide range of ENCI. Individual, household-based ENCI is stimulated through the foci on green company cars, and renovation of housing. Yet especially the institutionally hybrid arrangements, including roles of companies, are being promoted. The energy citizenship as enacted through social movements is mentioned hardly in the national energy plan.

Local examples: The Flanders and Wallonia regions have many energy-related competences. Accordingly, the national plan is built up along federal-level as well as regional-level action plans. These plans are coordinated to a certain extent (Cf. factor P 'multi-level governance').

P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)

How is this factor manifested in Belgium: As indicated in the introduction, the level of unification and integration in the energy governance of Belgium is in principle rather low. This poses considerable difficulties for the decision-making on truly national-level concerns, such as the nuclear phase-out. This phase-out is a particularly thorny political issue – it leads to clashes between on the one hand the more environmentalist and socialist oriented Brussels and Walloon regions, and on the other hand the more liberal-conservative-extreme right oriented Flanders. Still, it is noteworthy how the national plan integrates regional-level plans, and how governance capacity and coordination have been enhanced through deliberation platforms that cut across the institutional tiers. The national energy plan thus gathers

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a broad range of initiatives and policies on regional, provincial and municipal levels – which can support ENCI on a sub-national level.

How the factor influences ENCI: The multi-level energy governance structure in Belgium can be considered a threat to ENCI as far as it prevents very ambitious, broadly rolled out support programmes. On the other hand, governmental inaction has also evoked activism of social movements and a strong cooperative moment.

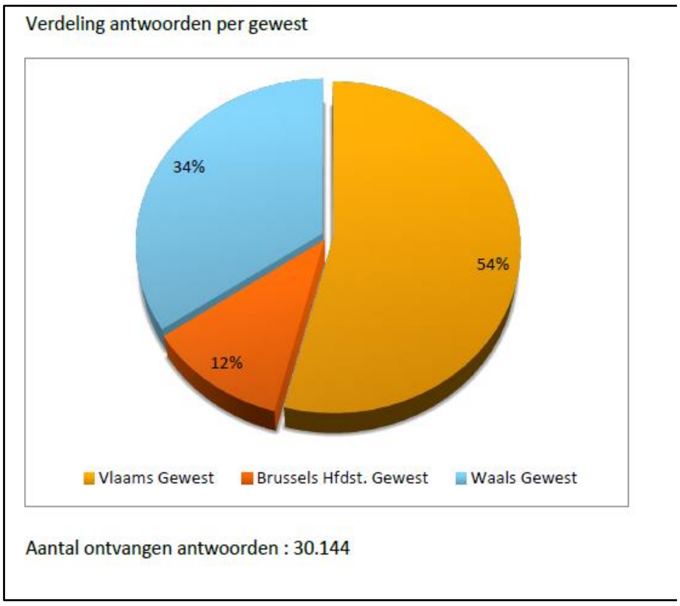
Affected ENCI types: The Belgian fragmentation creates particular impulses towards transformation-oriented social movements, who seek to take action in the face of a seemingly inactive government. The individual, household- based kind of ENCI are somewhat weakened, as far as political indecision leads to postponement of policies that impinge on individual consumption and behaviour.

Local examples: The strongly federalised governance structure leads to indecisiveness, especially as Flanders, Brussels and Wallonia are politically very divergent. A notorious example of the political indecisiveness is the nuclear phase-out. Announced in 2003, this measure has remained subject of decision-making ever since. Demonty (2023) provides an overview of the different governments that have struggled with the issue. Apart from the changing circumstances that have led political representatives to changing positions, the overview also highlights how the phase-out has long been supported by the environmentalist-Left (with a strong electorate in Wallonia and Brussels) and resisted by the Flemish nationalist parties. As a result, federal-level decision-making frequently became paralyzed.

P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in Belgium: The political support for ENCI appears to be increasing in Belgium. An important indication of this is the extensive consultation organised to inform the energy policy strategy. The Energy Pact has been set up as a structure for deliberations between the different governmental tiers. This involved a consultation of 129 key stakeholders, held between early May and end June 2017. Furthermore, an extensive online consultation has been organised for citizens, in October-November 2017. More than 45,000 citizens participated. The results of both these public consultations, i.e. of political representatives and individual citizens, have been analysed by a working group as inputs to the elaboration of the Energy Pact (PNEC 2019: 37/38). The Figure 5.1 indicates the number of survey answers recorded, as divided over the Flemish, Walloon and Brussels Capital regions (Cf. Energiepact 2017: 4).

Figure 5.1



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How the factor influences ENCI: The factor provides opportunities for ENCI. It remains to be seen, as always, how and to which degree the consultations lead to a mitigation of the choices made through representative democratic procedures. Still, in itself, this initiative towards extensive consultation rounds provides a moderate support for ENCI in Belgium.

Affected ENCI types: This factor supports ENCI in general. Importantly, the consultation involved both direct citizen consultation as well as consultation of political representatives. The latter can be taken as particular support for collective, institutionally hybrid forms of ENCI.

Local examples: As indicated in the figure above, the consultation covered the three Belgian regions – roughly in accordance with their respective population sizes. It is a relevant fact that this consultation was organised in an integral way, rather than through separate tracks of region/language communities.

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in Belgium: Belgium stands out internationally for its extensive 'Third sector' of institutions beyond the market and state domains. The presence of community centres, semi-governmental organisations and housing corporations allow for the typically small-scale, neighbourhood ENCI initiatives. The case study Pel (2023c) indicates how energy policy is increasingly becoming a working terrain for poverty reduction policy and NGOs working with underprivileged groups. This tradition of associative democracy is very strong in Belgium, and in that sense it is an institutionally very rich country. On the other hand, the strong dependence on nuclear energy needs to be mentioned: Energy production has traditionally been a matter for experts, utilities and governmental actors, organised in a somewhat secretive way at a distance from citizens (Pel et al. 2016).

How the factor influences ENCI: This factor is a very important stimulant to ENCI in Belgium. Even if central, federal-level policies may be weakened and even if regional-level policies may not compensate for this, there remains plenty of scope for local initiatives and local alliances that can carry collective ENCI projects. This factor provides opportunities that are quite specific to the Belgian context.

Affected ENCI types: This factor supports various individual kinds of ENCI, in the sense that individuals in Belgium can rely on a broad range of intermediaries (supporting institutions). The factor is also particularly conducive to institutionally hybrid forms of ENCI.

Local examples: Oxenaar (2021) highlights how the Flemish housing renovation programme, a key priority in Flanders' energy policy, is carried by various cooperatives. The case study Pel (2023b) shows how the cooperatives are also very important actors in Wallonia: The HOSe initiative on hydro-electricity is a collaboration between a dozen of cooperatives and a hydro-engineering company.

P5. Inclusion and empowerment policies

How is this factor manifested in Belgium: The inclusion and empowerment policies, especially with regard to energy poverty, are well developed in Belgium. The problem is well acknowledged in society (it is prominent in the media, the concept of energy poverty is very common), there is active political lobbying

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to have energy poverty higher on the political agenda (Koutsis 2022), and there is systematic monitoring of the problem (Fondation Roi Baudouin 2019). As indicated under other factors (Economic and Social factors, notably), there is a range of policies in place: To reduce acute energy poverty under the high prices of the 2022/2023 Winter, to prevent households from being disconnected from energy services, but also to increase energy literacy (personalised energy counsellors, neighbourhood initiatives, online guidance) and to address the structural elements of the problem (the high priority of housing renovation).

How the factor influences ENCI: The recent developments in Belgium regarding this factor (the high energy prices, the inflation) make it into a strong stimulating factor for ENCI.

Affected ENCI types: The solutions proposed and implemented are to a large extent focused on energy-poor households, and on their energy-inefficient housing. Meanwhile, action against energy-poverty is being undertaken through a very broad range of actors: Social movements, governmental and semi-governmental organisations, neighbourhood organisations, churches and schools, individual citizens. It can thus be considered a motivating background for ENCI in various settings.

Local examples: Energy poverty in Belgium is strongly linked to the poor energy performance of the housing stock, and the comparatively large houses – both in Flanders as well as in Wallonia. In this sense it is a nationally shared problem. Still, energy poverty is heavier in Wallonia, due to the overall significantly greater socio-economic vulnerability of this part of the country.

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Belgium: In 2022, Belgium has witnessed an unprecedented rise of energy prices and inflation rates. According to OECD figures, this peak was even a bit above the OECD average. The Figure 5.2 shows the magnitude of the peak in comparison with preceding years. Early 2023, this peak is falling again.

How the factor influences ENCI: The high inflation rate, and the skyrocketing energy prices, both can be considered wake-up calls, i.e. awareness-raising moments that incite towards ENCI. Calay & Claisse (2022) underline how they have marked the end of the 'age of abundance', and of the energy-providing welfare state. There are indeed widespread indications of energy saving, energy-conscious behaviours, and ENCI. It is too early to tell however how the overall economic situation will develop, and how structural the apparent behaviour change will be. The economic adverse conditions have raised further doubts about the nuclear phase-out, for example – not all signs point in the direction of ENCI. Altogether, this factor can therefore be considered only a moderate opportunity for ENCI in Belgium.

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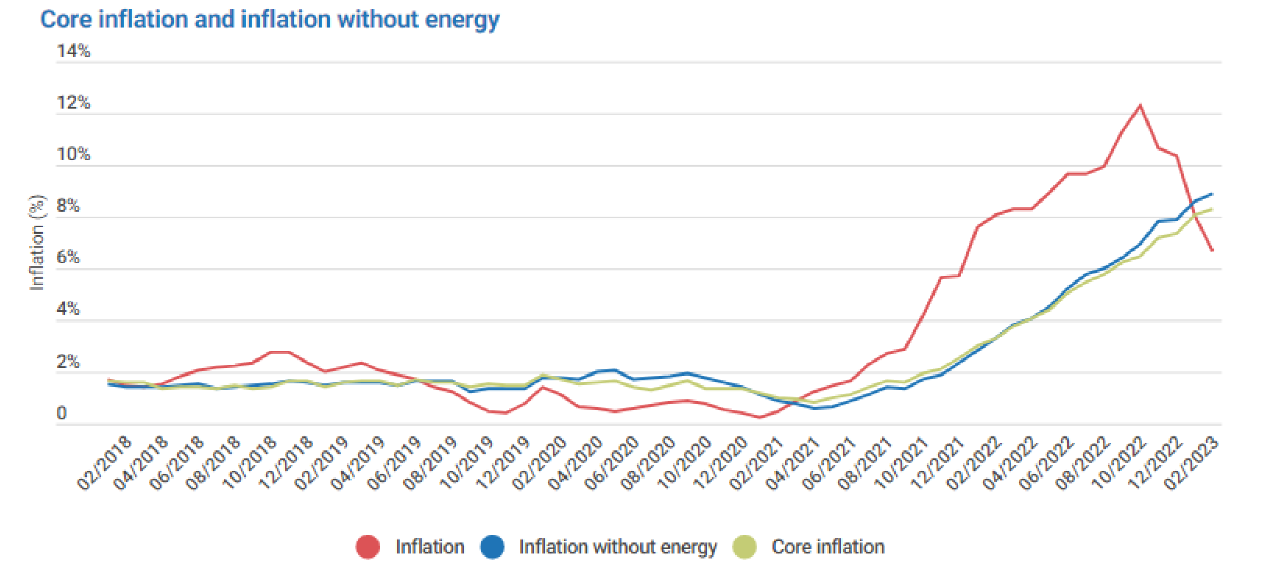
Figure 5.2: Inflation in Belgium (2018-2023)



Source: Statbel.

Affected ENCI types: The factor has impacts on all kinds of ENCI. As far as it poses direct pressures on buying power, it poses strong incentives towards ENCI on the level of households.

Local examples: This factor typically involves global developments (the war in Ukraine, geopolitical tensions, EU-level politics) that as such form the domain of federal-level policies. There are in that sense no marked differences across the regions. Still there are the traditional differences between the nationalist-Right and socialist-Left political orientations, leading to different positions regarding measures such as price caps, compensation measures and the relative importance of security-of-supply.

EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in Belgium: Just as many other EU member states, Belgium has witnessed a skyrocketing of energy prices in 2022. This has established energy saving as a high priority, across sectors and domains of society: The Pel (2023b) case study describes for example how it has incited organisation-level as well as sector-level commitments to stick to a 19 degrees Celsius room temperature, and also energy providers have launched campaigns to help their customers to reduce consumption. Combined with the lack of energy independence and the pending nuclear phase-out, this has evoked a strong impulse to ENCI in Belgium. Calay & Claisse (2022) accentuate the re-politicisation of energy issues that is taking place in response to the price rises. The implications of this politicisation are mixed, however. On the one hand it puts challenges of energy democracy and energy poverty higher on the political and societal agenda, on the other hand it appears to lead to a certain polarisation. The following newspaper article indicates the demonstrations and strikes that have organised in protest against the decreasing buying power of workers – where employers claim not to be responsible for this, reminding that the price rises have hit them as well.

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How the factor influences ENCI: The issue of the skyrocketing energy prizes has altogether contributed to ENCI. It has politicised energy issues, and it has even been a kind of wake-up call regarding the vulnerable position of Belgium on the international energy market. In Belgium, this politicisation does not necessarily drive towards ENCI, however – the issue of energy prizes has often been subsumed under general issues of buying power, inflation and negotiations over wages. The factor can therefore be classified as moderate 'opportunity'.

Affected ENCI types: The factor has impacts on all kinds of ENCI. In as far as it pertains to financial incentives, it can be considered a push towards reformative kinds of ENCI. The 2022 price peaks were extreme, however, and they were disruptive. The associated politicisation of energy issues drives rather towards transformation-oriented kinds of ENCI.

Figure 5.3: "The unions are fighting the wrong enemy", "not the right reaction": Reactions after the national strike.

«Les syndicats se trompent d'ennemis», «pas la bonne réponse»: les réactions suite à la grève nationale

Un vaste mouvement de grève nationale en lien avec la baisse du pouvoir d'achat impacte ce mercredi de nombreux secteurs d'activité.

Photo News

Source: le Soir, 9/11/2022.

Local examples: The extreme energy prices have acted as immediate financial incentives for ENCI initiatives such as the ULB energy efficiency mission (Pel 2023b). The impacts for HOSe, an institutionally hybrid initiative exploiting hydro-electricity, were rather favourable, however: They could use the increasing revenues to solidify their financial balance. Still, this enterprise operated in cooperative, not-only-for-profit spirit: They also considered a cap on the energy prices desirable as a matter of justice (Pel 2023a).

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EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in Belgium: Belgium has a liberalised energy market. In line with EU directives, Belgium's electricity market – to elicit this aspect – has been fully open to competition since 2007. It has independent regulators, responsibilities being divided between the federal regulator, the Commission for Electricity and Gas Regulation (CREG), and the three regional regulators: the VREG in Flanders, the CWaPE in Wallonia and the Brugel in the Brussels-Capital Region. These regulatory authorities have responsibilities for the electricity transmission system, including approval of transmission tariffs, they advise federal/regional governments on gas and electricity markets, ensure compliance with regional public service obligations, and monitor market competition. Both wholesale and retail market are characterised by rather high degrees of market concentration (IEA 2022:93/94).

Meanwhile there are range of policies in place that intervene in the energy market. A key example are the 'green certificates' that electricity suppliers need to obtain: This supports electricity generation from renewable energy. Operated by federal government (for offshore wind power) and by the 3 regions, the green certificate programmes have increasing annual quotas on the number of certificates each electricity supplier must obtain (IEA 2022: 23). Furthermore, there is the ETS emissions trading, which, as elsewhere in Europe, is starting to express carbon emissions as an important aspect of production costs. Other examples with particular relevance for ENCI are the measures to protect vulnerable groups: There is the safety net that protects households from being disconnected from energy services, the social tariff, and the energy bonus to dampen the extreme prices in the Winter 2022/2023. The article in the 'le Soir' newspaper of 13/03/23 indicates that certain vulnerable groups have not been receiving their bonuses due to misalignments between federal-level and the regional-level classification of the vulnerable groups. This also underlines the relatively high degree of energy market intervention in Belgium.

Figure 5.4: 'Imbroglio' in the pay-out of energy bonuses: thousands of households forgotten

Imbroglio dans le versement des primes «énergie»: des milliers de ménages oubliés

Les clients protégés régionaux, en Wallonie et à Bruxelles, n'ont pas reçu les primes fédérales en gaz et en électricité. Or ils auraient dû. Les gestionnaires de réseau viennent d'apprendre la nouvelle et vont rectifier le tir.

Article réservé aux abonnés

La Wallonie compte 27.000 clients protégés régionaux pour l'électricité et 16.000 pour le gaz. Autant de ménages qui devraient donc avoir la bonne surprise de recevoir cinq mois de forfait, soit un bol d'oxygène de 305 euros d'électricité et 675 euros en gaz. - Belga.

How the factor influences ENCI: The factor comprises a wide bundle of direct and indirect influences on ENCI. The analysis has highlighted the Belgian inclination towards intervening in the energy market, and this can be considered a very important 'opportunity' factor for ENCI. On the other hand, the market concentration reminds us that the market is not that open and not that receptive to new entrants. Hence the classification as an only moderate 'opportunity' factor.

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Affected ENCI types: The various forms of market ordering and market intervention are directed specifically towards the ENCI in the context of the household. They also impact ENCI in the context of organisations. Revolving around the price of energy, they may appear to be measures in a reformative spirit, to take off the rough edges of the energy transition and ensure social peace. The measures can also be taken as state-led moves towards transformative ENCI however: The policies reflect commitments to protection of vulnerable citizens, to have carbon emissions internalised in economic production, and to systematically require an increasing amount of renewables in the energy mix.

Local examples: The example of the administrative troubles with the energy bonuses indicates how federal and regional levels work with similar but different energy-economic policies. Apart from the coordination that may arise (as in the newspaper article above), this also indicates the scope for regional-level ENCI policies. Meanwhile, we can also see how the 'green certificate' schemes have been set up in all three regions.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in Belgium: Belgium's national energy plan lists a broad range of economic policy instruments. Very important ones are the 'green certificate' subsidies on renewable energy (Wallonie Energie SPW) 2023, helping these sustainable alternatives to be economically competitive. Other subsidy schemes are the low-interest loans for target groups, the subsidies for green heating, heat networks, residual heat and bio-methane, and bonuses for heat pump installations. The national energy plan also indicates various policy instruments residing under other discretions, such as social housing, innovation policy and agriculture (PNEC 2019: 247-249). Altogether, this indicates concerted efforts to steer the Belgian society towards sustainable energy. In terms of size and amounts, it needs to be said that the cumulated subsidies are still modest in view of the large amounts of expenditures needed: *"A study done on renovation in Europe estimated the investments in energy related renovation in Belgium as a whole at €8.4 billion in 2016, of which €618 million was spend on deep renovations. (...) To reach the 2050 goal an investment of around €200 billion is needed, of which around €150 billion for residential buildings amounting to around €55,000 per house"* (Oxenaar 2021:9).

How the factor influences ENCI: The factor is an opportunity for ENCI in Belgium, at least for the apparently high degree of cross-sector action – this indicates concerted efforts, and a certain anchorage of sustainable energy objectives across policy domains. On the other hand, critical analyses have argued that the amounts of subsidy and investment are still falling short - and the subsidies are not always reaching the groups who need them most. The Pel (2023c) case study on the BBL renovation plan describes how the environmental NGO BBL is launching a political lobby to pressure the Flemish government towards a significantly more ambitious policy. The factor is therefore considered as a moderate opportunity for ENCI in Belgium.

Affected ENCI types: The subsidies are targeting households (e.g. bonuses on installation of heat pumps and on renovations), collectives such as renewable energy cooperatives (the green certificates) as well as businesses and organisations (renovation of buildings). In that sense they are providing opportunities for ENCI across the board. Yet as far as the financial incentives mainly appeal to economic motives, they are favouring the reformative over the transformative-oriented forms of ENCI.

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Local examples: This factor does not display very major differences across regions, for the still important role of the federal level on these matters.

EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Belgium: The Belgian context displays quite strong efforts towards the mobilisation of capital, towards the 'financing of the transition' as it is often called. From the governmental side, this has materialised in several investment funds (PNEC 2019: 23):

- The green bonds, involving a total of 6.89 billion, will be directed exclusively to public investments in sustainable development.
- The 'National Pact for Strategic Investments'.
- The 'Infrastructure for Belgium' fund.
- The energy transition fund. This fund, established in 2016, served to finance innovative projects in the energy domain. Key foci were security of delivery and net balancing, especially production and storage of energy as well as demand management (PNEC 2019: 24).

How the factor influences ENCI: These efforts towards the financing of the energy transition, including the financial support to the late adopters who have difficulty to finance investments in their business or their home, are strongly working as opportunity for ENCI.

Affected ENCI types: Particular types that are impacted are the reformative-individual kinds of ENCI, and the hybrid types in which the private sector is also involved. There is a market being opened up for energy efficiency interventions that combine well with these particular kinds of (reformative) ENCI. The returns-on-investment, the lowering of the energy bill, are quite important financial motives.

Local examples: Importantly, the above national-level financing arrangements are complimented by a wide range of regional-level arrangements, often organised on the level of economic sectors and policy sectors.

Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Belgium: This factor gives a mixed picture for Belgium. Belgium is a relatively wealthy EU member state, and its citizens are therefore on average well-positioned to find the financial resources for ENCI-related investments. Qua wealth disparity it is clearly below the EU average.

Still, notwithstanding the overall wealth and the relatively balanced distribution of it, Belgium does have considerable levels of energy poverty. In 2017, well before the extreme price peaks of 2022, it was found that 21.7% of Belgian households were suffering from a form of (measured, hidden, or experienced) energy poverty (Fondation Roi Baudouin 2019). The study also indicates an energy poverty rate of 28.3% in 2019

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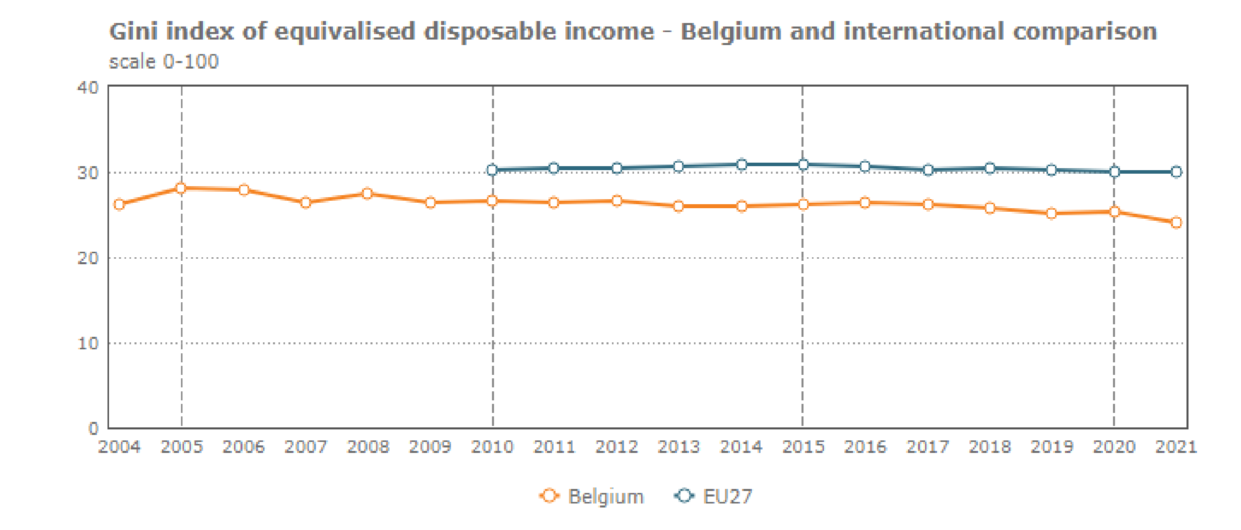
in Wallonia. This level, well above the national average, reflects not only the relatively lower levels of incomes but also the large size of housing (it is the more rural region) and the low energy performance of the housing stock.

How the factor influences ENCI: The relatively high levels of energy poverty, even before the peaks in 2022, pose threats to ENCI in Belgium as far as it disempowers households. Importantly, the energy poverty in Belgium appears to be related strongly to the stock of relatively large houses with low energy performance. This gives the energy poverty a structural character from which it is difficult to escape. This poses a threat to ENCI. Meanwhile, energy poverty is increasingly prominent on the political agenda, and it also has a certain awareness-raising, mobilising effect. Considering this counterbalancing effect, the factor can arguably be classified as middle-impact.

Affected ENCI types: The energy poverty is arguably the most constraining for ENCI in the context of the household. By contrast, the mobilising effect of it rather pertains to the collective forms of ENCI, and notably those revolving around social movements. Underlining the socio-economic inequality that underlies current energy challenges, this factor also seems to favour the transformative kinds of ENCI more than the reformative ones.

Figure 5.5: Gini index (Belgium versus EU 27)



Source: indicators.be

Local examples: There are marked socio-economic differences between the Belgian regions. The Brussels Capital Region stands apart as a metropolitan region, characterised by strong socio-economic contrasts between highly affluent cosmopolitan professionals and widespread poverty in marginalised neighbourhoods. The graph below also indicates the significant socio-economic difference between the Walloon and Flemish regions: This structural gap puts severe pressure on the federalist model, as Walloon socialist politics plea for national-level solidarity and Flemish nationalists tend towards radical disentanglement and possible independence.

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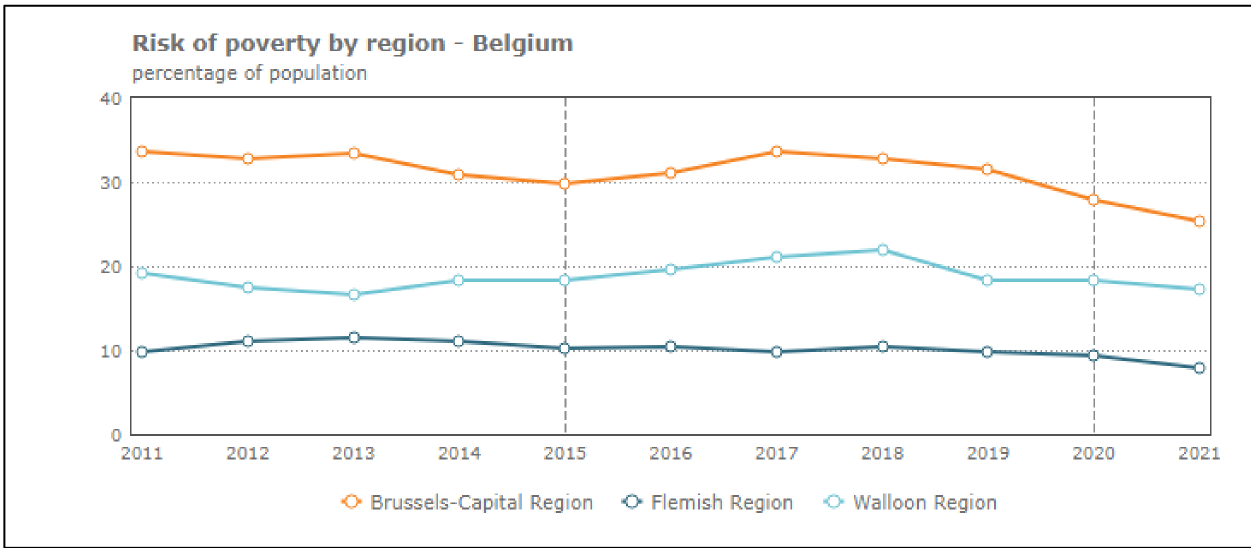
Figure 5.6: Risk of poverty by region



Source: indicators.be

S2. Energy literacy, awareness and skills

How is this factor manifested in Belgium: The energy literacy in Belgium is arguably increasing in recent years. This is not necessary a quality of citizens themselves: Energy literacy is being enhanced through a broad range of governmental, semi-governmental and private sector initiatives that inform citizens about energy saving. Prominent examples are the energy teams that provide audits, and the 'zet hem op 50' campaign to clarify the possibility of installing a heat pump installation. As Oxenaar (2021: 2) indicates below, there is even the development of 'one-stop-shop' services, i.e. integrated home renovation services in which citizens are helped through all the steps of renovation. *"Citizen-led renovation is energy communities and/or cooperatives undertaking renovation activities for, and with, their members and local communities. This includes renovation, energy efficiency in buildings, and sustainable heating and cooling. Furthermore, these activities are often combined with installing renewable energy systems. Renovation activities range from performing energy audits and providing information to homeowners, all the way to guiding households through the entire renovation journey, which includes planning, financing, delivery of measures, and evaluation (a 'one-stop-shop' or 'integrated home renovation' service)."*

How the factor influences ENCI: Energy literacy in Belgium is being enhanced through various intermediaries. This poses important opportunities for ENCI: Awareness of the energy challenges, knowledge of possible solutions, understanding of the costs and benefits involved – all these are allowing individuals to become citizens making conscious decisions about their energy use.

Affected ENCI types: This factor affects ENCI throughout. The awareness and the knowledge can be deployed in various kinds of ENCI agency. Still it appears that this particular kind energy literacy is inclined towards the reformative kinds of ENCI: The 'one-stop shop' arrangement is oriented much towards financial savings, it is oriented towards the material results (rather than towards transformative ambitions of energy democracy, for example), and most of all: The agency is to a large extent delegated to experts,

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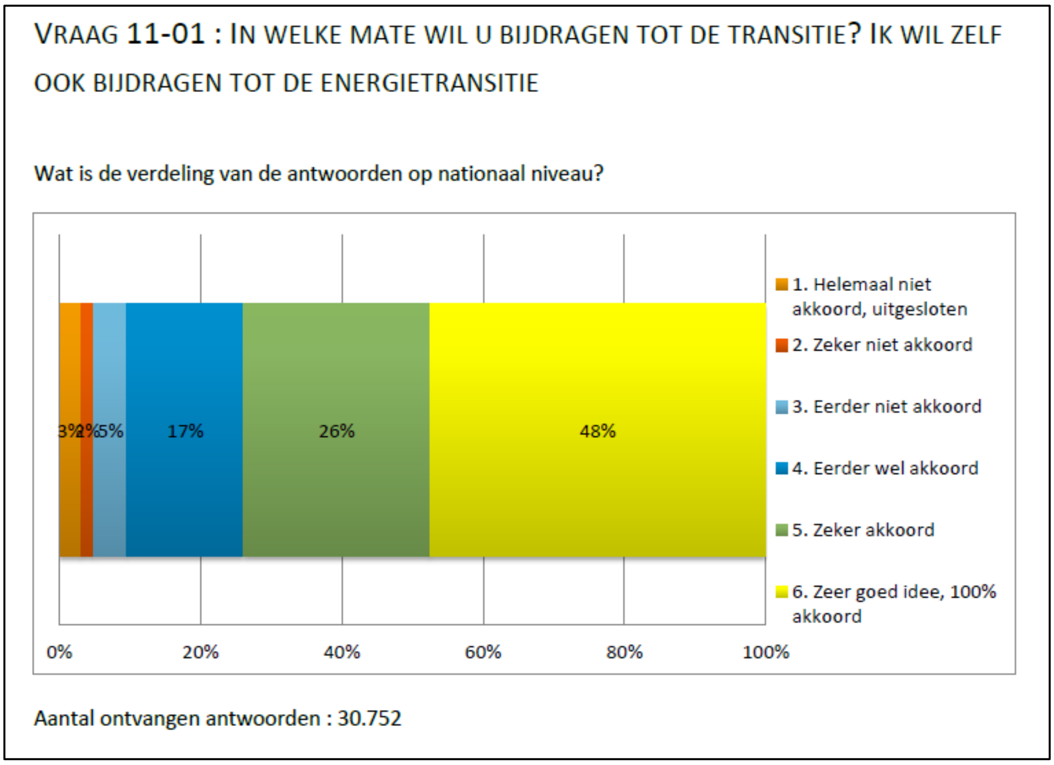
companies and intermediaries. The individuals making use of these services are essentially still energy consumers.

Local examples: There are no major inter-regional differences in this respect. However, as elaborated under technological factors/digitalisation, it is striking how Flanders has advanced much more in the roll-out of smart meters than the Brussels and Walloon regions.

S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in Belgium: Belgium may appear to have high levels of citizen engagement, through its extensive institutional landscape of social enterprises, neighbourhood organisations, citizen associations, and semi-governmental intermediaries. This aspect of the citizen engagement has been accounted for elsewhere as a boost ENCI. On the other hand, the citizen engagement in terms of individual environmental-energy conscious choices and responsibility yields a less positive picture. The national Energiepact (2017) consultation gives a relatively favourable impression, but importantly, these are the citizens who felt called upon to participate. On the question whether respondents were willing to make a contribution to the energy transition themselves, only 9% indicated that they'd rather not.

Figure 5.7: "I want to contribute to the energy transition myself, too"



Source: EnergiePact 2017.

On the other hand, election results do not indicate such strong environmentalist/ENCI engagement. The following surveys – i.e. with measures taken to ensure a representative population – actually classify a

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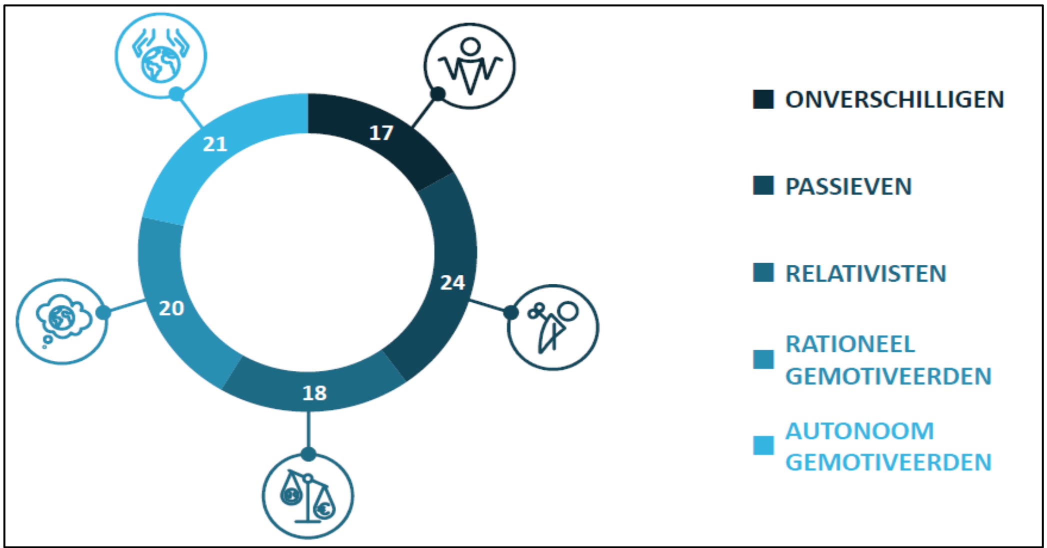
significant part of the Belgian population as 'passive' or 'indifferent'.

The Ipsos (2019) survey on energy saving awareness and behaviours generated the following characterisation of the Flemish population:

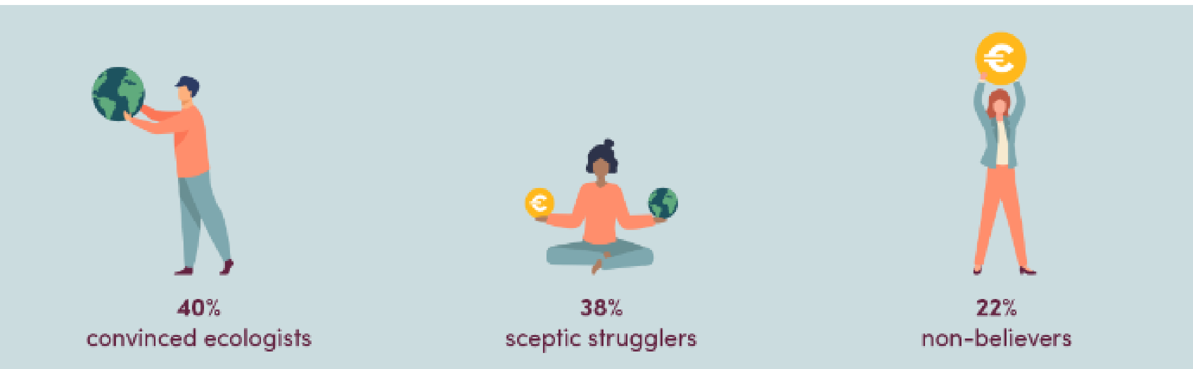
Figure 5.8: Indifferent, Passive, relativist, rationally motivated and autonomously motivated energy saving profiles.



Source: Ipsos 2019:15.

Underneath these profiles, there are marked differences in activity/passivity depending on the age of citizens, education level, and whether or not they are home owners. The 41% of passive citizens is in itself an important indication, however. Further indications of pervasive passivity speak from surveys and market polls on the purchase of environmentally unfriendly products (Brussels Times 2021), and on the attitudes and behaviours regarding sustainable food.

Figure 5.9: Three groups of consumers regarding sustainable food



Source: Fevia 2021.

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How the factor influences ENCI: The evidence above is of course very broad-brushed and sketchy. It does not directly measure ENCI. Still it does measure attitudes on quite similar issues of environmentally-friendly behaviour. It points out that there is a serious degree of passivity in Belgium, alongside the active citizen engagement of both individuals as well as civil society. Altogether, this passivity counts as a moderate threat to ENCI.

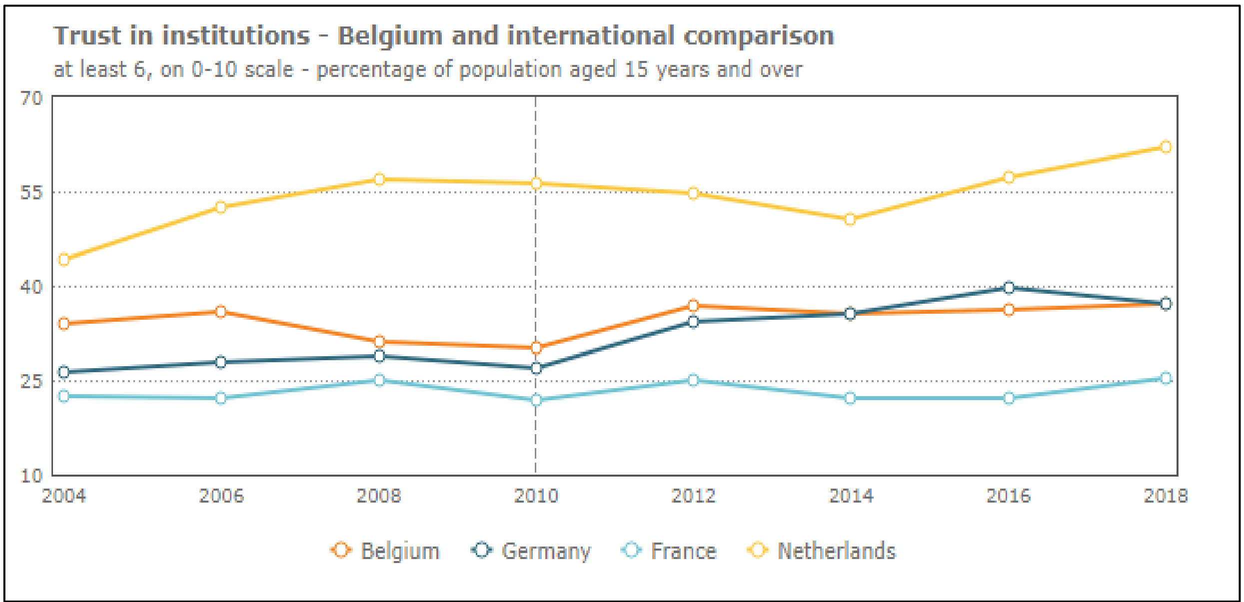
Affected ENCI types: The passivity discussed here refers quite specifically to ENCI within the context of the household. The surveys referred actually suggest that a significant part of the passive/indifferent citizens does support or endorse ENCI – but then in the form of state-led or otherwise collective action.

Local examples: The evidence on passivity has not been systematically organised on either national level, regional level - or on the level of languages. It is worth considering however that Flanders has a relatively large electorate voting nationalist-Right, whilst Wallonia has an outspoken socialist-Left orientation. These political orientations lead arguably in different kinds of passivity, indifference, fatalism, or delegation of individual responsibilities.

S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Belgium: As indicated in the Figure 5.10, the trust in public institutions in Belgium is low (under 40%). The graph also put this number in perspective: it is not dramatically low when compared to neighbouring countries Germany and France.

Figure 5.10: Trust in Institutions (BEL, GER, FRA, NL)



Source: indicators.be.

The second graph (Figure 5.11) on trust in government – which is different from trust in institutions more generally – confirms the low level of trust. The relative low levels of trust of the younger citizens are significant in the context of sustainability transitions and ENCI.

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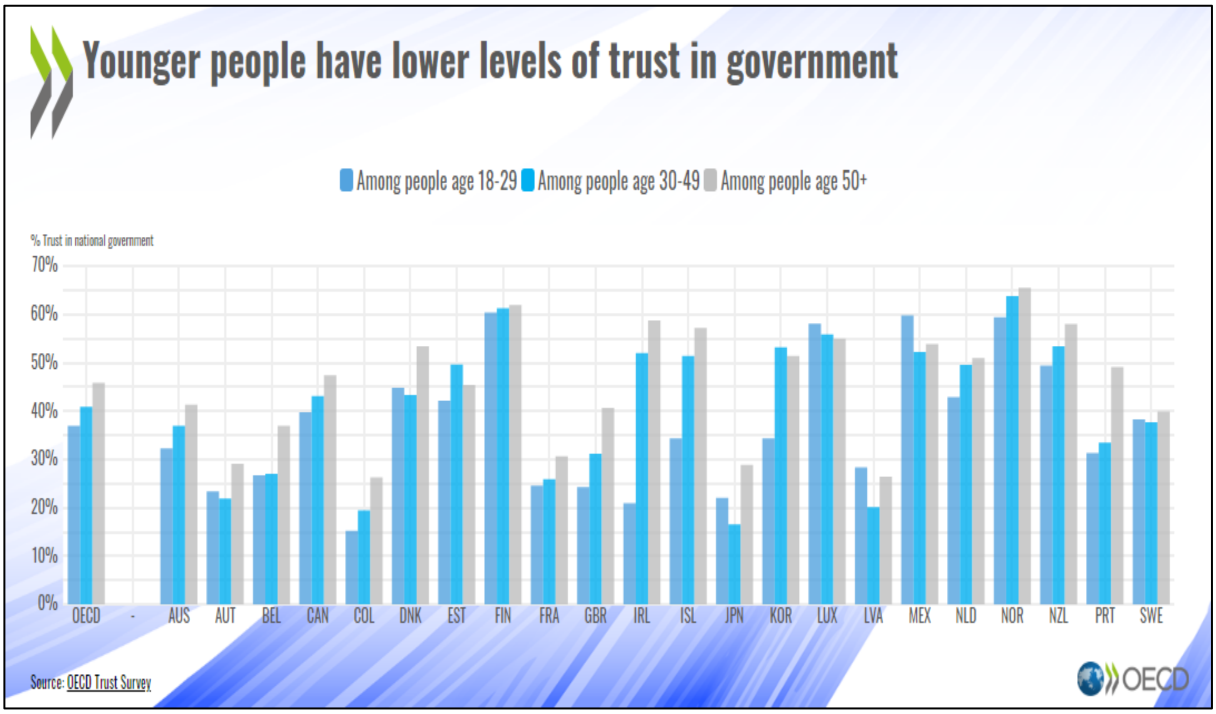
Figure 5.11: Trust in government by age group (international comparison)



Source: OECD.

How the factor influences ENCI: The low level of trust – in government, and in institutions more generally -arguably has the capacity to impede the energy transition. It can be considered a threat to ENCI in Belgium as it invites fatalism, and undermines collective action. Also considering how ENCI tends to require certain support by intermediaries, this lack of trust drives citizens away from ENCI. Still the threat should be considered 'low' impact: The trust levels are not that low, and they do not necessarily extend to all kinds of collective action. As indicated under Political factors, Belgium actually has a rich institutional landscape of civil society and Third Sector initiatives.

Affected ENCI types: The low levels of trust work against the institutionally hybrid forms of ENCI, but they might even stimulate certain forms of ENCI as enacted in social movements: One can consider the rise of Extinction Rebellion, through the increasingly widespread reasoning amongst citizens that society cannot afford to wait for governments to take climate action.

Local examples: The low trust levels in Belgium have at least in part to do with the often very lengthy periods of government formation – on several occasions leaving the country in a situation of a drifting ship. It is because of these deadlocks that the trust levels are low *across* the regions. However, the Flemish electorate is inclined towards nationalist-Right voting, whilst the Walloon electorate tends towards the socialist-Left. In other words, there are likely to be different reasons for the mistrust, across political orientations and across regions.

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Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)

How is this factor manifested in Belgium: The technologies for the decarbonisation of the energy sector and renewable energy, these are in principle available. Whilst Belgian governmental actors and businesses are involved in the development of offshore wind power, hydrogen and next-generation nuclear energy technologies, various non-state actors have started to exploit the potentials for solar energy, wind power as well as biofuels. The Pel (2023b) case study on hydro-electricity production at the Ourthe and Sambre rivers indicates on the one hand that the potential for hydro-electricity is very limited in Belgium – on the other hand, it also indicates how this potential is being exploited to the maximum. The availability of technologies is constrained however by the scarcity of qualified workers. Oxenaar (2021) indicates how especially the renovation of buildings, a key pillar under the Flemish energy plan, is seriously constrained by the labour shortage. *"The government is currently devising a plan to help tackle this issue and has partnered up with the construction industry to set up supportive measures and provide training".* (Oxenaar 2021: 11). The labour shortage is further exacerbated by the shortage in materials and the dependence on imports.

How the factor influences ENCI: All in all, the availability of technology can thus be considered to pose a rather limited opportunity for ENCI. The technology is there, and the wealth needed to make it affordable is also there, but there are the labour market constraints that appear to be of a structural nature.

Affected ENCI types: This factor affects all kinds of ENCI, as far as they all presuppose a certain availability of means for the realisation of their ambitions. Still, it appears that the household-based forms of ENCI are impacted relatively more, for their greater dependence on suppliers and intermediaries. As far as reformative forms of ENCI are more focused on material results (rather than on political ideals of energy democracy and inclusion, for example), this factor is relatively more important for the reformative forms.

Local examples: The factor is relevant for Belgium as a whole, but there are some geographical and socio-economic differences between the regions to consider. In Wallonia, the share of renewable energies is relatively highest: Although nuclear and fossil fuels (petroleum and natural gas) still constitute a significant share of gross final energy consumption, the share of renewable energies increased from 4% to 12.4% between 2005 and 2019 (IWEPS, 2021). The share of renewable energies in gross final energy consumption in Wallonia is above the national average (9.9% in 2019), but remains below the European average (19.7% in 2019) (Eurostat, 2020).

T2. Decentralised energy system and storage

How is this factor manifested in Belgium: This technological factor is in principle well-developed. "Belgium has a well-developed and highly interconnected electricity system serving domestic demand and supporting the European electricity market. Belgium's electricity network is one of just a few networks in the world to make extensive use of dynamic line rating (DLR). DLR uses distributed sensors to provide real-time monitoring of high-voltage electricity lines. DLR allows the TSO to better determine actual line capacity and improve overall system performance. In 2020, the TSO was using DLR on 28 high-voltage lines

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and estimated that DLR had increased Belgium's import and export capacity by around 10%, resolved congestions issues, and reduced redispatching costs and curtailment of renewable generation (Renewables Grid Initiative, 2018)." (IEA 2022: 96) However, the cost of electricity distribution remains high in Belgium, and another hindering factor is the long time needed to obtain permits (IEA 2022:14).

How the factor influences ENCI: The above assessment is very broad brushed. Furthermore, the implications for ENCI are also only indirect. Still, it seems reasonable to consider this factor as minor source of constraint.

Affected ENCI types: The constraint applies to all kinds of ENCI that involve material changes in the energy system – the somewhat more ideological-political driven initiatives, the transformative-oriented forms of ENCI will be constrained less.

Local examples: The condition has differential effects across the country, following the organigram of distributors. No clear differences can be distinguished between Flanders and Wallonia.

T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in Belgium: The digitalisation of the energy system is taking off in Belgium, and the national energy plan shows a clear commitment to advance on this front. This resides partly in the development of hydrogen infrastructure, in fortification of the international connectivity, and in the development of demand-response capacity. Particularly relevant for ENCI is the commitment to advance with intelligent meters: *"That should first of all allow users to better grasp their energy consumption, so that they're better aware of the possibilities to use less energy. These meters would equally help businesses and families to reduce their consumption at peak hours, and to use it in periods of excess, without losses in terms of productivity or comfort".* (PNEC 2019: 398). On the other hand, it appears that Belgium is not very far yet in the realisation of the digital solutions. In many ways it is also constrained by the relatively old housing and infrastructure, as inherited from the past. The case study Pel (2023b) on the ULB energy efficiency mission shows how this circumstance is actually placing constraints on ENCI. Moreover, in the current situation there are also the effects of 'digital divide', where the digitalisation empowers mostly those who are already empowered.

How the factor influences ENCI: Altogether, the factor is as yet only a weak 'opportunity' factor. There are certainly the political commitments, plans and concrete steps towards further digitalisation, but the major opportunities through digitalisation yet need to materialise.

Affected ENCI types: The digitalisation is described explicitly as a set of infrastructural transformations that empower businesses as well as households, individual as well as collective forms of ENCI. Much of the envisioned gains reside in better efficiency and fine-tuned control, and this drives towards the reformative kinds of ENCI. On the other hand, the technology is also clearly intended to facilitate changes in consumption patterns, in routines and lifestyles, and in governance (facilitating decentralised energy). In the latter aspects it also could be facilitating transformative forms of ENCI.

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Local examples: The digitalisation comes, at least as yet, with a certain 'digital divide' between social groups. But also between the regions there turn out to be major differences, as described in the 'le Soir' newspaper of 03/02/2023: *"Their deployment [intelligent meters] has started in the kingdom a few years ago, managed by the local distribution network operators, and subject to regulatory frameworks of the regions. Along different rhythms, to say the least. In Flanders, things are well underway: About one of every three households already possesses an intelligent meter (2.100.000 of them are connected to the grid), and the region foresees a coverage of 80% in 2024. The same objective has been fixed in Brussels and Wallonia, however, that is only for 2030! In the South of the country, one is only at about 155.000 metres installed, and 40.000 in Brussels. Another difference, in the North there is installation of communicating meters for electricity and gas, whilst elsewhere, it is almost only (or exclusively, as in Brussels) just for electricity. So it is all at their own timing, but also along their own modes of installation and functionality."*

T4. Energy efficient buildings

How is this factor manifested in Belgium: The energy efficiency of buildings is a big concern in Belgium. It lies below the average in Europe. "Compared to European average (63.6% of energy consumption in households according to Eurostat (2020b)), Citizens' energy consumption for space heating is particularly high in Belgium, and by extension in Wallonia (74% of energy consumption in households according to SPF Economie, 2019). This can be associated to the high proportion of old buildings with a low level of energy performance in the Walloon building stock." (Pel et al. 2023: 17). On the other hand, this problem is currently taken up as a key priority in the national energy plan, and in the policies of the regions[1] (PNEC 2019: 15). The poor physical state of the housing stock is actually the starting point for a large-scale renovation wave – which according to Oxenaar (2021:3) includes citizen-led renovation: "There are many relatively in-efficient detached and semi-detached buildings and a below EU average level of apartments in Flanders, although overall building quality has improved over the years. Moreover, there is a large heterogeneity of buildings, meaning a tailored approach to renovation services is likely to have more success. This fits well with the characteristics of citizen-led renovation programmes."

How the factor influences ENCI: The poor energy efficiency of buildings is an opportunity for the development of ENCI. It has created problem awareness, and it has elevated renovation into a high policy priority. Even if targeting primarily the houses, the renovation activities do tend to affect and involve the users/dwellers as well.

Affected ENCI types: This factor particularly affects type 2, the private household ENCI actor. However, it involves citizens in the context of organisations and their workplace. The case study (Pel 2023a) on the ULB energy efficiency mission brings out how the renovation wave also involves companies – and employees that are confronted with the interventions at their workplace.

Local examples: Especially Flanders is characterised by the relatively large size of the dwellings, and by a considerable challenge to improve the energy efficiency of buildings: *"Flemish houses are relatively large compared to the European average (125m2 compared to 95m2, and, although on the rise, the proportion*

[1] "Les Régions se concentrent principalement sur la rénovation à grande échelle du secteur du bâtiment."

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of people living in apartments still lies below the European average of 40 percent. Moreover, the great majority of Flemish buildings dates from before the 1970's and around 30 percent from before 1945. Although quality of dwellings has improved still 12 percent was found to be in moderate, and 11 percent (310,000 dwellings) in poor or very poor condition, in 2018. The 310,000 dwellings – off which around 115,000 rented - in poor/very poor condition need to undergo either deep renovation or demolition and reconstruction. The majority of households are owner-occupiers (72%, slightly above EU average), with around 20 percent private and 7 percent social tenants. Rented dwellings generally have lower energy efficiency and quality than owner-occupied dwellings in Flanders." (Oxenaar 2021:4)

Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in Belgium: There is clearly growing awareness of climate vulnerability in Belgium, and this provides a strong boost to ENCI. The case study on the ULB energy efficiency mission (Pel 2023b) shows for example how the increased organisation-wide efforts towards energy efficiency followed partly from the university's allegiance to the climate marches.

Figure 5.12: Climate march in Belgium

Beyond this general awareness of the climate change challenges, the issue of climate vulnerability has become particularly prominent through the occurrence of extreme weather events. One major source of concern was the sustained drought, over several years. Another is the issue of rising sea levels, which poses flooding risks. Yet particularly alarming was the flooding that took place in the Summer of 2021, turning several minor streams suddenly into wild rivers. Apart from the psychological impact that this disaster has left in the affected Walloon areas, it came with a total cost estimated at around 2 billion €.

How the factor influences ENCI: The increased awareness of climate vulnerability works as a boost towards ENCI. The linkages between natural disasters and energy-related behaviours are not very direct, however: The weight of this factor is arguably moderate.

Affected ENCI types: This factor affects all kinds of ENCI. It provides the problem awareness, the sense of urgency that underlies all kinds of ENCI.

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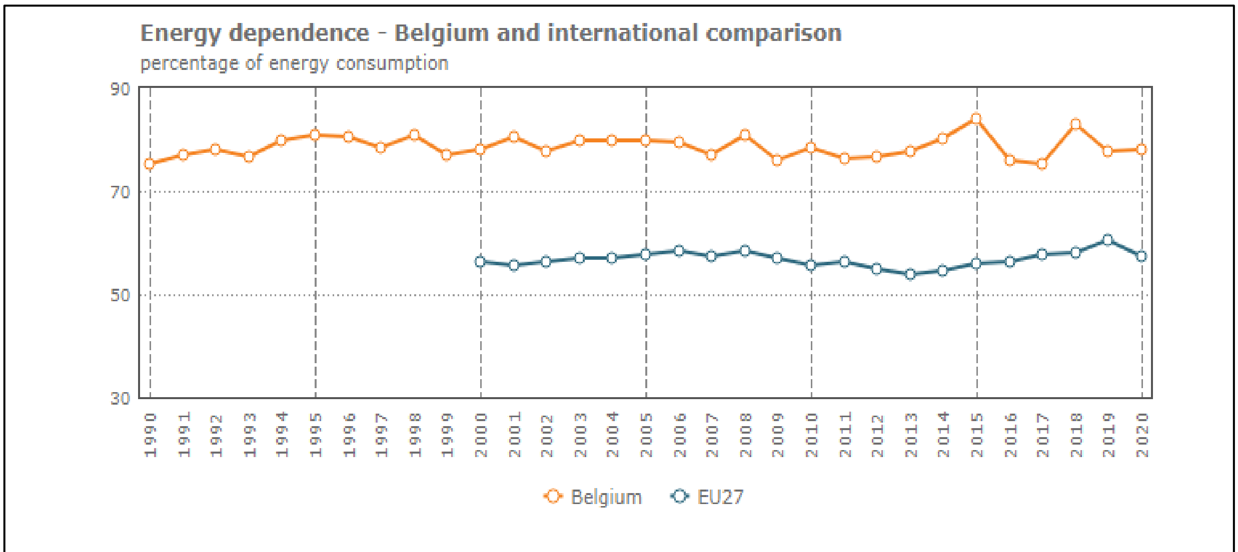
Figure 5.13: Flooding in Belgium (Wallonia)

Local examples: The flooding of Summer 2021 hit only the Walloon region, with its Ardennes landscape of hills and streams. The disaster had a national impact, however, not only for the sheer magnitude but also as it raised issues of inter-regional solidarity and federalised governance: Who coordinates? Who bears the costs? On the other hand, the flood risk and drought issues are felt more in Flanders: The awareness of climate vulnerability takes different forms across the country.

EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

Figure 5.14: Energy dependence (Belgium versus EU-27)



Source: [indicators.be.](indicators.be)

How is this factor manifested in Belgium: The availability of resources is very problematic for Belgium. Whilst there is a certain institutional capacity, energy literacy, wealth and technological know-how, the fact remains that Belgium has a very high energy dependence. This energy dependence will be decreased through various efforts in the national energy plan – these have been covered in the discussion of other factors.

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How the factor influences ENCI: The factor does not have a clear influence on ENCI. It indicates that there are certain constraints qua technological options and qua strategic resources, yet it also raises the awareness about the urgency of energy saving and alternative forms of energy production. In sum, the factor could be considered as a slightly positive factor for ENCI.

Affected ENCI types: The factor covers a broad range of resources and as such it is hard to differentiate between types of ENCI impacted. Still, one could argue that the resource constraints weigh heavier for the reformative forms of ENCI that are focused on problem-solving and renewable energy projects with returns-on-investment: The HOSe initiative towards the exploitation of hydroelectricity is an example (Pel 2023a). By contrast, the so particularly high and structural energy dependency arguably supports transformative-oriented ENCI, and social movements arguing for deep, systemic transformations. The BBL appeals for a major policy programme for housing renovation is an example of the latter (Pel 2023c).

Local examples: There are some relevant geographical differences between Flanders and Wallonia in terms of available space for solar/wind power installations. The overall national situation of high energy dependence remains the defining factor, however.

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Belgium: The ‘pollution’ factor works, just as the ‘climate vulnerability’ factor, as a boost to ENCI in Belgium. There is a rather wide range of pollution issues, however. The issue that stands out, also in European comparison, is the issue of the nuclear phase out – this decision taken in 2003 has been subjected of ongoing political debate ever since. Although the debate revolves around safety, the generation of nuclear waste (and associated risks of heavy pollution) is an important dimension of the problem as well. Another high-profile pollution dossier is air quality, and this has led to the Low Emission Zones, set up to phase out cars with internal combustion engines (Callorda Fossati et al. 2022). This is quite a rigorous measure, which in a way requires a form of ENCI in mobility behaviour. Finally, nitrogen deposition levels are excessive, especially in Flanders. Although not directly related to energy policy and ENCI, it does make for another heavy pollution dossier.

How the factor influences ENCI: The factor has an altogether mobilising factor for ENCI. The reality and urgency of pollution problems in the densely populated country are increasingly becoming a common understanding, and in principle this incites towards ENCI. On the other hand, each of the three indicated pollution dossiers are surrounded with controversy and polarisation. The Low Emission Zone policy exemplifies how governmental demands and impositions of ENCI are rejected by a significant share of the population (see further below under ‘Local examples’). The opportunity posed by this factor is therefore as yet only moderate.

Affected ENCI types: This factor does not have clearly differentiable impacts on particular kinds of ENCI. The pollution problems tend to be deep-rooted, systemic problems, and they form a background for all kinds of ENCI. The LEZ example does show how air quality problems (and other pollution such as noise) have led to a politicisation of individual mobility behaviours.

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Local examples: The pollution problems have a geographical component, and they come with distributional issues. Regarding the Low Emission Zones, implemented in Brussels, Antwerp and Gent, it turned out that this measure was supported significantly more in Brussels.

Figure 5.15: Low Emission Zone

An important circumstance is that this measure involves many commuters and visitors of the capital, i.e. travellers who do not live in the area covered by the LEZ.

EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in Belgium: This factor does have a moderately constraining effect in Belgium. The country is quite densely populated and densely built, and this comes with spatial frictions. Even if actual conflicts do not seem to arise frequently, the development of renewable energy installations does appear to be difficult to fit in spatially. The case study Pel (2023b) describes the development of several hydro-electricity installations at the Ourthe and Sambre rivers. These installations had to be fit in with safety regulations, policies on the use of waterways, environmental regulations on fish migration, as well as the cultural heritage regulations regarding the architectural shaping of the installations.

How the factor influences ENCI: This factor does not appear to pose a major threat to the development of ENCI, but it does pose constraints.

Affected ENCI types: This constraint mainly seems to apply to the larger ENCI initiatives, i.e. those that can be carried and implemented only by collective forms of agency.

Local examples: The spatial frictions occur throughout Belgium; there is no clear distribution to discern per region. The pressure on land appears to be relatively higher in Flanders.

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Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Belgium: Belgium has an extensive legal anchorage of the social economy, and the associated not-for-profit enterprises. This is effectively providing legal support for former grassroots initiatives. Fitting in with this tradition is the legal approach to the renewable energy communities. The Walloon region appears to have been the initiator of a legal framework, in 2018. *"The collective consumption of locally produced green energy will allow, notably, to limit the inputs of energy onto the local transmission and distribution network, favouring the local networks. It will also soften the difficulties with the integration of so-called intermittent sources to the energy network, through collective auto-consumption that is local and reasoned – potentially accompanied by means towards energy storage that are adapted to the needs of private individuals and collectives"* (PNEC 2019: 242) This renewable energy community legislation also indicates that tailor-made tariffs for network usage will be applied – taking into account the solidarity principle, and the need to bear the costs of the energy network collectively (Idem: 243).

How the factor influences ENCI: This factor works as an opportunity for ENCI in Belgium. The overall approach can thus be characterised as an effort to accommodate ENCI and the associated renewable energy communities – though under conditions. It is therefore an opportunity for ENCI, but a moderate one.

Affected ENCI types: The indicated framework on renewable energy communities has specific implications for the collective forms of ENCI.

Local examples: The Social Economy arrangements have been set up in all regions, just as the cooperatives can be found throughout Belgium. The Pel (2023a) case study on HOSE highlights the Walloon context, and an ENCI initiative that gathers near a dozen of energy cooperatives.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in Belgium: The attention to energy poverty has been increasing strongly in recent years. Energy poverty and the vulnerability of certain social groups have become prominent themes in public debate. Illustrative is the open letter in the 'le Soir' newspaper, on 20/10/2022: The children and the families, are they the invisible ones in the crises, and in the energy crisis? The national energy plan indicates a sustained effort to combat energy poverty on federal as well as regional levels: *"The totality of existing far-advanced measures against energy poverty, on federal and regional level, will continue to concentrate for the coming years on solutions at the source, conform EU directives, with targeted measures to reduce energy consumption"* (PNEC 2019: 17)

How the factor influences ENCI: The attention to energy poverty and inclusion provides an opportunity for the development of ENCI. A particularly important development is that various NGOs and social movements with missions of poverty reduction and social inclusion have joined forces with environmentalist NGOs such as the BBL (Alliance for Better environment). The case study Pel (2023c) highlights this particular political advocacy to support the disadvantaged citizens.

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Affected ENCI types: The legal measures, awareness-raising and political agenda-setting on energy poverty have in principle in impact on all kinds of ENCI: It underlines the importance of civic solidarity, in whatever kind of organisational setting. Still, the source-oriented approach (targeting the often poor state of the housing of the energy-poor) indicates the particular impulse given to ENCI in the context of the household.

Local examples: Energy poverty is, considering the fact that Belgium is otherwise a rather wealthy country, quite pervasive. Flanders is the relatively wealthier part of Belgium, but also there one finds high levels of energy poverty, which tends to hit particular demographic groups: *"Reporting on energy poverty the Government indicates that around 680,000 inhabitants (11%, or around 280,000 families) live under the poverty threshold in Flanders, and around 16% of all families live in energy poverty. Single-parents and elderly singles are especially at risk and those living in social housing. There are several support programmes for people in energy poverty."* (Oxenaar 2021: 5)

L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (incl. rights for active participation of customers in the electricity markets)

How is this factor manifested in Belgium: The national energy plan seeks to make further advances on this factor. Currently, it appears that key rights are in place. For example, it is a notable indication for consumer rights that in 2019, Belgium had the highest consumer switching rate for electricity in Europe (IEA: 2022:14). Other circumstances that allow Belgians to autonomously take part in the energy market are the abundant offers of information helpdesks, auditing services, and renovation advice. A particularly significant development for ENCI is the mandatory use of EPC, the energy performance certificates. The EPC system does not only create awareness and market transparency, it also forms a basis for entitlements (tenants can request landlords to comply) and requests for subsidies and loans.

How the factor influences ENCI: The factor has a facilitating effect on ENCI. The indicated rights are exercised under certain structural constraints, however (including market concentration, energy poverty, economic inequality and different access to good quality housing, and issues of bureaucracy). The facilitating role should therefore not be overstated.

Affected ENCI types: This factor is to a significant extent bolstering the exercise of individual, household based ENCI. It consolidates the role of the energy consumer and sets certain side constraints for the energy market. The rights also extend to the renewable energy communities, however, giving them a specific license-to-operate. And through the EPC system it also sets important conditions for ENCI in organisational contexts.

Local examples: Regarding these rights, the federal level remains very important in Belgium. No major disparities can arise on these aspects. Still the legislation on renewable energy communities did enter into force on different moments in the Belgian regions. The indicated in the article in ‘le Soir’ of 19/03/2023, an important law was just passed that facilitates the local sharing of renewable energy production. This will make the renewable energy accessible to a broader public, allowing for lower energy bills, but it will also allow for economies of scale for the construction of renewable energy installations.

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Figure 5.16:

Wallonie: enfin un cadre légal pour les communautés d'énergie

Le gouvernement wallon a adopté l'arrêté qui permettra le partage de l'énergie renouvelable produite localement. Plusieurs dizaines de projets attendaient ce feu vert.

Article réservé aux abonnés

A l'avenir, le partage d'énergie sera aussi possible entre un particulier dont la maison dispose de panneaux photovoltaïques et ses voisins qui n'en sont pas équipés et qui pourront bénéficier des surplus de production. - Amélie Landry.

L4. Bureaucracy and red tape

How is this factor manifested in Belgium: The IEA (2022) country report indicates permitting procedures to be cumbersome in Belgium. The administrative procedures do pose significant barriers to the realisation of projects for renewable energy production. The case study Pel (2023b) on the development of hydro-electricity installations shows how these projects involve sometimes lengthy and complicated negotiations with local authorities. The development of the hydro-electricity installations involved safety regulations, cultural heritage regulations, environmental regulations (regarding fish migration), energy price arrangements, and the duration of exploitation concessions.

How the factor influences ENCI: The red tape is a threat to ENCI. This is not only a matter of bureaucracy that delays and stifles ENCI initiatives, but also a matter of inclusion: The high administrative complexity makes it more difficult for average citizens to embark on ENCI projects, and it strengthens the role of experts and dedicated companies.

Affected ENCI types: The red tape affects all kinds of ENCI, but the type 7/8 hybrid forms of ENCI are relatively well-equipped to handle it. Individual forms of ENCI appear to be particularly vulnerable to this factor.

Local examples: This factor applies to the Belgian context as a whole. Even if there may be differences in administrative and organisational cultures across the regions, across municipalities and across departments, the 'red tape' factor is shaped to a large extent by the particularly complex governmental structure of Belgium (Cf. political factors). In the national energy plan, removal of red tape and facilitation of permitting procedures features as a priority across the federal and regional plans.

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Summary table

Factors		High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition					X	
	Multi-level energy governance structure of a country			X			
	Political support for ENCI (mechanisms, networks, etc.)					X	
	Political/democratic culture and traditions						X
	Inclusion and empowerment policies						X
ECONOMIC	General economic situation / Inflation rate & purchasing power					X	
	Energy prices					X	
	Energy market					X	
	Energy taxation, state aid, fuel subsidies					X	
	Financing and investment opportunities						X
SOCIAL	Level of income / wealth disparity and energy poverty		X				
	Energy literacy, awareness and skills						X
	Citizen engagement and passivity in society		X				
	Trust in institutions and collective endeavours			X			
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES				X		
	Decentralised energy system and storage			X			
	Digitalisation of the energy system				X		
	Energy efficient buildings						X
ENVIRONMENTAL	Climate vulnerability					X	
	Availability of resources				X		
	Pollution					X	
	Conflicts and opportunities about land use for renewable energy		X				

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LEGAL	Legal framings of ENCI forms					X	
	Legal measures dedicated to vulnerable consumers, energy poverty, inclusion						X
	Rights and duties of consumers, prosumers on the energy market				X		
	Bureaucracy and red tape	X					
	Total factors per level of barrier/support	**1**	**3**	**3**	**4**	**9**	**6**

Conclusion

Major barriers and opportunities to the emergence and/or development of ENCI in Belgium

The overview table immediately brings out a striking conclusion from this analysis: The current conditions in Belgium seem to be very conducive to the flourishing of ENCI. This is the conclusion that imposes itself when considering the strong prevalence of factors classified as ‘supporting ENCI’ (i.e. the last three columns of the overview table).

This bright picture appears improbable. But it should not be confused with a bright assessment of Belgian society, or of the Belgian energy system. In fact, several context factors can be considered to be conducive to ENCI, whilst they are otherwise widely considered to be undesirable themselves: The Environmental factors indicate vulnerabilities, concerns and pressing problems. These are the typical problems that nobody wants, but for ENCI these problems have a positive significance as they act as mobilising factors (and in turn, high levels of ENCI promise to be a helpful factor in the resolution of these environmental problems). In similar vein, economic adversity and financial pressures have been marked as positive factors, as incentives towards ENCI. The particularly pressing technological problem in Belgium of the poorly performing building stock has equally been marked as an ENCI-inciting factor. In other words, certain problems incite towards ENCI – but these are not ‘success factors’ on which to build policies, or circumstances that one would seek to sustain or create elsewhere.

This still leaves many ENCI-enhancing factors that are *not* problematic, i.e. assets and fortunate circumstances of the Belgian context that in principle could be considered as elements of a national ENCI strategy. Amongst the political factors, it is inspiring how ENCI is carried by the rich institutional context of local-regional governments, semi-governmental organisations, civil society organisations and the social economy. The fragmentation and indecisiveness of the hyper-federalised governance do not necessarily undermine ENCI – ENCI can be developed locally, and it is not *that* dependent on governmental initiative.

The barriers to ENCI were limited to the following list of factors:

- **P:** Multi-level energy governance structure of a country
- **S:** Level of income / wealth disparity and energy poverty
- **S:** Citizen engagement and passivity in society
- **S:** Trust in institutions and collective endeavours
- **T:** Decentralised energy system and storage
- **E:** Conflicts and opportunities about land use for renewable energy
- **L:** Bureaucracy and red tape

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Taking these together, the factor that stands out is perhaps the prominence of social factors. It cannot be read off from national energy plans, and the national consultation did not bring it out either: A significant part of citizens appears to falling in the category of 'passive', 'indifferent' or in any case not fully responsibility-taking citizens. This appears to be linked up with issues of socio-economic marginalisation, and with low levels of trust in institutions. Considering this list of factors, it becomes understandable how ENCI may remain limited to frontrunners and early adopters in Belgium – notwithstanding otherwise favourable circumstances in terms of wealth, safety, and technological means.

Overall evaluation of the ENCI situation in Belgium

Many of the awareness-raising factors are manifesting themselves very strongly now: Energy prices, energy poverty, and climate vulnerability. Some of these will fade away in the public attention, no matter how important they are. Especially the barriers and limitations residing in the social factors are bound to keep limiting ENCI. The passivity may even have increased, as far as governmental actors have stepped in and taken over – addressing urgent issues of energy poverty and buying power through a range of measures. On the other hand, the policies and information channels to address energy poverty and energy inefficiency have been set up, the policies towards 2030 and 2050 have been stepped up, and the deep energy dependence of the country have become firm political realities. The boost to ENCI that Belgium has seen in the last two years, it is therefore likely to have a lasting effect.

An outlook of the possible developments and transformation of the national ENCI ecosystem

The outlook for the national ENCI ecosystem is, first of all, that it is going to remain fragmented or federalised. There is a range of means of empowerment that is going to become available from federal-level action (flexible electricity grids, stepped up efforts towards renewable energy production, concerted efforts towards renovation, international collaborations), but ENCI will remain regionalised and localised. As the energy transition process proceeds, it is quite probably that governmental, semi-governmental and business organisations will remain important leaders-of-action. Together they might undertake a thorough renovation operation, not only of houses but also of Belgian society more broadly. Considering the joint force of the institutions, it is not inconceivable that quite a big part of the energy transition will still be undergone by the Belgian population in not very active roles. The roles of the public will arguably involve a mixture of ENCI, and of the energy consumer roles as they have historically evolved in the Belgian welfare state.

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6. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN BULGARIA

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Introduction

Current focus in the national energy policy

The Integrated Energy and Climate Plan of the Republic of Bulgaria 2021–2030 (Ministry of Energy, 2020) defines the following key objectives, which relate to the core energy policy objectives of the European Union:

- Decarbonisation: Bulgaria's 2030 target for greenhouse gas (GHG) emissions not covered by the EU Emissions Trading System (non-ETS) is 0% compared to 2005. While the country's per capita GHG emissions are below the EU average, the main reasons for this are the decline in energy-intensive enterprises and a shift from solid and liquid fuels to natural gas in energy consumption, rather than implementation of energy efficiency measures. The carbon intensity of the Bulgarian economy (the ratio of GHG emissions to GDP) is the highest in the EU. The main source of GHG emissions is the energy sector (39%), followed by transport (16%), industrial processes and product use (12%), and agriculture (11%) (Yougova, 2021).
- Renewable energy: Bulgaria will strive to achieve a share of at least 27.09% of energy from renewable sources in gross final energy consumption by 2030.
- Energy efficiency: The 2030 target is to reduce the primary energy consumption by 27.89% and final energy consumption by 31.67% as compared to the PRIMES 2007 reference scenario.
- Energy security: The main goals are diversification of the energy supply; increased flexibility and resilience of the national energy system; and improved interconnectivity and information security (cybersecurity).

Although the Bulgarian energy poverty rates are the highest in the EU (a result of the combination of low incomes, high energy prices, and poor quality of buildings), the Integrated Energy and Climate Plan includes no assessment of energy poverty and deals with the problem rather vaguely. It is mentioned that the definition of vulnerable users, criteria for identifying them, and measures for their protection are currently being developed, and that the country will seek to set up mechanisms for the support of vulnerable consumers. In fact, the new government that took office in December 2021 started the work towards developing a definition of energy poverty, but lost its parliamentary support in the summer of 2022 and resigned. The procedure for adopting the official definition of energy poverty was thus interrupted and cannot be continued until the next parliament starts its work.

Current energy mix and the short- and long-term goals

In 2021, Bulgaria recorded the largest decrease in the share of gross final energy consumption from renewable sources among EU countries – from 23.3% in 2020 down to 16.8% (Vodenova, 2023). Bulgaria is a net electricity exporter (mainly to Romania, Greece and North Macedonia).

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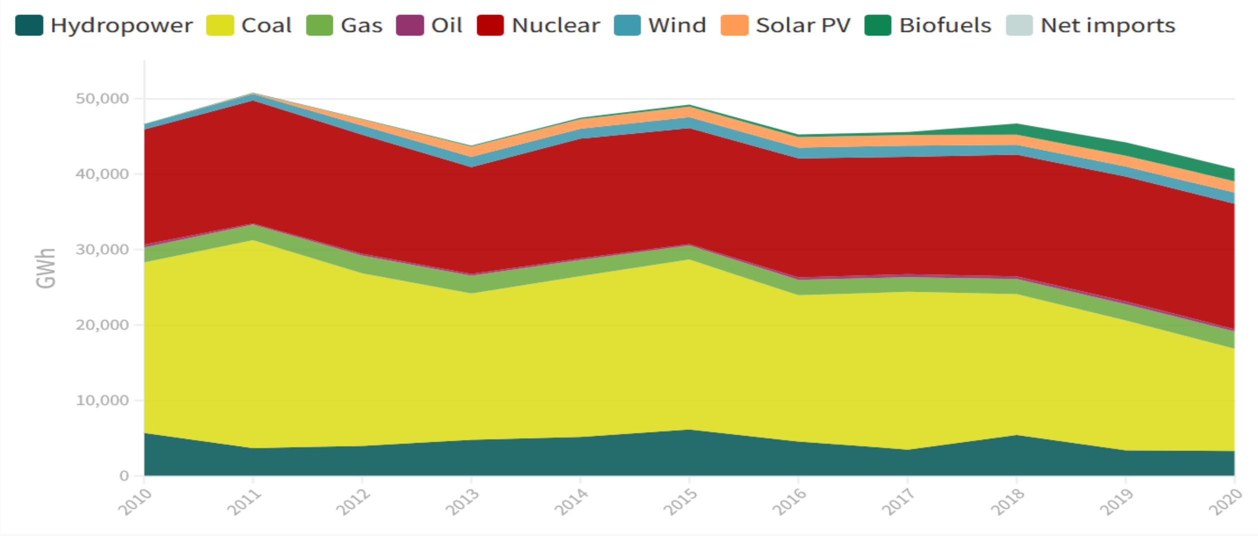
Table 6.1: Primary energy production by type of fuel

	Current mix (2020)	2030 goal	2040 goal
Solid fuels (lignite and brown coal)	46.4%	37.2%	2.5%
Nuclear energy	33.3%	35.9%	69.5%
Biomass and biofuels	13.2%	14.9%	14.8%
Hydro power	3.4%	3.6%	3.6%
Solar power	1.2%	4.0%	2.7%
Wind power	1.0%	1.5%	4.0%
Natural gas	1.1%	2.3%	2.3%
Geothermal energy	0.3%	0.3%	0.3%
Liquid fuels (oil and oil products)	0.2%	0.2%	0.2%

Source: Integrated Energy and Climate Plan of the Republic of Bulgaria 2021–2030.

Figure 6.1: Bulgarian electricity mix



Source: Bankwatch Network, 2023.

Energy governance/ownership (governance and regulatory structures, regulated/deregulated market, main actors)

The Bulgarian energy market is still undergoing the process of liberalisation and integration into the wider EU market. It remains dominated by state-owned players. Bulgarian Energy Holding (BEH) manages the most important companies in the energy sector, the Kozloduy nuclear power plant, Maritsa Iztok 2 coal power plant, the National Electric Company (NEK), Electricity System Operator (ESO), fifteen hydro power plants, Bulgargaz (the largest Bulgarian natural gas distribution company), and Bulgartransgaz (natural gas transmission and storage system operator) (Bankwatch Network, 2023).

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The electricity market is still highly regulated and dominated by a few major players. In theory, all final consumers should be able to choose their electricity supplier, however, households are practically obliged to purchase their electricity from the sole supplier, which operates in the respective area (three big supply companies dominate the market, each covering a part of the country – West Bulgaria, South-East Bulgaria, and North-East Bulgaria).

The energy prices are regulated by the Energy and Water Regulatory Commission (EWRC). Established in 1999, EWRC is an independent specialised state regulatory body for the energy and water supply sectors. It regulates retail prices in the gas and electricity markets and issues licenses for electricity generation, electricity trading, transmission and distribution. The regulated prices for all final consumers should be phased out by the end of 2025 in line with the recommendation of the European Commission for the development of competitive wholesale and retails energy markets.

Until the crisis caused by the Russian invasion of Ukraine, Bulgaria was heavily dependent on imported fuels from Russia, but has since accelerated the attempts to diversify its energy supplies and become a regional energy hub.

The role of citizens in relation to energy use

In general, the democratic culture in Bulgaria is rather low and the majority of citizens are passive and refrain from involvement with public problems. A distrust towards state institutions is prevalent. Most citizens are sceptic and do not believe that something could change through their participation. This inevitably shapes the attitudes regarding participation in public activities, including creating or joining a group or community in order to pursue a certain goal. Such reservations are also valid for different forms of energy citizenship, despite the generally positive inclinations towards participation in the energy transition through generation of own electricity or energy renovation of homes.

The existing civic sector often lacks resources (material and human) and expert capacity for active participation in the energy governance. Another considerable obstacle is the inability (or reluctance) of institutions to engage in dialogue with citizens. Mechanisms and venues for involvement of civil sector exist, but they are insufficiently used and often ineffective. As a result, the energy policymaking in Bulgaria is seldom based on broad public debate and real stakeholder involvement.

There are expectations that the digitalisation of the energy system (smart grids deployment, smart metering, smart mobility and other ICT solutions) could enhance citizen participation in the energy markets, but the roll-out of these technologies is still rather slow.

Marginalised groups and vulnerable consumers are practically excluded from active participation in the energy system. There are no targeted policies, dealing with energy poverty and protection of vulnerable people, apart from social welfare programmes, which seldom stimulate active energy citizenship.

The Integrated National Energy and Climate Plan of the Republic of Bulgaria until 2030 acknowledges that citizens should have an active role in the energy system, however specific measures that support such a role have yet to be developed. The vague recognition of citizens as active participants in the energy system in the country, not supported by concrete regulations and measures, hinders the development of energy citizenship.

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Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)

How is this factor manifested in Bulgaria: To date, energy generation in Bulgaria is heavily dependent on the local coal production and the nuclear energy. The coal phase-out is challenging since coal regions have energy intensive local industries, which are slow in diversifying away from their fossil fuels dependence. This process is further complicated because of the existence of entrenched state capture networks in the energy and mining sectors on both local and national level.[2] In the medium term, thermal and nuclear power plants are expected to remain the main contributors to electricity generation in the country.

The most recent documents in the field of energy and climate change mitigation are the Strategy for sustainable energy development of the Republic of Bulgaria until 2030 with horizon to 2050 and the Integrated National Energy and Climate Plan of the Republic of Bulgaria until 2030 (Integrated Plan, INECP). The former sets out the general framework for the development of the energy sector in Bulgaria in line with European policies and objectives for energy development and climate change mitigation, while reflecting national specifics, experience and traditions in the energy field. The latter includes specific measures and was developed in response to Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action. According to these two documents, the contribution of Bulgaria to the achievement of European energy objectives until 2030 shall be ensured through:

- Reduction in primary energy consumption by 27.89%, compared to the baseline year 2007;
- Reduction in final energy consumption by 31.67%, compared to the baseline year 2007;
- 27.09% share of energy from renewable sources in the gross final consumption of energy;
- at least 15% electricity interconnectivity.

INECP complies with the main strategic documents on both EU and national level. Relevant national documents include 16 strategies, development plans, policy frameworks, programmes and action plans in the fields of energy/energy efficiency/RES, climate change adaptation, building stock renovation, smart specialisation, transport and transport infrastructure.

How the factor influences ENCI: The documents mentioned above acknowledge that citizens should have an active role in the energy system in Bulgaria (apart from being the end users of energy services or the target group of awareness raising campaigns regarding the benefits and opportunities for using renewable energy), however specific measures that support such a role have yet to be developed. In this environment, it is hard to predict what the role of citizens in Bulgarian energy transition might be. The vague recognition of citizens as active participants in the energy system hinders their practical inclusion in the system, which could be interpreted as a threat, rather than an opportunity. Hence, there is a huge gap between estimations for citizen participation in the energy system and the provision of regulations and measures which could support the development of energy citizenship in the country.

[2] These networks have preserved their status-quo by securing costly coal subsidies, estimated at €1 billion per year.

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Affected ENCI types: All ENCI types can be affected to varying degrees.

Local examples: The local authorities in Gabrovo have recognised that the challenges in the transition towards a climate- and carbon- neutral city are a common responsibility, which requires the active involvement of the R&I community, the private sector and citizens. Therefore, the Municipality of Gabrovo, which plans to achieve a net zero GHG emissions by 2030, has already involved citizens in the development of the Integrated Development Plan of Gabrovo Municipality 2021-2027 (2021), which encompasses priorities, objectives and targets across various fields, including energy. Participation of citizens in the development of the Integrated Plan is expected to strengthen their commitment to reaching its objectives in the area of energy efficiency and RES.

The Integrated Plan will be supported by the new Sustainable Energy and Climate Action Plan (SECAP) of Gabrovo until 2030 (2022), developed in the framework of the Covenant of Mayors (Gabrovo is a signatory in the initiative). One of the measures of SECAP aims to improve the energy efficiency of existing residential buildings after thorough inspection and evaluation in order to meet class A and class B energy efficiency standards. To successfully implement this measure, citizens have to be engaged in effective way. Gabrovo will also participate in the EU Mission for 100 climate-neutral and smart cities by 2030, the so-called Cities Mission. All 100 cities will develop Climate City Contracts, including an overall plan for climate neutrality across all sectors such as energy, buildings, waste management and transport.

P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)

How is this factor manifested in Bulgaria: The Bulgarian energy market is currently in a process of liberalisation and integration into the wider EU market, which is expected to boost the competition among electricity suppliers. The regulated share of the electricity market currently stands at 40%, with steps being taken towards its full liberalisation according to measures foreseen in the Integrated National Energy and Climate Plan of the Republic of Bulgaria until 2030. According to changes in the Energy Act from June 2020, as of 1 October 2020, all non-domestic customers in Bulgaria should purchase electricity on the free market and have no regulated prices. This process was the next step towards the complete liberalisation of the electricity market in the country. Although, theoretically, final consumers should be able to choose their electricity supplier, households are practically obliged to purchase their electricity from a retailer supplier, which operates in the respective area, at prices that are regulated by the Energy and Water Regulatory Commission (EWRC), which provides them with no real options to choose.[3]

Regulated prices for all final consumers will be phased out by the end of 2025 in line with the recommendation of the European Commission for the development of competitive wholesale and retails energy markets. By this time, measures for protection of vulnerable consumers need to be put into operation as well. According to INECP, other policy measures for the development of the Bulgarian energy market in line with EU objectives include “the development of a market-oriented capacity mechanism,

[3] EWRC is an independent specialised state body which regulates the activities of the energy sector in accordance with the Energy Act.

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consumption optimisation, incentives for creating energy communities for renewable energy generation and consumption, and encouraging consumers to play a more active role." INECP stipulates that Bulgaria should eliminate any trade and legislative barriers, which currently prevent consumers from participating in the market by using, storing or selling the electricity they have produced. Respective measures to encourage the active participation of energy consumers in the market, complementing the liberalisation process, include promotion of local energy communities, development of platforms which enhance information transparency, aggregation contracts and dynamic electricity pricing, and elaboration of a regulatory framework, which creates incentives for consumers.

How the factor influences ENCI: Market liberalisation is an opportunity that supports the emergence of ENCI in Bulgaria. In the centralised market, final consumers did not have the option to choose their electricity provider, let alone produce their own energy. Right now, consumers are able to choose their electricity supplier and respective strategies in the field promulgate that citizens shall become active participants in the energy system, which is expected to promote the development of ENCI in the country.

Affected ENCI types: Types 1, 2, 7 and 8.

Local examples: Some municipalities in Bulgaria are on the road to becoming energy independent, each following its own pace. One of the first steps they are taking in this direction is to become more energy efficient. An important step towards achieving this aim was made by the Municipality of Pleven, which is the first town in the country that managed to complete the transition to energy efficient street lights (in the period 2020-2021). The project for reconstruction of the streetlight system cost €2.5 million and included 7,272 energy-efficient streetlights, a centralised system for control and monitoring of the network, fixing of 339 electric boards, 294 new steel lamp poles, 2,259 new mounting installations and various mechanical elements throughout the city. The new system has already reduced energy consumption by 40% on a monthly basis and is expected to lead to savings of around €300,000 per year.

P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in Bulgaria: The overall political environment in Bulgaria has been marked by instability over the past two years. Despite having three rounds of elections in 2021, none of the major political parties could establish a stable government. Another elections followed in October 2022, but this again did not result in the formation of a government. The last elections before finalisation of this report were held in April 2023, with results similar to those at the previous elections.

This instability hinders the work of national, regional and local level institutions, which are dependent on the decisions of the government. Also, the political turmoil does not allow adopting and/or amending legislation in various fields, including energy. Nevertheless, even in the current unstable political situation, one option for citizens to express their opinion on relevant issues is available via the dedicated website (strategy.bg) of the Council of Ministers, where draft legislative documents, action plans, and strategies are published by the institutions that created them for public consultation. Relevant stakeholders, including civil society organisations, business representatives, associations, NGOs, academia, other actors and the general public are given a certain period of time, usually one month, to provide their opinions on the draft documents. Thus, all interested parties are able to comment and propose amendments, which

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are then taken into consideration when finalising the document under scrutiny. Furthermore, the Constitution of the Republic of Bulgaria provides for the right of citizens to submit proposals for legislative initiatives/amendments and petitions to public authorities. On the local level, there is a possibility for citizens to submit written proposals to the committees of the municipal councils for the adoption of normative acts such as regulations, ordinances, etc. or for the adoption of strategic and political documents. Some municipalities also organise focus groups, round tables, public deliberations and citizen consultations on relevant topics of public interest.

How the factor influences ENCI: Although there is no direct link to ENCI cases in Bulgaria, the fact that stakeholders, including the general public, can express their opinion on any piece of draft legislation is a precondition for the creation of regulations that support the more active participation of citizens in all sectors of the public life, including their active participation in the liberalised energy market. Therefore, the possibility to express opinion on draft legislation provides opportunities for people to present their point of view on draft ENCI-related acts, thus supporting their emergence over time. Furthermore, in addition to the national-level forms of public participation, more and more local administrations realise the importance of including the general public in decision-making and strategy formulation.

Affected ENCI types: All types are potentially affected.

Local examples: The city of Burgas used to be highly energy inefficient, leading to very high energy costs for local authorities and citizens as well as poor living conditions and environmental inequality. Nowadays, Burgas is a smart, energy efficient city, implementing the most up-to-date energy approaches and measures. This transition happened as a result of the targeted efforts of local authorities to involve citizens in listing the priorities where authorities needed to focus their attention. A decision was made to invest in energy efficiency, renewable energy sources, electric vehicles, efficient street lighting, and smart management systems. The authorities also raised awareness among citizens about the Energy Efficiency of Multi-Family Residential Buildings National Programme and motivated them to participate in the programme through an extensive information campaign (posters, discussions and press conferences, media publications, dedicated web page, and information points in each neighbourhood). This campaign continued for two years and made Burgas the city with the highest number (more than 200) of refurbished buildings in Bulgaria. Thus, Burgas municipality is now leading the country when it comes to energy efficient living.

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in Bulgaria: Bulgaria has started its transition to democracy and market-based economy in 1989 when the communist regime collapsed. Although the majority of people in Bulgaria support democracy (52% in 2022) and the rule of law, they are sceptical when it comes to political parties and politicians, and this scepticism and distrust has been enhanced in the recent years as a result of the political instability. Despite the fact that the democratic culture in the country still needs time to reach maturity after being part of the communist bloc for 45 years, participative governance has become more popular in recent years. Local authorities have begun consulting citizens when decisions that concern their everyday life need to be made (e.g. making new zones for paid parking in central neighbourhoods in Sofia). Citizens are also able to provide feedback and comments about draft legislation via the strategy.bg

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website of the Council of Ministers. However, with regard to the energy system, although there is a trend of encouraging consumers to play a more active role, there are still many hurdles and challenges.

How the factor influences ENCI: The low democratic culture in Bulgaria and the general distrust towards institutions influence the attitudes of citizens when it comes to activities that require public participation, which includes any form of energy citizenship. Studies evince that some local administrations perform better than national-level institutions, because they are closer to people. The factors which influence positively citizen engagement on local level include the feeling of belonging to a community, willingness to participate in defining the local agenda, willingness of local authorities to support civic engagement, and the level of trust between people and local authorities. However, according to studies, these factors are present in a small fraction of municipalities in Bulgaria. Therefore, one can conclude that ENCI in Bulgaria result from sporadic personal initiatives, rather than a well-developed culture of citizenship and public engagement.

Affected ENCI types: This factor affects all ENCI types.

Local examples: The first energy community in Bulgaria, called “Izgrei” Ltd, has been established in Belozem, a village near Plovdiv. Belozem has a perfect location as the area is one of the places with the highest sunlight activity in Bulgaria during most months of the year. The project is a 4kW rooftop solar installation that will generate electricity for own consumption and the excess will be sold to the grid. The investment was about 15,000 BGN, which is approximately €7,500. Currently, the panels still lay unexploited on the floor in one of the rooms in the house as Tzvetan Georgiev, the founder of “Izgrei,” is waiting for the documents that will allow him to install them. An innovation within the project is the backup box, which will be installed in order to be used in cases when the national grid is down (there are frequent power cuts in the area).

P5. Inclusion and empowerment policies

How is this factor manifested in Bulgaria: According to Eurostat, about 2 million Bulgarians are energy poor and 30% of the population are not able to cover the cost of heating their homes. According to the definition for energy poverty, developed in January 2023, energy poor are all those people who fall below the poverty line after paying their expenses for energy. As the amendments to the Energy Act, which would incorporate the energy poverty definition, have yet to be passed by the Parliament, Bulgaria for the time being continues to implement a support scheme for people who cover income-tested and property-based criteria for poverty. Heating allowances are provided to eligible recipients during the heating period via the social assistance system. Kulinska (2017) emphasises that the energy poverty in Bulgaria will remain driven by the specific local social, political and environmental conditions. Both the current political instability[4] and the lack of systematic studies in the field hinder the development of effective policies and measures, targeted at resolving this problem.

[4] Since the beginning of 2021, Bulgaria does not have a stable government. The fifth round of elections in a period of two years were held in April 2023.

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How the factor influences ENCI: The empowerment of vulnerable consumers provides an opportunity for them and as such it is expected to support the emergence of ENCI. INECP refers to a mechanism for the protection of vulnerable consumers after the full liberalisation of the market, but since no details are provided at this stage, it is not known what this mechanism will include. Therefore, it is hard to predict how vulnerable consumers could benefit from empowerment policies in practice, let alone to predict whether they will be interested and/or motivated to participate in energy citizenship initiatives.

Affected ENCI types: Types 1 and 2.

Local examples: In order to reduce energy poverty, the Municipality of Gabrovo is participating in an initiative for tailored measures that support energy vulnerable households. The action is targeting vulnerable groups by organising meetings with this type of households and by making awareness raising campaigns regarding the need for changing people's behaviour towards increased energy efficiency. As a result of the initiative, four multi-family residential buildings will be energy audited for free, 300 households will receive energy-saving products or services and the energy consumption of 20 households will be measured in real time. This initiative is an example of a local-level measure that could result in increased energy efficiency of targeted vulnerable households in the context of a general mistrust of people in policies and measures of national-level institutions. Gabrovo is also a member of the Municipal Energy Efficiency Network EcoEnergy, whose objective is to subserve end users in the participating municipalities in order to decrease their expenses.

P6. Public participation and multi-level climate and energy dialogues with non-political actors

How is this factor manifested in Bulgaria: The process of elaboration and finalisation of the Integrated National Energy and Climate Plan in Bulgaria 2021-2030 involved several iterations with relevant stakeholders, including local and regional authorities, social partners, civil society and the general public. INECP was published online, giving the opportunity to all interested stakeholders to provide their feedback and submit recommendations. Written opinions on the draft have been submitted by different stakeholders such as NGOs, private and government energy companies, industrial associations, economic institutes and others. Relevant stakeholders were also able to discuss a wide array of issues related to the Plan in several conferences and round tables.

Some of the feedback to the draft Plan included comments concerning the integration of renewable energy sources into the liberalised energy market as well as the necessity to add additional mechanisms for the support of active consumers and energy communities and the development of RES in urban areas. Feedback was also received regarding the need to eliminate administrative barriers to the market entry of RES. Proposals to increase the share of energy from RES to at least 27% and even higher were also made. Although these comments have been taken into account and measures supporting the establishment of energy communities are envisaged in the final version of the Plan, it is yet to be seen how these will be implemented in practice.

How the factor influences ENCI: In general, providing opportunities and venues for public participation in consultations pertaining to the formulation of national energy and climate strategies is undoubtedly a stimulating factor for ENCI. However, it very much depends on the practical implementation – the way

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citizens are informed about such opportunities, the types, timing, and venues of the events, the language used, etc. If participation procedures are conceived in a way that does not allow for a meaningful expression of opinions and 'lay' expertise, they might actually represent a hindrance for the ENCI.

Affected ENCI types: Types 5, 6, 8, 9 and 10.

Local examples: In recent years, Burgas has become one of the most energy efficient cities in Bulgaria. An important aspect of the energy transition in Burgas is the fact that the city's administration has turned citizen involvement into a key municipal action strategy. The Municipality has participated in an initiative aiming to implement models and policies that promote citizen participation in local governance. After realising how important public involvement is, the municipality has begun investing efforts into collecting the input of the citizens who are affected by its actions and measures. Nowadays, the Municipality of Burgas organises focus groups on a regular basis so that citizens, businesses, academics, NGOs, and regional and local bodies can express their views and reach a consensus about the top priorities of the city. So far, such focus groups have been organised about sustainable energy management, building retrofitting, mobility, smart IT solutions, and street lighting.

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Bulgaria: According to OECD data from November 2022 (OECD, 2022), Bulgaria faces weaker growth and high inflation. The projections for 2023 are for the GDP growth to slow to 1.7% before raising to 3.1% in 2024, supported by private and public investments driven by EU funds. At the same time, the high energy prices and rising interest rates will weigh on consumption. Statistics show that high inflation is weighing on private consumption, but consumer confidence has improved after an initial drop in 2022. Inflation pressures from energy and food prices are cushioned by means of several temporary support schemes including price caps on electricity, subsidies for fuel and tax cuts for gas and bread.

In October 2022, Bulgaria's annual inflation reached 14.8% which was the highest increase in consumer prices among EU member states in Southeast Europe (SEE) and above the EU average of 11.5%, according to Eurostat data (Kokalova-Gray, 2022). The inflation is expected to slowly decline amidst stabilising energy prices and subdued economic activity from high levels of around 14% in 2022 on a year-average basis to around 7.5% in 2023, followed by a further gradual decline in 2024 (OECD, 2022).

A study of the Institute of Market Economics (SEGA, 2022) shows that in May 2022, Bulgaria occupied penultimate place in the EU in terms of purchasing power of households.

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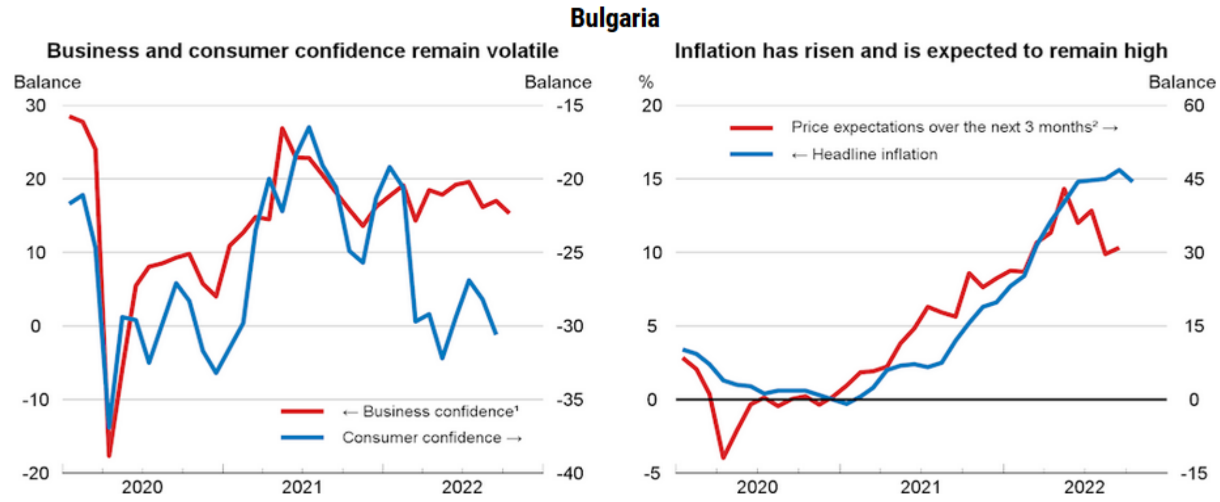
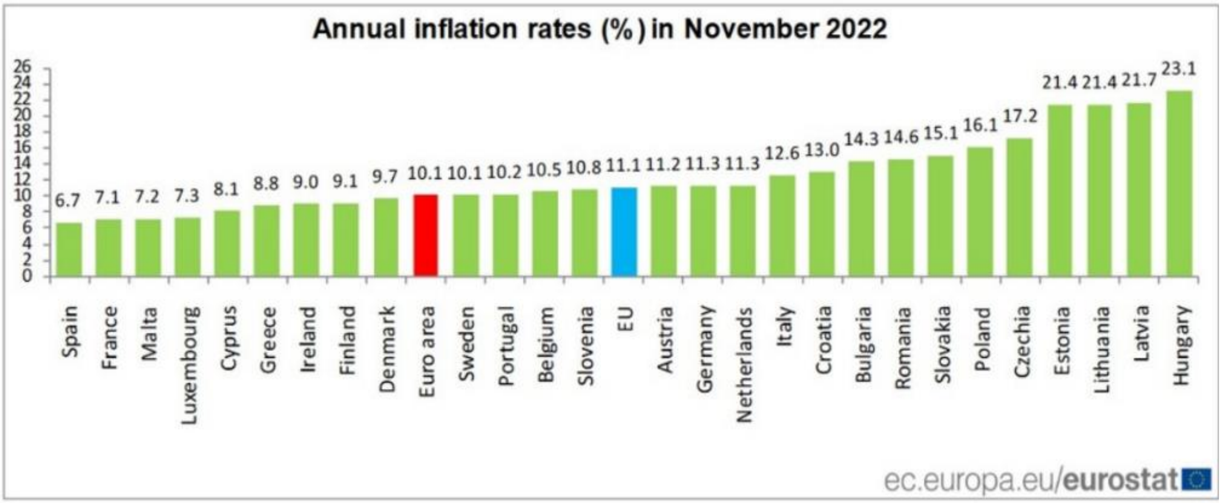
Figure 6.2: Business and consumer confidence and inflation rate in Bulgaria



Source: OECD, 2022.

Figure 6.3: Annual inflation rates (%) in November 2022



Source: Yanovski, 2023.

To conclude, 2022 has been a dynamic year in terms of economic matters not only in Bulgaria but in whole Europe. Bulgarians have experienced a rapid decline in their purchasing power as a result of the high inflation rates and slowed economic growth. All these reflects on citizens' decisions for taking actions in various spheres of life – investments, purchases, etc.

How the factor influences ENCI: Economic growth, inflation rate and purchasing power of citizens could influence a lot the context of ENCI at a national level. On the one hand, the decrease in purchasing power would result in citizens avoiding making investments in infrastructures such as renewable energy installations because of lack of financial resources. On the other hand, the high inflation rate and the decreased purchasing power would motivate people to make savings by reducing the energy consumption

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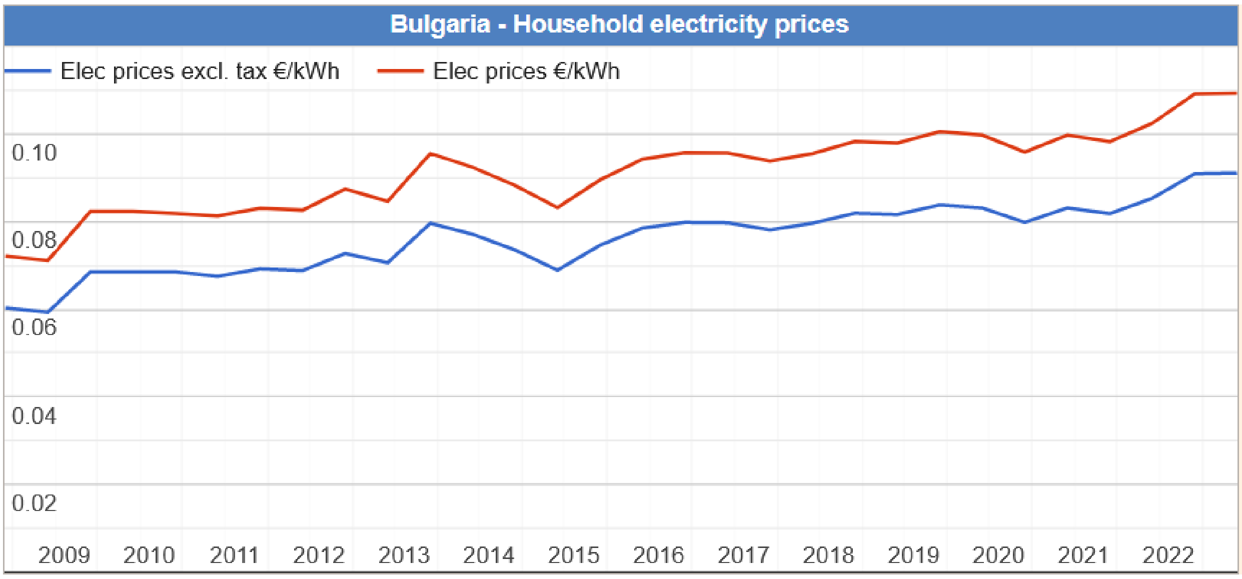
or looking for other solutions such as joining energy communities, using more sustainable (and cheaper) transport, etc.

Affected ENCI types: Applicable to all types of ENCI.

EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in Bulgaria: Household electricity prices in Bulgaria are set and regulated by the Energy and Water Regulatory Commission (EWRC) and are not directly affected by the dynamically changing market situation. To help the households during the post-COVID financial crisis, the government has imposed a moratorium on rising electricity prices, central heating, and water supply for households between 16 December 2021 and 31 March 2022.

Figure 6.4: Household electricity prices in Bulgaria



Source: Countryeconomy.com, 2022.

Statistical data from June 2022 (Countryeconomy.com, 2022) show that the average price of electricity in Bulgaria including taxes has been €0.1093 per kilowatt hour. As seen in the Figure below, the price is much lower than the EU average for the same period – €0.2525 per kWh, and also among the lowest in Europe (Eurostat, 2022).

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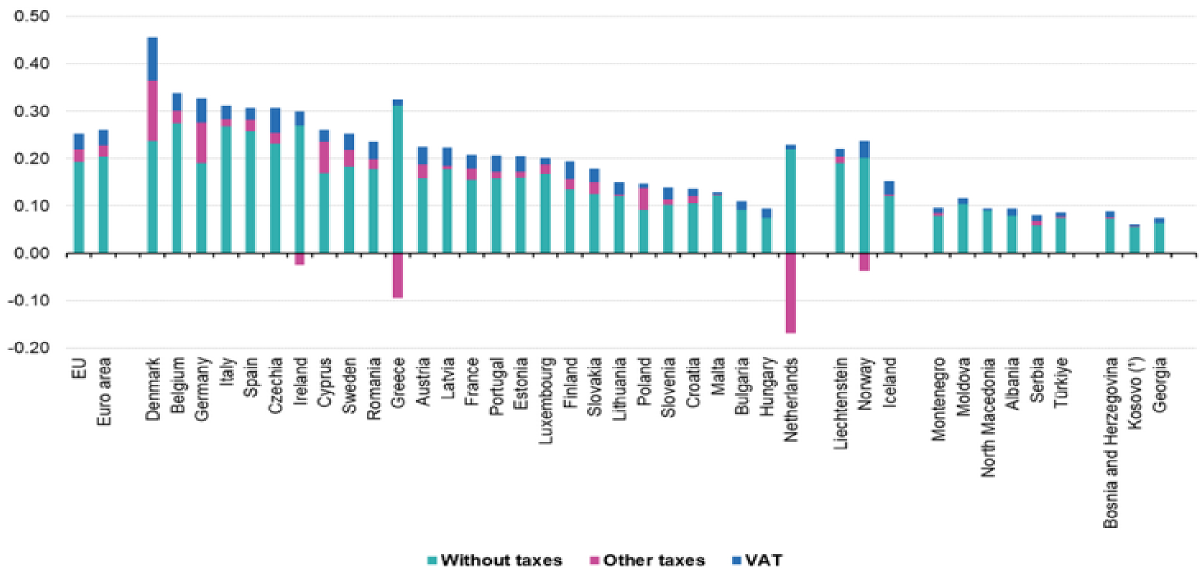
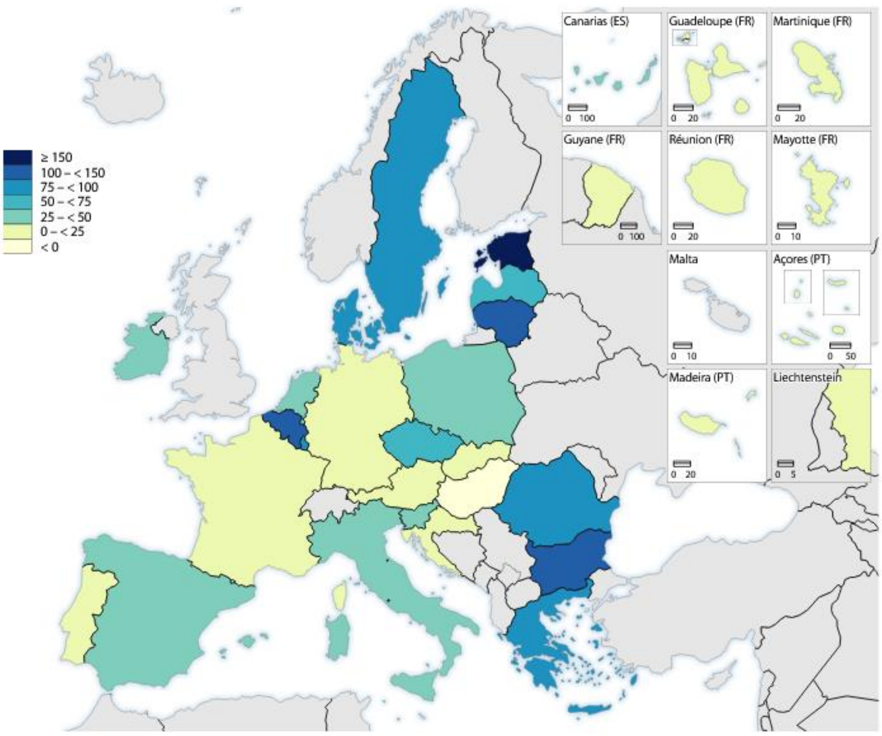
Figure 6.5: Electricity prices for household consumers, first half 2022 (€ per kWh)



Source: Eurostat, 2022.

Figure 6.6: Change in natural gas prices for household consumers (%) (1st half 2022 compared with 1st half of 2021 based on prices in national currency)



Source: Eurostat, 2022.

A majority of Bulgarian households use natural gas for heating their homes. The year of 2022 has been a very dynamic year in terms of natural gas prices due to the impact of the war in Ukraine. Along with Estonia and Lithuania, Bulgaria is the third country in the EU with the highest increase in natural gas prices (Eurostat, 2022). The prices peaked in September 2022 at BGN 353.21/MWh, compared to BGN 133.41/MWh in January 2022, followed by a gradual drop. The price of natural gas in January 2023 was BGN 179.33/MWh (Dukovska, 2023).

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In addition to the similar changes on the global markets, the price drop in Bulgaria was also a consequence of the fact that the country managed to secure alternative to the Russian imports (larger volumes of gas delivered from Azerbaijan and the favourable discounts achieved in the tenders for the supply of liquefied natural gas) (Kokalova-Gray, 2022).

How the factor influences ENCI: Despite paying one of the lowest energy prices in the EU, Bulgarian households remain the most vulnerable in the EU in terms of affordable energy due to their low level of income. Bulgaria is also the country with the highest levels of energy poverty in the EU. Considering these circumstances, energy prices are an ambiguous factor. The relatively low prices can act as a disincentive for more affluent citizens but can be a very motivating factor for vulnerable households to rethink their energy consumption behaviour and practices and look for more sustainable ones through participation in ENCI initiatives.

Affected ENCI types: Types 1, 2, 3, 4, 7, and 8.

EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in Bulgaria: The electricity market in Bulgaria is in a process of liberalisation, which has started in 2004. The electricity is currently traded both at freely negotiated prices and at regulated prices. The market segment for trading at regulated prices remains substantial – 40% of net electricity generation (ATEB, n.d.). Since July 2021, all business consumers have been obliged to enter the liberalised market and only the households remained on the regulated market. They are expected to enter the liberalised market by the end of 2025, when all electricity consumers will be supplied at freely negotiated prices as per Bulgaria's commitments in compliance with the EU regulatory requirements (the Third Liberalisation Package of the EU) (ENERGETIKA, n.d.).

Households can purchase electricity from a retailer supplier operating in the respective area at prices regulated by the Energy and Water Regulatory Commission and through the public provider NEK EAD which functions as a single buyer for this market segment. Three big supply companies dominate the market, each covering a part of the country – West Bulgaria, South-East Bulgaria, and North-East Bulgaria.

It is expected that the phasing out of the regulated prices for all final consumers will give impulse to competition among electricity suppliers. At the same time, this could expose consumers to greater price volatility. To protect the vulnerable consumers, the Bulgarian government is going to develop support measures to ensure the smooth and just transition to full liberalisation (Ministry of Energy, Ministry of Environment and Water, 2021).

The electricity market in Bulgaria is still centralised. Decentralisation would require a significant improvement of the municipal governments' administrative capacity. Municipalities also seem to be non-prepared to process projects for the installation of small-scale renewable energy plants which in turn would allow the development of energy communities. The system inertia continues to be an obstacle for complex and disciplined policy developments (CSD, 2018).

The current state of the energy market in Bulgaria does not offer favourable conditions for energy self-production of households. It is not by chance that energy communities are lacking in Bulgaria, as the policy

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framework and developments in this regard are still missing. Citizens who try to build their own installations encounter bureaucratic difficulties and legal ambiguities (Stoyanov, 2023).

How the factor influences ENCI: The non-liberalised and centralised energy market hinders the development of ENCI initiatives in the country. There are still many administrative issues, complex process and bureaucracy that very often make people to give up the idea of taking advantage of energy self-generation or initiating energy communities/cooperatives. This limits consumers' opportunities for involvement in energy generation and for future energy independence.

Affected ENCI types: Applicable to all types of ENCI without types 9 and 10.

Local examples: Despite the complicated energy market conditions that hinder the energy independence of consumers, in the last years there have been some successful examples of people who have become energy independent. A documentary series "The Independent" created by the Bulgarian Solar Association presents stories of Bulgarian citizens who have decided to become independent from the grid, including through sustainable energy production and consumption, urban farming, and other ways. The documentary shows the most common struggles they face, including resistance from the national energy providers, bureaucratic complexities, lack of local support for urban farming, and other aspects (BSA, 2021).

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in Bulgaria: In July 2022, the Bulgarian National Assembly adopted a number of tax measures affecting consumer energy products to mitigate the effects of the inflation and to respond to the increased fuel prices. Private consumers were provided with a fixed discount of €0.13 per litre/kg from the retail prices of certain motor fuels. The measure lasted from July 2022 to the end of the year.

A reduced 9% VAT rate on central heating and natural gas was also introduced in July 2022 and will stay in force until July 2023. The excise tax for LPG (Liquefied Petroleum Gas) and natural gas, heat energy, fuel used for the combined production of heat energy and electricity, and electricity produced from renewable sources was temporarily abolished. The excise tax exemption is planned to apply until June 2025 provided that the European Commission does not consider the measure incompatible with state aid rules (WTS, 2022).

There are also other state aid measures that support energy consumers in Bulgaria. Heating allowances are provided to socially vulnerable consumers who meet certain requirements. The eligible consumers can choose the type of fuel: solid fuel, electricity, gas or heat.

Another governmental aid measure provides funding for the renovation of multi-family residential buildings to improve their energy efficiency and consequently the living conditions for citizens. Support and assistance are provided to associations of owners whose buildings meet a set of eligibility criteria determined in advance. The grant covers 100% of the costs and organisational arrangements necessary for renovation works to be undertaken (Ministry of Energy, Ministry of Environment and Water, 2021).

Since 2023, households are able to apply to the national scheme for supporting households in the field of

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energy from renewable sources. The scheme is part of the Bulgarian Recovery and Resilience Plan. Its purpose is to increase the use of renewable energy in the final energy consumption in the household sector by providing financial aid for the purchase of solar installations for domestic hot water supply (covering 100% of the investment) or the purchase of photovoltaic systems up to 10 kW, including electrical energy storage systems (covering 70% of the investment). By the end of 2025, the scheme is expected to support more than 10,000 households that use inefficient solid fuel heat sources (Ministry of Energy, n.d.).

How the factor influences ENCI: The economic policy instruments factor could play a double role for ENCI – as an opportunity and a threat. For example, the heating allowances that are provided to socially vulnerable consumers in Bulgaria allow for choosing the type of fuel: solid fuel, electricity, gas or heat. Therefore, these measures in a way stimulate the use of solid fuels, which is in contrast with the goal of decreasing the carbon footprint. This measure has thus been criticised by environmental NGOs in Bulgaria for supporting the use of solid fuel for heating and not offering any long-term solution to energy poverty. On the other hand, state aid related to retrofitting and access to renewable energy is expected to facilitate ENCI initiatives.

Along with the measures that encourage the active participation of consumers in the electricity supply market, there will also be measures designed to protect consumers. The policy for full electricity market liberalisation by 2030 provides for measures that guarantee a gradual and smooth transition for household customers. This will include deregulation of the retail electricity prices in several stages until fully liberalised. Full electricity price liberalisation in the household sector will be given the green light only after a mechanism for the protection of vulnerable (energy poor) consumers of electricity has been put in place (Bogdanov and Zahariev, 2022).

Affected ENCI types: Applicable to all types.

EC5 Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Bulgaria: Several existing support schemes could be steered towards community energy initiatives in Bulgaria. For example, in the heating and cooling sector, residential building owners or tenants could take advantage of financial grants for improvements in energy efficiency provided by the Bulgarian Energy Efficiency and Renewable Sources Fund (EERSF, n.d.).

As of December 2022, EERSF was transformed into the National Decarbonisation Fund (NDF) as a result of the reforms set in the National Recovery and Sustainability Plan. The creation of the NDF is a key financial scheme for the implementation of the objectives of the Long Term National Strategy to support the renewal of the national building stock by 2050 (Gospodinova, 2022).

Consumers can also take advantage of bank loans to finance actions for making their homes more energy efficient or for photovoltaic installations. In 2012, there has been an attempt to introduce the collective loans from banks that could be used by associations of homeowners to retrofit apartment blocks. However, this measure has been very limited, since homeowners are considered unreliable credit seekers (Naniova, n.d.).

The Home Energy Efficiency Loan Programme (REECL) was another financial mechanism active in Bulgaria until 2019. The programme was developed by the European Commission, the European Bank for

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Reconstruction and Development and the Bulgarian Ministry of Energy to help Bulgarian households reduce their heating costs through installation of energy efficient windows; wall, floor and roof insulation; efficient biomass stoves and boilers; solar water heaters; heat pump air conditioning systems; integrated photovoltaic systems; and other measures (MegaElectronics, n.d.).

How the factor influences ENCI: The various forms of financial mechanisms allow end consumers to invest in different energy efficiency measures – either retrofitting, or renewable energy installations. The mechanisms available in Bulgaria act as enablers of ENCI, by providing households the necessary financial resources to implement measures that would otherwise be unavailable to them. The existing financial support from local and national government institutions is a motivator for people to invest in renewable energy solutions and communities. On the other hand, the lack of accessible supporting incentives on a national level and the governmental preference for distributed generation schemes have been pointed out as reasons for an insufficient energy transition progress and a meagre number of renewable energy communities. Financial support schemes are one of the largest drivers for renewable energy communities (RECs), as schemes, independent of common market prices, allow for small-scale projects to take part in the energy system. Access to financial support is an important prerequisite also for increasing the number of energy efficient dwellings. However, it is believed that the collective loan would be hardly accepted by the commercial banks with an additional obstacle being the national psychology of the Bulgarians, which discourages them from participating in neighbourhood associations (Ivanova, 2012).

Affected ENCI types: Types 1, 2, 3, 4, 7, and 8.

Local examples: The homeowners association of an apartment block in the “Asparuhovo” neighbourhood in Varna, Bulgaria, has renovated its building with money from the demonstration programme of the Ministry of Regional Development and the Bulgarian Association of Consultants on European Programmes and a loan from the Energy Efficiency Fund under the project “Demonstration renovation of residential buildings”.

Experts claim that creating a successful collective lending model is a win-win situation. They consider the loan as a winning ticket for the banking institutions to enter the market for renovating multi-family buildings. The collective loans would also allow for more people to get involved in the distribution of European resources for the renovation of residential buildings, avoiding the risk of turning the renovation projects into a boutique venture, implementable only by financially strong homeowners' associations (Naniova, n.d.).

EC6. Security of energy supply and security of supply of raw materials and other resources

How is this factor manifested in Bulgaria: The war in Ukraine that started in 2022 put Europe’s energy supply to test. As a response to the imposed sanctions at EU level, Russia completely cut its gas supplies to some EU countries, with Bulgaria and Poland being the first ones on the list. Russia’s gas supply to Bulgaria was stopped in April 2022 (Maximow, 2022). As Figures below demonstrate, at that time the country was among the EU member states relying almost entirely on Russian gas imports, with Gazprom supplying 85-90% of the country’s gas. The Russian gas cut forced Bulgaria to look for solutions for accelerating the process of energy diversification (Vladimirov, Rangelova, and Dimitrova, 2022).

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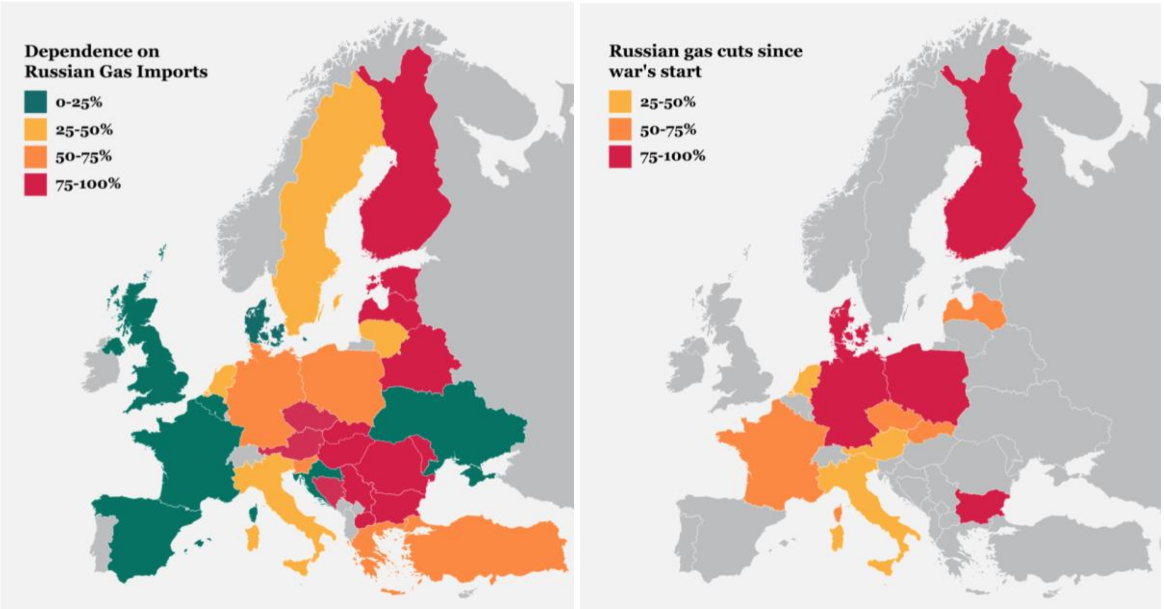
In March 2022, the country announced that it would not renew its contract with Gazprom after its expiry in the end of 2022 and would look for another source to cover its demand for natural gas. The Greece-Bulgaria gas pipeline started operating in October with a potential to help decrease Southeast Europe's dependence on Russian gas and boost energy security of the region.

Figure 6.7: Dependence on Russian gas imports and Russian gas cuts since war's start, April 2022.



Source: Vladimirov, Rangelova, and Dimitrova, 2022.

The Bulgarian Ministry of Energy commissioned the construction of another nuclear reactor in 2022. However, an expert from the CEE Bankwatch has criticised the planned construction considering obvious environmental and financial reasons and stating that it would be in contrary to the sustainable Bulgarian energy transition. He also emphasises that it was high time for Bulgaria "*to finally embrace sustainable solutions to increase the country's energy independence, protect the natural environment and improve people's quality of life.*" (Maximow, 2022).

When it comes to security of petroleum imports in Bulgaria, the situation has improved over the past several years as a result of some supply diversification. The progress has been slow, however, highlighting a missed opportunity in securing alternative oil supplies to Russian crude. Bulgaria's only oil refinery is owned by Russia's Lukoil, which partially explains the reluctance towards a stronger push for alternative crude oil suppliers (Vladimirov, Rangelova, and Dimitrova, 2022).

Some recent developments from the beginning of 2023 that were approved by the Bulgarian interim government try to respond to the challenge of the monopolised oil import. Two memorandum documents aim at further boosting the energy cooperation between Bulgaria and Greece. The first memorandum is about the construction of a new oil pipeline from Alexandroupolis to Burgas to provide crude oil supplies to the "Lukoil Neftochim" refinery (a rather ambitious goal to build the pipeline by the end of 2024), and the second is about the conclusion of an agreement that will allow Greek gas suppliers to reserve capacity from the Bulgarian gas storage facility in Chiren. In return, Bulgarian energy companies must receive slots

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for unloading liquefied gas at Greek terminals (Nikolov, 2023).

Finally, the problem with the energy supply security could serve as a boost for measures that have already proven successful – energy efficiency, renewable energy and decentralisation of power generation. An expert from the Centre for the Study of Democracy claims that "*In the long term, we have to understand that when it comes to energy security, the best approach would be to focus on renewables and for Bulgaria and Europe to also invest in research and development.*" (Maximow, 2022)

How the factor influences ENCI: The started diversification of the energy supply sources in Bulgaria could serve as an opportunity for the rapid deployment of renewable energy sources. Furthermore, the energy crisis could become the engine for the acceleration of the coal and gas phase-out, as well as the penetration of low-carbon technology investments such as renewable energy installations and storage solutions. All these could serve as an opportunity for ENCI in Bulgaria, with people feeling motivated to move to renewable energy sources or to start saving resources in order to decrease dependence on certain energy sources (for example the Russian gas) or as a response to the increased energy prices.

Affected ENCI types: Applicable to all ENCI types.

Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Bulgaria: Although some indicators related to energy poverty in Bulgaria, such as the ability of households to keep their homes adequately warm, improved in the 2010s, and even though electricity prices have stayed among the lowest in the EU, energy poverty remains a national challenge. The European Energy Poverty Index (EEPI) for 2019 shows that Bulgaria has the worst performance in the EU in terms of energy poverty. This is a result of the combination of low incomes, high energy prices (relatively compared to the income levels) and poor quality of buildings.

According to the EU Statistics on Income and Living Conditions (EU-SILC), in 2020, 27.5% of Bulgarian households could not keep their homes adequately warm, and 22.2% were struggling to pay their energy bills. The Bulgarian National Statistical Institute reports that in 2020, 1.66 million Bulgarians (23.8%) lived below the poverty line of BGN 451 (€230.60) per month; of this group only about 250,000 received heating subsidies (Bogdanov and Zahariev, 2020).

Although energy poverty has been a hot topic on the policy agenda for years, until recently little had been undertaken to address it. The new government that took office in December 2021 stated its intention to develop a definition of energy poverty and design tools to alleviate it. The government lost its parliamentary majority in the summer of 2022 and resigned, followed by the dissolution of the National Assembly and snap elections. The new parliament failed to produce a working majority and was also dissolved, followed by another elections in April 2023. The procedure for adopting the official definition of energy poverty was thus interrupted and cannot be continued until the next parliament starts its work. Until this happens, the official energy poverty line cannot be determined and new eligibility criteria for receipt of targeted support cannot be designed (Bogdanov and Zahariev, 2022).

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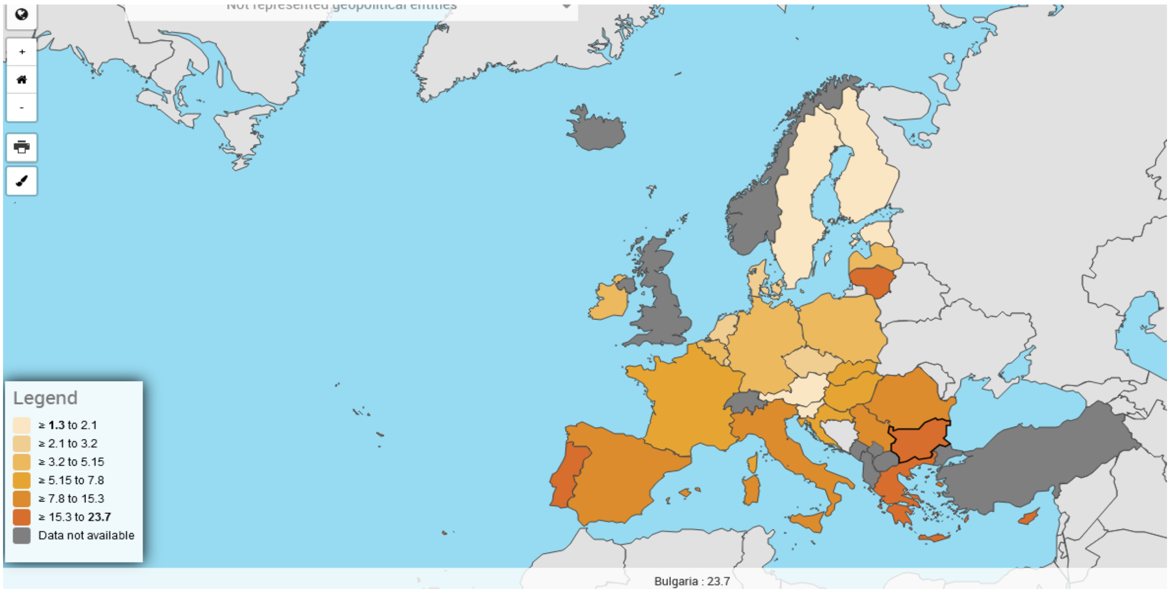
Figure 6.8: Population unable to keep home adequately warm by poverty status.



Source: Eurostat, 2023.

The currently implemented support scheme provides heating allowances via the social assistance system to persons who meet certain income-tested and property-based criteria for poverty. However, the scheme does not reach all Bulgarians who cannot afford to heat their home properly – 23% of population, according to the latest survey, conducted in August 2022 by the European Investment Bank (EIB, 2022).

How the factor influences ENCI: The lower disposable income and wealth disparity negatively affect community initiatives and thus hinder the development of renewable energy cooperatives and communities. Therefore, the factor under scrutiny is a barrier to ENCI initiatives in Bulgaria, considering the high percentage of energy poor households and the significant percent of households living below the poverty line. Low-income and vulnerable households are also more unlikely to upgrade their old energy systems, for example their heating. The household welfare level influences the willingness to invest in small-scale renewable energy installations as well.

Affected ENCI types: Types 1, 2, 7, 8, and 9.

Local examples: Energy Agency - Plovdiv has been involved in the European project POWERTY (Renewable Energy for Vulnerable Groups), which aimed to promote the use of renewable energy sources among vulnerable groups, affected by energy poverty. In 2021 the Agency installed innovative hybrid systems consisting of photovoltaics and lithium-ion energy storage systems (e.g. batteries used in electric vehicles) in 3 social buildings for youths and children with disabilities owned by the Municipality of Plovdiv. The installation was with a total capacity of 30 kW and 40 kWh storage capacity (Kisyov, n.d.). The aim of the installations was to serve as a possible solution for social households to achieve a significant share of renewable self-consumption and thus decrease electricity bills and contribute to the decarbonisation of the energy system. The expected annual savings of the installation are 50 to 70% of annual electricity consumption. This will allow users to increase their heating/cooling comfort using an innovative renewable energy approach and to significantly reduce their energy bills (POWERTY, 2021).

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S2. Energy literacy, awareness and skills

How is this factor manifested in Bulgaria: The level of citizen literacy and awareness about energy issues is not prominent in Bulgaria. People learn about energy saving actions, energy efficiency and energy devices (including the energy label) mainly through information campaigns and engagement activities organised as part of the EU funded projects. Other actors in awareness raising are NGOs (e.g. Greenpeace), the energy supplier companies, eco-activists.

The Ministry of the Regional Development conducts regular information campaigns to raise awareness on the energy renovation of homes and thus promotes the national programme for energy efficiency renovations of multi-family residential buildings (Plovdiv, n.d.). Information campaigns also reach out to students at schools to teach them how to be part of the energy transition process (TotalEnergies EP Bulgaria, 2023).

According to research from the end of 2020, the lack of awareness and literacy about certain energy technological solutions (renewable energy technologies such as solar systems, wind turbine installations, biomass installations, etc.) results in low level of social acceptance of such technologies and respectively – low uptake and investment in them. The main communication channels for getting informed about renewable energy solutions and technologies are friends, TV, social media, and online platforms, and the least used are specialised print media and websites. The lack of expert information affects the opinion of citizens, who mostly associate renewable energy with positive environmental effects and less often with its socio-economic impact. 67% of the 1,034 respondents who participated in the study claimed that they would not join an energy community due to lack of information on its benefits, as well as due to the lack of financing and clear regulatory framework. The study concludes that communication and information campaigns could influence public attitudes and commitment with regard to the implementation of the renewable energy projects and installations (Trifonova, 2021).

How the factor influences ENCI: The low levels of energy literacy and awareness in Bulgaria are a threat to ENCI. People are not aware of the opportunities and benefits that renewable energy offers, they do not know much about the technologies to produce their own energy, they have limited knowledge about how to consume energy in a conscious way. It is highly recommended that any project or programme to promote renewable energy production be accompanied by an information campaign, in communication with the local community and with a thought of how its implementation would contribute to higher added value for the public.

Affected ENCI types: Type 1, 2, 7, and 8.

Local examples: In 2016, the company TotalEnergie EP Bulgaria with the assistance of the Education Departments of Varna and Burgas Municipalities and the Association of Bulgarian Black Sea Municipalities started an educational energy and environmental awareness campaign in schools along the Bulgarian Black Sea coast. Members of the company's team met with students from 5th and 6th grade and, through interactive presentations and short videos, provided information about different types of renewable and non-renewable energy sources. The challenges of responsible energy production and use, and the goals of balancing the social, economic and environmental needs of current and future generations were

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discussed. Children received an "Energy Guide" handbook with illustrations, games and crosswords related to energy. By 2023, the campaign has spread to other parts of the country, reaching 1,120 children from 22 schools in Varna, Burgas, Shabla, Kavarna, Durankulak, Byala, Primorsko, Staro Oryahovo, Pchelnik and Sofia (TotalEnergies EP Bulgaria, 2023).

S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in Bulgaria: A study of the World Wildlife Fund among Bulgarian citizens from 2021 shows that 50% of the adult Bulgarians have a positive attitude towards participation in the energy transition of the country and would like to be able to generate their own electricity for their household needs (World Wildlife Fund, 2021). Another study from 2022 claims that 70.9% of Bulgarians would engage in an energy renovation programme that requires co-financing and are convinced of the benefits of complete renovation of buildings (3E News, 2022).

On the other hand, most Bulgarians prefer to stay passive and refrain from involvement with public problems. There is usually quite a challenge to motivate citizens to create or join a community in order to pursue a certain goal. A low trust in institutions is prevalent and most citizens are sceptic that something can change through their participation (Workshop for Civic Initiatives Foundation, n.d.).

Nevertheless, there are several examples of successful civil society campaigns and activity, such as protests against the political system, or related to social security and environmental topics (deforestation, air pollution, etc.). For example, the drastic increase of the energy prices for households in 2012 provoked massive national civil protests which resulted in the resignation of the then government. This is an example of how the civil society has succeeded to act as a corrective to the government decisions (OFF News, 2022).

The "Civic Health Index" survey conducted by Sofia Platform has established that citizens do not know how to associate for common causes and thus are not prone to do so. The Index outlines a very low level of preparedness, but also a low willingness to engage in any organised forms of civic activism related to initiatives to improve the place where the citizens live – neighbourhood, municipality, town/village. The lack of organisational and institutional culture affects in many ways civic activism and the ability to seek change and improve the performance of institutions, policymaking and our overall life together as a society. The existing civic sector, on the other hand, has a limited capacity to actively participate in policymaking processes, mainly due to a lack of resources (material and human), but also a lack of expert capacity for active participation.

Another significant phenomenon is the inability of institutions to engage in a dialogue with citizens, but also apathy. Feedback and access to the institutions remain low. Despite the availability of mechanisms for civil sector involvement in the process of policymaking, many are ineffective. All this leads to policymaking that is not based on broad public debate and real stakeholder involvement (Sofia Platform, 2021).

The level of collaboration between the NGO sector and the government is consequently not very high. In 2020, the government limited opportunities for NGOs to participate in decision-making processes and dialogue with government institutions. NGOs working in the field of the environment had difficulties

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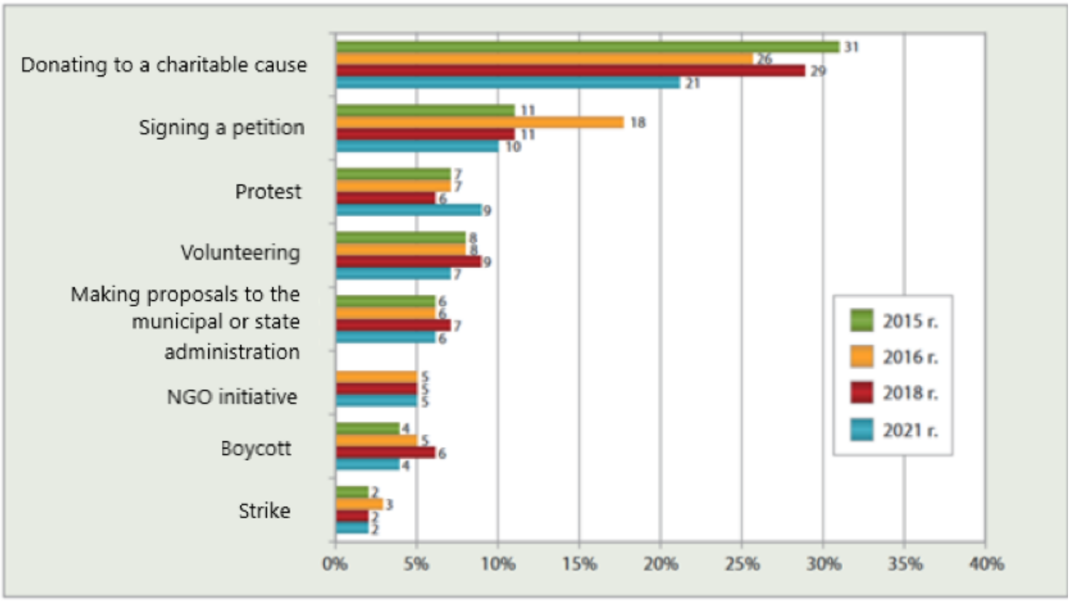
accessing the relevant institutions as well as gain access to information that should be made public. The government became less willing to work with NGOs and suspended numerous initiatives aimed at cooperation with the NGO sector (Spasova and Braungardt, 2021).

Figure 6.9: The forms of civic engagement in 2015, 2016, 2018, and 2021.



Source: Smilov, 2022.

How the factor influences ENCI: Although more than half of the Bulgarian citizens are ready to participate in the energy transition of the country and would like to be able to generate their own electricity for their household needs, there are still policy, economic and social burdens that slow the process. The general level of citizen engagement in Bulgaria is low and is thus a threat to ENCI. Citizens have positive attitude towards energy transition but are still passive towards taking actions in this direction.

Affected ENCI types: Applicable to all types.

Local examples: In March 2022, Greenpeace Bulgaria activists entered the Ministry of Energy where they organised a peaceful demonstration for Bulgaria's energy independence from Russian gas. The protesters demanded that the Minister of Energy takes clear and firm actions for energy independence through renewable sources and making it easier for people to produce energy for their own needs. They insisted the Minister to make a commitment and by the end of March 2022 to start the public debate on the texts of the Renewable Energy Directive. Greenpeace says the directive, which would allow people, communities and businesses to generate their own renewable energy, has been delayed for nine months. The Minister met with the protesters and commented that the transposition of the Directive and other legislative changes are currently put on hold because of the war in Ukraine. He supported Greenpeace's demands and promised that any changes would be made in a way that would not compromise security (OFF News, 2022).

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S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Bulgaria: Studies show that Eastern European countries, including Bulgaria, have an underdeveloped cooperative model due to the concept's association with socialism. The terms "community energy" and "cooperative" are also often associated with "communism" in this part of Europe. The phrase "communal energy" has been purposefully avoided in some NGO's publications to avoid misconceptions.

Energy cooperatives would not be easily and unanimously accepted among Bulgarian citizens because many people connotate the cooperative with something negative. For energy cooperatives to succeed, information on their direct benefits is needed, as well as good financial instruments (Association SIP, n.d.).

The Open Society Institute in Bulgaria organised a survey to check the civil attitudes towards democracy, the rule of law and fundamental rights for 2021-2022. Although the majority of the respondents agreed that democracy is the best form of government, citizens' trust in the institutions of representative democracy and national institutions in general is persistently low. Political parties and parliament are at the bottom of the rankings (only 11% of respondents trust the political parties and 9% trust the parliament, while 80% distrust them). Confidence in the government dropped from 24% in October 2021 to 16% in June 2022, likely due to the political crisis in mid-2022. The erosion in confidence in the parliament, the government, and the political parties since the first half of 2022 can be explained by the inability to form a stable government in the country, as well as the exacerbation of the inflation and energy crises amid the war in Ukraine (Smilov, 2022).

Another study focused on the opinion of the citizens about the institutions and authorities that are responsible for the transition to low carbon technologies and their wider use. The results show that a significant share of respondents (45%) did not know which were the responsible institutions, 16% indicated that they know about these institutions, but only 12% trusted them (Trifonova, 2021).

How the factor influences ENCI: Trust or distrust in institutions can both push and jeopardise ENCI. As described above, the level of trust of Bulgarian citizens in the national institutions is rather low, mainly due to the dynamic political situation in the recent years. Along with the durable negative understandings and connotations from the past about cooperatives and communitive energy among Bulgarian citizens, this distrust hinders the development of ENCI and especially the emergence of energy communities.

Affected ENCI types: Applicable to all ENCI types.

S5. Age, gender, education and class as ENCI factors

How is this factor manifested in Bulgaria: The demographic situation in Bulgaria is characterised by continuous population decline and ageing, low birth rates and high mortality rates. Data of the Bulgarian National Statistical Institute shows a trend of population decline that started in the beginning of the 1990's and continues to today. The latest census from 2021 recorded the biggest population decline in 40 years. Studies foresee that the population is expected to decrease to 5.4 million people in 2050 (BGNES, 2022).

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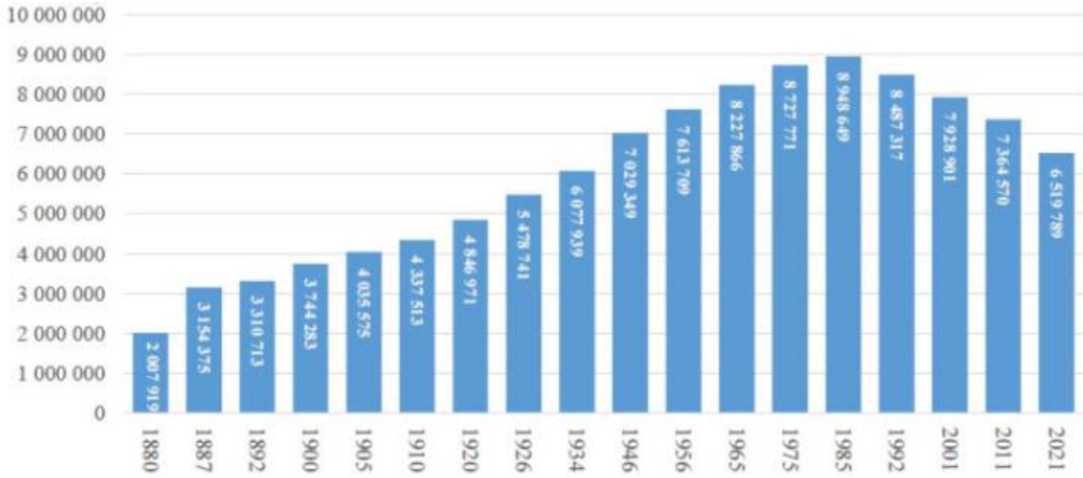
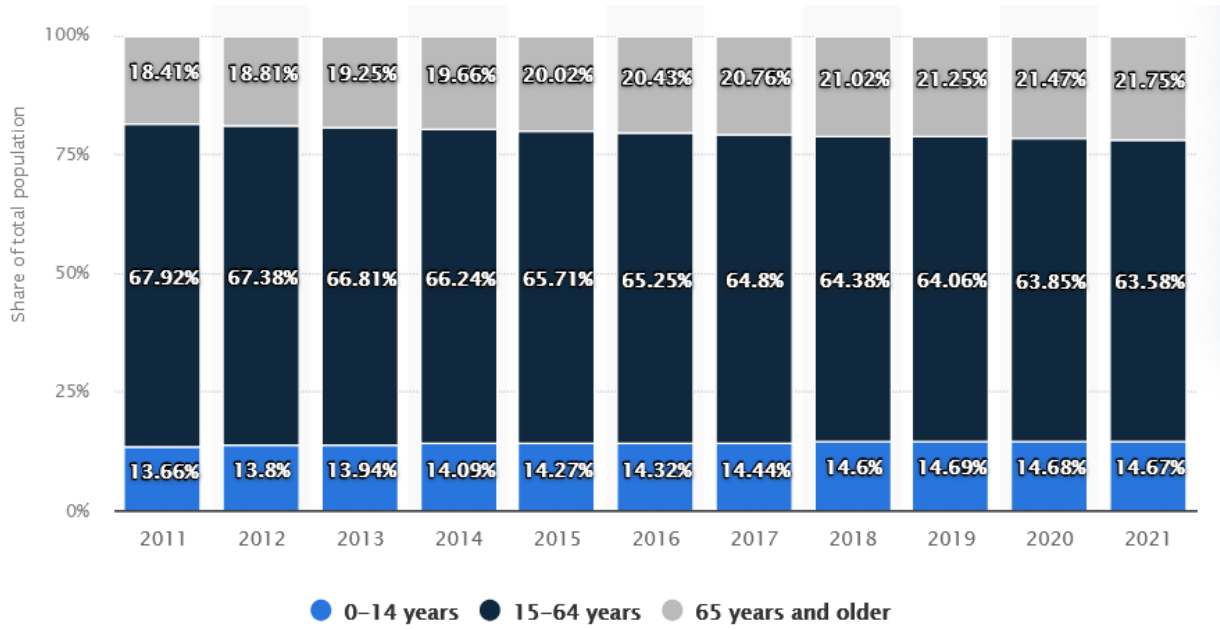
Figure 6.10: Population in Bulgaria by census years.



Source: Chobaligova, 2022.

In addition to the decline, the population in Bulgaria is also steadily ageing. According to data from the online portal Statista, in 2021 the share of people over 65 was 21.75%, which ranks Bulgaria among the EU countries with the oldest population(Statista, n.d.). More detailed statistics conclude that ageing is more prominent among women (27.3% of Bulgarian women are aged 65 and above, while men in the same age group are 19.4%). The trend is for women to live longer than men (Chobaligova, 2022).

Figure 6.11: Bulgaria: Age structure from 2011 to 2021.



Source: Statista, n.d.

There is no data available about the gender distribution of participants in energy communities or other energy initiatives that are taking place in Bulgaria.

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The report "Education in the Republic of Bulgaria 2021" has studied the educational attainment of the population 25-64 years of age. The results for 2020 show that the highest share of the population (53.9%) have upper secondary education, while 29.2% have completed tertiary education, and 16.9% are with primary education (NSI, 2021).

How the factor influences ENCI: Considering the high share of people aged 65+ and the low level of income, it could be claimed that the ageing population is a barrier to ENCI in the country. People are not able to make personal investments in green energy installations due to the high financial resource required. However, older people could act as ENCI if they participate in any of the support schemes provided by the government.

Affected ENCI types: Types 1, 2, 7, and 8.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)

How is this factor manifested in Bulgaria: The availability of technologies for the decarbonisation of the energy sector is increasing on the national level; the Bulgarian solar energy market has grown noticeably – both in the number of actors and in revenue, and is expected to develop further in the foreseeable future. Solar energy is by far the most easily available decentralised energy option to Bulgarian citizens, as offshore wind and ocean energy sources are more likely to be implemented by national or municipal actors for collective use.

Decentralised energy supply options are becoming increasingly popular among Bulgarian citizens and other societal actors. Both increasing prices in the traditional energy sectors and the awareness of the impact of climate change are urging citizens and businesses alike to invest in renewable energy technologies, as confirmed by the Chamber of Commerce and Industry (BCCI, 2022). In addition, solar photovoltaic systems have become more accessible in recent years. Availability is also positively impacted by the current fragmentation of the solar energy market, as increased competitiveness improves accessibility.

However, the development of decentralised energy supply options is also hindered by a variety of factors. Firstly, photovoltaic technologies remain inaccessible to a significant percentage of citizens – the gross disposable income of Bulgarian households is the lowest in the European Union (Spasova & Braungardt, 2021). Insufficient information about renewable energy communities (RECs) among the public, the lack of a concrete legislative definition, and the shortage of engineers likewise negatively impact the availability of such technologies. Finally, organisations associated with the sector – such as the association "Solar Academy Bulgaria" – note that availability is also restricted by administrative obstacles, namely by excessive and exceedingly time-consuming bureaucratic procedures (Solar Academy, 2022).

How the factor influences ENCI: In general, the growing availability of renewable energy sources is undoubtedly an opportunity for the development of energy citizenship, as private enterprises and

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households alike recognise them as an efficient tool to combat climate change and the rising energy prices. This process mobilises organisations to become more active in the public sphere by offering opportunities for acquiring information, for exchanges of ideas and for discussions between stakeholders. However, it is still questionable whether the decentralisation of the energy system, to the degree that it applies currently, facilitates energy citizenship in Bulgaria. The process is still ongoing, with numerous obstacles to be resolved. As many citizens find themselves dependent on national or local funding in order to obtain and install renewable energy sources – especially photovoltaic panels –, energy citizenship is perhaps stalled by legislative and bureaucratic barriers.

Affected ENCI types: Types 1 and 7.

Local examples: Although renewable energy resources – such as photovoltaic installations – are not yet commonplace in households, citizens and private enterprises appear to express great interest therein. NGOs are similarly attempting to increase the availability of such technologies both by raising awareness of the issue and by offering concrete solutions: Greenpeace Bulgaria, for example, offered courses for aspiring PV installers in Bulgaria's most prominent mining towns. Despite the aforementioned barriers, attempts to increase availability have been relatively successful. According to the Regional Information Centre of Kyustendil, an increasing number of households are applying for the installation of photovoltaics (Ivanova, 2023).

T2. Decentralised energy system and storage

How is this factor manifested in Bulgaria: The trend for Bulgaria points to an overall increasing amount of renewable energy. The country possesses significant potential for decentralised photovoltaic-based power generation; however, large-scale, centralised RES investments are prioritised over the potential role of households or small and medium enterprises (International Trade Administration, 2022). Nonetheless, it is assumed that the currently rising energy prices could potentially urge households and enterprises to shift toward decentralised energy solutions (Dely, 2022).

Apart from lack of investment in such projects, two main problems may be observed that hinder the development of decentralised energy systems. Firstly, for many households willing to contribute to the energy transition, the installation of photovoltaics or other RES systems may prove too expensive to realise. Secondly, energy cooperatives – which are a common way of decentralising power in other European countries - are not widespread in Bulgaria. The development of decentralised systems for the exploitation and storage of energy is moreover hindered by administrative barriers and policies.

How the factor influences ENCI: The potential development of a decentralised energy system would greatly facilitate the emergence of energy citizenship in Bulgaria. For example, an increase in energy cooperatives could significantly change both the current conditions of the energy system and the public's outlook on renewable energy sources. The evolution and transition of the energy system would provide important opportunities for individuals and enterprises alike.

However, the large number of barriers which currently prohibit – or at least delay – the development of a decentralised network also consequently hinder energy citizenship. Issues such as administrative barriers, ambiguous energy policies, lack of financing or access to capital, and lack of information or good local

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practices are hampering Bulgaria's progress in the energy sector.

Nonetheless, the process is still underway: citizens' and enterprises' increased interest in decentralised renewable energy networks, and the recent development of the country's first energy cooperative, may in fact imply a positive trend for the future of energy citizenship.

Affected ENCI types: Types 2, 4, 7 and 8.

Local examples: Decentralised energy networks are currently being developed. As of 2021, there existed approximately 2,273 solar installations with a capacity of up to 1 MW that were connected to the energy network (Couture et al., 2021). The number of small-scale photovoltaic facilities has also increased in recent years. Nonetheless, it is noted that these are established predominantly by enterprises, as households continue to face great administrative difficulty.

Another example of progress in the field of decentralised energy systems is that of *"Izgrei"*, Bulgaria's first energy cooperative. Although its conception was very recent, it currently works with all licensed electricity providers in the country, offers innovative solutions to enterprises, and is active in forums and discussions relating to energy transition.

T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in Bulgaria: Digitalisation of the energy system is underway in Bulgaria, although perhaps less prominently than in other European states. Smart metering is becoming increasingly popular in Bulgarian households and is considered as one of the main requisites in the reduction of household energy consumption, along with the renovation of old housing estates. Private energy companies are striving to offer smart metering options to households, and water utility companies are proceeding similarly. Nonetheless, smart metering is still relatively uncommon outside the capital Sofia and few other large cities.

Likewise, the deployment of smart grids is still in process. Private corporations (such as Entra Energy) are involved in their application, and in 2021, a large forum on the implementation of smart grids in Bulgaria was conducted, representing various stakeholders – namely, private enterprises and policymakers (Capital, 2019).

Smart mobility appears to be more developed than the two aforementioned measures - non-CO2 emitting transport is now commonplace in the country's largest cities, provided both by private companies and municipalities. Electric car sharing services and various forms of electric micromobility are gaining popularity, while investments have also been made in e-buses, most commonly in Sofia and Burgas.

How the factor influences ENCI: The digitalisation of the energy system represents a potential opportunity for energy citizenship in Bulgaria, especially on a household level in the form of smart metering, and on a more widespread level through the availability of zero-emission means of transportation. Nonetheless, it can be assumed that this digitalisation has not yet been developed extensively enough to be assessed in its impact on energy citizenship. The process is still underway, and there remain various issues to be resolved - such as concerns surrounding smart metering (i.e. the

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possibility of cyberattacks) and the acquisition of resources by households and enterprises that seek to implement it, among others.

Currently, the digitalisation of the energy system does not appear to specifically facilitate energy citizenship in Bulgaria, although the aforementioned communication between numerous and diverse stakeholders may prove beneficial therein.

Affected ENCI types: Types 1 and 7.

Local examples: The enterprise ADD Bulgaria is currently a leading force in smart metering and remote control, not only by offering technological solutions, but also by maintaining a blog that provides readily accessible information and resolves misconceptions about the digitalisation of the energy system. Local utility companies, however, are likewise involved in the process to varying degrees.

Citizens facilitate the digitalisation of the energy system on both an individual and a collective level - for example, by endorsing micromobility and supporting zero-emission transportation, but also by advocating for solutions that will facilitate their involvement in energy trade. Examples thereof include a protest held in Varna (Greenpeace, 2019), which united various stakeholders behind the demands that emphasised the need for both technological and legislative solutions that would allow them to pursue prosumerism.

T4. Energy efficient buildings

How is this factor manifested in Bulgaria: Energy efficient buildings have become a primary focus for Bulgarian citizens and other stakeholders in recent years, which is displayed through the construction of housing estates that emphasise energy efficient measures, and through the renovation and retrofitting of existing buildings. In Bulgaria's largest cities - including Sofia, Plovdiv and Burgas - the latter option has evolved into a prominent issue, requiring the collaboration of citizens, private enterprises and municipal authorities alike. Information on the energy performance of housing estates is easily accessible, while guides for renovation are regularly published in the media or otherwise available for distribution. Both pollution and the expenses caused by energy inefficiency have urged citizens to address the issue.

However, due to the low disposable income in the majority of households, renovation often proves to be a slow and difficult process. Many citizens rely on financial support from the municipality to implement it, which places additional obstacles in the path of energy efficiency.

How the factor influences ENCI: The increased focus on renovation and retrofitting and the construction of more energy efficient buildings is a significant opportunity for energy citizenship in Bulgaria. Media outlets appear to pay more attention to the issue in recent years, while citizens utilise social media to exchange information and opportunities for renovations. Conversely, the obstacles that have surfaced have also generated discussions among citizens through interviews and online platforms: the necessity of public funding and the processes related thereto, the institutional barriers that may be faced, and even the means to facilitate cooperation between residents of the same housing estate. Meetings and panels, often organised by the municipalities themselves, may also facilitate energy citizenship, as they connect citizens and offer them the information they may be required to implement the renovation process.

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Affected ENCI types: Types 1, 7 and 8.

Local examples: Renovation processes are conducted individually, in small communities (such as the residents of a housing estate), and on a larger scale with municipal aid throughout the country. The most notable example is that of Burgas, where a significant percentage of buildings located in the municipality – including apartment buildings, schools, kindergartens and other public institutions – were entirely renovated to ensure energy efficiency (Trendafilov, 2020). An increasing number of residents in other municipalities, however, is likewise becoming involved in the process. Environmental organisations such as *EnEffect* and *Climateka* have held seminars and forums regarding the issue, encouraging citizens to familiarise themselves with the prerequisites for retrofitting (Climateka, 2022). Despite recent efforts to emphasise the significance of energy efficiency and the urgency of renovations for many households, studies showcase a notable discrepancy between the knowledge and resources possessed by citizens in different cities. Studies highlight citizens of Burgas and Gabrovo as positive examples of involvement in the renovation process of their housing estates in comparison with the residents of other cities (Chobaligova & Popova, 2022).

T5. Smart mobility and green mobility

How is this factor manifested in Bulgaria: Smart mobility is becoming increasingly accessible in various forms in all of the larger cities. Concerns surrounding air and noise pollution and fossil fuel prices have driven a transition to more efficient mobility technologies to which citizens appear to adapt. Private enterprises, NGOs, individual citizens and municipalities are all involved in promoting smart and green mobility in the country's major cities with the intent of increasing efficiency and limiting energy usage and subsequent carbon emissions.

The application of smart mobility systems in Bulgaria appears to be exceedingly multidimensional. Organisers of projects supported by the EU have deliberated in workshops and forums, while private companies have established innovative forms of green transportation, such as autonomous and semi-autonomous electric vehicles and affordable opportunities for micromobility, accessible to citizens through mobile applications. Citizens are likewise seeking to contribute to the transition by promoting and offering ridesharing opportunities on social media platforms. Although car-sharing does not guarantee zero-emission transportation, it contributes greatly to the reduction of pollution. The largest social media platform on which citizens offer and seek rideshares - the Facebook group "Rideshare Plovdiv <> Sofia" - has over 65,000 users. There are also groups that involve other cities, and some, such as "Rideshare," with almost 56,000 members, allow users to post requests and opportunities for rideshares around the entire country. Associations and non-governmental organisations such as Bike Evolution and Green Line Sofia promote the creation and maintenance of bicycle lanes as an alternative means of mobility in densely populated cities.

Smart, green mobility is also made available to citizens through municipal investments in electric buses, which both reduce pollution and render public transport an attractive alternative to citizens by saturating the network. Other innovative alternatives driven by digitalisation include a mobile application that encourages users to navigate their city sustainably by displaying the carbon emissions they have saved and offering rewards.

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How the factor influences ENCI: The promotion of smart and green mobility opportunities in Bulgaria surfaced out of necessity; the increasingly alarming issue of air pollution in Bulgarian cities, especially in Sofia, became a prime motivator for the creation of initiatives that provide alternatives to vehicles powered by fossil fuels. Thus, the promotion of smart and green mobility greatly supports the development of energy citizenship in Bulgaria.

Owing to the number of actors involved in the process of implementing opportunities for smart mobility - and thus the amount of information and the number of alternatives they offer - citizens have become actively engaged in transforming their cities. Representatives of existing NGOs have furthered energy citizenship by collaborating in initiatives such as Sofia Green, while other associations have been created out of the urgent need for green mobility opportunities. Citizens who do not participate in any formal groups or organisations likewise have a significant role therein; by seeking and offering means of greener mobility from and to each other, they greatly facilitate the creation and maintenance of energy citizenship networks across the country.

Affected ENCI types: Types 5, 7, 8 and 9.

Local examples: The examples of local initiatives that support the creation of energy citizenship in the area of green mobility are numerous. Private enterprises offer a variety of electric vehicles: in the case of Spark Cars, these are self-driving vehicles that produce no carbon emissions, and are currently available in Sofia and Plovdiv, while a number of competing firms offer readily available e-scooters and bikes. These include, most notably, companies such as Lime, Hobo and Bird. While the latter two only operate in Sofia, Lime also offers rental e-scooters in Gabrovo, Plovdiv, Burgas, Varna and Stara Zagora (Simova, 2021).

Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in Bulgaria: Due to the ever-increasing effects of climate change, Bulgaria is becoming more susceptible to numerous natural hazards such as flooding, wildfires and drought, as well as extreme temperatures. Individual actions against climate change, although perhaps less pronounced than in other European countries due to both lack of information among the public and inability to participate in the promotion of green energy due to financial challenges, are thus increasing as a means of combating the aforementioned effects.

Energy communities are still not widespread due to a variety of political, economic and legal reasons; nonetheless, citizen attempts to mitigate the effects of climate change can be observed. For example, several informative platforms, which strive to educate the public on climate change and energy transition have been established. Platforms such as Climateka provide crucial, yet accessible information, exclusively using their own resources. Citizen movements against climate change – most notably participation in the Fridays for Future movement – have also become more popular over the last years.

Cooperation between households with the intention of investing in renewable energy is also observable in Bulgaria's larger cities, with individuals promoting the installation of photovoltaic panels on the roofs of

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apartment buildings. The establishment of Bulgaria's first energy cooperative, "Izgrei", which was founded under the pressure of climate change, is likewise a notable example of energy citizenship; as is the Bulgarian Photovoltaic Association – which includes more than 400 companies in the country – and which contributes to the efforts against climate change by showcasing its prioritisation of sustainability by encouraging local businesses to familiarise themselves with renewable energy.

How the factor influences ENCI: The urgency of action against climate change has accelerated the establishment of energy citizenship in Bulgaria, as citizens strive toward both the education of the public and practical measures which can alleviate carbon emissions and excessive energy consumption. Climate change as an inevitable consequence of unsustainable and environmentally damaging practices has essentially mobilised citizens to take action. Its effects are particularly noticeable among students, which participate in large numbers in educational events and practical measures - including frequent protests, student collectives, and campaigns conducted in educational institutions. Moreover, the need for an efficient transition toward renewable energy has inspired local businesses to alter their practices.

Affected ENCI types: All ENCI types are affected.

Local examples: Energy citizenship includes protests against deforestation and construction in protected sites and on the coastline. Such protests are conducted frequently in various cities. Most notably, a project for the construction in the Pirin National Park was countered with demonstrations in over ten cities. The protests, which took Place in Sofia, Plovdiv, Varna, Burgas, Ruse, Haskovo, Sliven, Smolyan and a number of other smaller cities, were sparked by a government decision to construct a second gondola lift within the boundaries of a protected area. According to protesters, exceptions could not be made for construction projects in protected areas, as they are fundamentally unconstitutional, environmentally destructive, and potentially a stepping stone for even greater construction investments (BNR, 2018).

Students have proven especially active in promoting energy citizenship, not only participating in protests against climate change but also establishing collectives and partaking in educational events. Among them are the climate simulation project made by students in Varna with the intent of combating rising temperatures, as well as educational competitions and open discussions (Velcheva, 2022).

EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

How is this factor manifested in Bulgaria: Bulgaria, although its most prominent energy sources are currently coal and nuclear power, possesses the necessary resources for a successful transition to green energy. Geographical opportunities play an important role therein, as they facilitate the use of solar and wind energy, as well as biomass (Stankova & Toneva, 2021). Geographical opportunities include high solar resources in the Southeast and significant wind speed in various small regions throughout the country, most notably in the North-East, the West, and Central Bulgaria (Koleva & Mladenov, 2014).

Nonetheless, Bulgaria does not possess great potential for wind energy; approximately 1,400 km2 of the country's total territory can reach an annual wind speed of over 6.5 m/s, which is considered to be the baseline for sustaining economic advantage (Georgieva, 2006). Thus, while its potential is still being explored, wind energy is not the most readily available and usable renewable resource in Bulgaria.

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Solar energy, on the other hand, may be more easily and extensively utilised, as the country is located in the upper border of the world's "solar belt" and has significant solar activity from March to October (Gramatikov, 2007). Solar thermal water heating, for example, is used extensively in the country's larger cities. Solar power installation increased steadily until 2017; however, installation costs are rendering them less accessible to households (Ganeva, 2022). Other issues that reduce openness to using renewable energy producers include lack of information among the public and the potential administrative barriers (Trifonova, 2021).

How the factor influences ENCI: This factor contains both threats and opportunities for energy citizenship in Bulgaria: the opportunities presented by geographical diversity are rather significant, as the country possesses the potential to develop a vast array of renewable energy sources to various degrees. Moreover, existing methods of renewable energy production, while not widespread, offer a solid foundation on which energy citizenship may be further cultivated.

A potentially significant threat, however, are the rather widespread inability or reluctance to use renewable energy sources. Consumers are, in many cases, incapable of implementing lifestyle changes due to the lack of resources (as in the case of requesting green electricity), while information concerning their potential willingness to do so – and to what degree – is insufficient according to recent data, thus hindering and delaying the development of energy citizenship in the country.

Affected ENCI types: Types 1, 2, 5 and 6.

Local examples: The North-East region of Bulgaria is estimated to have a high wind potential, especially offshore. Most of Bulgarian onshore wind energy capacities are located in this region (about half of the overall 700 MW generation capacity in the country). A recent World Bank map (2020) estimates the technically viable wind energy potential of the Bulgarian Black Sea area at 26 GW (World Bank, 2020). The potential conflicts regarding the utilisation of Bulgarian offshore wind potential might arise from the fact that the area is crossed by established navigational routes and presence of underwater cables, while large portions of the coastal waters have been set aside for gas exploration concessions and military training areas. Parts of the area located close to the shore are also in conflict with several sites protected under the Habitats Directive and Birds Directive.

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Bulgaria: Pollution is a chief concern in Bulgaria, as the levels of air pollution in numerous areas have been cited to be life-threatening, while water pollution has strongly affected citizens in various cities. Over the recent years, the levels of air particulate matter in the country have consistently exceeded the permissible levels.

Thus, different activities have been undertaken in recent years to reduce pollution in Bulgaria's most populous cities, usually by different NGOs. Za Zemiata, for example, has repeatedly challenged the Municipality of Sofia over its passivity in regard to air pollution, both in the media and through court processes.

Individual citizens, on the other hand, take action against air and noise pollution by rejecting petrol- and

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diesel-powered cars, and instead switching to e-scooters, which are now available in seven Bulgarian cities. Moreover, protests, petitions and clean-up initiatives have become increasingly popular in many cities. Clean-up campaigns in particular are conducted on a regular basis. Initiatives such as "Let's Clean Bulgaria Together" include volunteers from various cities, inciting small-scale action against environmental degradation.

Action against pollution therefore persists through NGOs, informal citizen initiatives, media publications, and individual lifestyle changes - it is, in fact, one of the most widely discussed environmental issues with which the country is faced.

How the factor influences ENCI: Pollution, and in particular air pollution, has been an exceedingly pressing issue for many Bulgarian cities in recent years. Due to the health and safety risks it poses, it has contributed greatly to the furthering of energy citizenship. Citizen action against pollution extends from the establishment of organisations that strive to inform the public on the effects of pollution and the potential countermeasures that can be taken, to protests in various cities. Mediation between citizens and state actors has also become more prominent in the face of increasing pollution, as organisations address both the responsible government authorities and the judiciary.

Practical action is also taken, most notably in the form of clean-up initiatives with participation of citizens. The prominence of pollution in Bulgaria and the seeming inability to reduce its harmful impact in the most urbanised regions has furthered the development of energy citizenship to a great degree, inciting continuous and diverse citizen action.

Bulgaria's largest cities also appear to take individual action against pollution: car-sharing and micromobility (i.e. e-scooters, e-bikes) have become increasingly prominent in both the capital and other cities that struggle with air pollution. E-scooters and e-bikes are used extensively by citizens who strive to avoid contributing to carbon emissions.

Affected ENCI types: All ENCI types.

Local examples: Notable protests against air and water pollution have taken place in many Bulgarian cities in recent years. Examples include the residents of Pernik and Marten, who have protested on numerous occasions against the pollution of Bulgaria's rivers. The environmental activists of Pernik have drawn attention to the necessity of protecting local fish species in the Struma River and the Pchelina Reservoir, claiming that industrial pollution has essentially poisoned the waters (Tamakyarska, 2019). In Marten, citizens have signed petitions for the protection of the Danube, alluding to the presence of oil spills (Nikiforova, 2014).

Similarly, in Sofia, actions against air pollution are very prominent. The organisation "Breathe, Bulgaria" serves as an example thereof, as it has conducted informative events on the effects of pollution, as well as potential countermeasures, while also including and hosting meetings with citizens, and attempting to serve as a mediator between the public and state actors. Greenpeace Bulgaria, meanwhile, collaborated with local robotics labs in order to provide citizens with an affordable and accessible way to measure dust and particulate matter (Stoyanova, 2016).

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EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in Bulgaria: Bulgaria, due to its natural geographic features, has significant potential for solar and wind energy, as well as biomass from agricultural solid waste. However, the topographic diversity of the country makes these sources of renewable energy region-specific, greatly limiting the options for land utilisation. For example, wind energy may realise its maximum potential in the Central and North-East regions, where the average wind speed is significantly higher. While this geographical diversity may prove beneficial in implementing a variety of RES structures, it also poses certain challenges. The North-East, for instance, is home to protected areas and ornithological sites, thus limiting the potential for the installation of wind turbine parks and rendering them controversial among environmentalists. Approximately 60% of Bulgaria's land area is arable land, which under the current legal framework cannot be repurposed for the installation of solar panels.

Energy citizenship focusing on the installation of RES is therefore relatively limited, as the constraints remain numerous. The installation of renewable energy sources inside or in proximity to urban areas, however, is proceeding efficiently, as investment projects to harness wind and solar energy increased greatly between 2019 and 2022.

How the factor influences ENCI: Currently, the repurposing of land in Bulgaria for the production of renewable energy seems to be stalled by a number of factors. Discussions around the use of land for RES installations have proven mostly a hindrance to energy citizenship, as the existing options for land use are limited and often in conflict with the interests of environmentalists and rural communities.

The conditions surrounding land use not only slow down energy transition and prevent the cultivation of energy citizenship, but also raise suspicions towards its supporters. Organisations and companies that favour energy transition may not receive widespread support, as the use or repurposing of land for RES may be perceived as threatening to the environment. Thus, actions facilitating the energy transition process may be mistrusted by the public, or create a division between such organisations, on the one hand, and environmental activists and rural communities, on the other hand.

Affected ENCI types: All ENCI types.

Local examples: Given the difficulties in utilising agricultural lands for the production of renewable energy, stakeholders appear to have redirected their interests toward industrial areas with fewer regulations on construction - a prominent example being the North industrial area in Burgas (Lecheva, 2022). However, spaces which would be considered more appropriate for the installation of renewable energy resources remain unused due to their natural significance – in various rural areas, protests have been conducted to prevent the utilisation of natural sites such as rivers and forests for renewable energy installations. Examples include citizens' negative response to the photovoltaic investments near the Ogosta Reservoir (Hristova, 2023).

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EN5. Biodiversity protection issues connected to renewable installations

How is this factor manifested in Bulgaria: Bulgaria is a European hotspot of biodiversity, home to thousands of species of flora and fauna, and with approximately 20% of its territory protected under the Natura 2000 network. This generates great controversy surrounding the installation of renewable energy plants, as the specific geological and climate requirements for their efficient functioning often include natural areas such as rivers, forests and seas. Forests and agricultural lands amount to over 75% of the national territory, rendering the installation of large-scale photovoltaic plants increasingly difficult.

Although the utilisation of wind-powered energy sources has gained popularity in recent years, it has also been questioned by environmental organisations and directives, as part of the limited area in which wind turbines may be placed – most commonly on elevated areas on the Black Sea coast – includes the documented migration route for local birds, Via Pontica.

Nonetheless, as the necessity for renewable energy sources is recognised, their construction is not foregone, leading to conflict between stakeholders in the energy sector and environmentalists. The construction of an autonomous hybrid RES system near the border of the Central Balkan National Park, for example, was strongly opposed by citizens, especially environmentalists. While carbon neutrality may be a priority for the latter group especially, this phenomenon has become the cause of notable obstacles in the promotion of energy citizenship.

How the factor influences ENCI: The conflict between the promotion of renewable energy sources and the protection of the country's natural biodiversity has perhaps hindered the emergence of energy citizenship. Citizens, especially in rural areas, have repeatedly opposed investments in RES due to potential environmental threats. The opposition to RES has also been noted to stem from the fact that the government or municipal authorities tend to approve of exceedingly large-scale investments which require greater land use, while smaller RES projects with less environmental impact remain difficult to realise. Environmental activists denounce the construction of renewable energy plants that are regarded as an investment in a growing industry rather than an urgent necessity and strive to abide by the zoning maps created for the environmentally safe installation of wind turbines and photovoltaic plants. This phenomenon has the potential to greatly hinder the development of energy citizenship in Bulgaria, as the connotation of renewable energy to environmental safety may be consequently lost.

Affected ENCI types: Type 10.

Local examples: Renewable energy development is sometimes opposed in favour of environmental protection, as in the case of recent protests against investment plans to install photovoltaic systems on a lake and reservoir in the Northwest of the country. However, some environmentalists are striving to reconcile the two: for example, a representative of the Bulgarian Society for the Protection of Birds in the department of European policies gave an interview in support of RES, provided their installation adheres to the established regulations on environmental protection (Dobrudja Information Agency, 2022). Other examples include the independent coalition *For the Nature*, which has provided reports on its position toward RES investments, detailing the importance of prioritising "go-to areas" - such as surface mines, rooftops, unused urban areas and non-exploitable land, while simultaneously protecting Natura 2000 areas and territories with recognised biodiversity (For the Nature, 2022).

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Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Bulgaria: The acts, which regulate the sector, include the Energy Act from 2003, which established the general conditions for efficient use and generation of energy from renewable sources, the Renewable and Alternative Energy Sources and Biofuels Act from 2008, which set up a system for producing electricity from RES, and the adopted in 2011 Energy from Renewable Sources Act (ERSA), whose objective was to create a more favourable investment climate and to achieve the EU targets. ERSA regulates the self-consumption of electricity, produced from renewable energy sources (e.g. energy produced by photovoltaic systems, located on the roofs or facades of buildings). According to its provisions, the producers can use generated renewable electricity for self-consumption after filing an application for connection to the electricity network operator. The surplus electricity has to be purchased by a supplier at a price, set by the regulator in accordance with the conditions and the procedure laid down in ERSA.

Bulgaria has not yet transposed all provisions of the "Clean Energy for all Europeans" Package from 2016, especially the ones that refer to *self-consumer of electricity produced by RES*, *jointly operating consumers of own energy from RES* and *renewable energy community (REC)*, as regulated by Directive (EU) 2018/2001 (REDII). The same applies to the provisions of the Directive (EU) 2019/944 (recast Electricity Directive) (IEMD) for *active customers* and *citizen energy community (CEC)*. Therefore, the current legislation in Bulgaria lacks the needed provisions on the establishment and functioning of energy communities. These changes need to take place as soon as possible because the European Commission is already criticising the country and threatens to impose sanctions in the near future. Furthermore, citizens are expected to become actors on the free energy market in 2026, but legislation in the field of energy has to be revised in order to allow this to happen. Relevant stakeholders, which are pushing the process forward, include local energy agencies such as Sofia Energy Agency SOFENA and Energy Agency – Plovdiv, experts/lawyers in environmental and energy law, organisations such as the Center for Energy Efficiency EnEffect, the Chamber of Installation Specialists in Bulgaria (CISB), Black Sea Energy Research Centre, Greenpeace Bulgaria, the Green Policy Institute, the Consumer Association, the Bulgarian Council for Youth Development, the State Fund for Energy Efficiency and Renewable Energy, Habitat Bulgaria etc.

Nevertheless, the INECP supports the promotion of energy communities and their participation in the energy market by prescribing the introduction of the needed legislative measures.

How the factor influences ENCI: While the latest trends and developments both in Europe and Bulgaria support participative governance, the existing legislation still hinders the development of energy communities in the country. The fact that the provisions regarding the establishment and operation of renewable energy communities (RECs) and citizen energy communities (CECs), provided by REDII and IEMD, respectively, have not yet been introduced into Bulgarian legislation, hinders the emergence of ENCIs in the country as there are no clear rules and procedures that need to be followed. Furthermore, the fact that such provisions will be adopted in the future makes the situation even more uncertain, because it is not known whether these regulations will be retroactive or not.

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Affected ENCI types: All ENCI types.

Local examples: "Izgrei" – the first energy community in Bulgaria - has been registered as a limited liability company since the REDII and IEMD Directives have not yet been transposed into national legislation. The process of registration was costly, lengthy (more than a year) and cumbersome, and the founder of "Izgrei" Tzvetan Georgiev is still waiting for an approval to install the panels on the roof of his house. Although "Izgrei" is a member of the European Federation of Renewable Energy Cooperatives, it does not have the legal status of a cooperative. Furthermore, because of the lack of relevant legislation for the establishment and operation of energy communities in the country, Tzvetan Georgiev cannot, at this stage, include his neighbours in his endeavour, thus turning his initiative into a real community.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in Bulgaria: A definition for energy poverty was developed in Bulgaria in January 2023. According to it, energy poor are all those people who fall below the poverty line after paying their expenses for energy. According to data, these are more than 2.8 million Bulgarians with an income below BGN 722 per person. What needs to be done next are the amendments to the Energy Act in order to include this new definition. Meanwhile, Bulgaria is implementing a support scheme for people who cover income-tested and property-based criteria for poverty and is granting heating allowances to eligible recipients during the heating period via the social assistance system.

In line with the recommendation of the European Commission for the development of competitive wholesale and retails energy markets, regulated prices for all final consumers will be phased out by the end of 2025. This development might additionally complicate the situation of vulnerable clients. Therefore, before reaching full liberalisation of the market, the government is planning to introduce measures that shall ensure the protection of vulnerable societal groups. Some of these measures, presented in INECP, include:

- Provision of target heating allowances to vulnerable groups;
- A mechanism for the protection of vulnerable consumers, following the full liberalisation of prices of electricity for final consumers;
- Renovation of multi-family residential buildings, aiming to improve the living conditions of households with low incomes and to get them out of the group of households at risk of energy poverty;
- Introducing a requirement, complementing the national target under Directive 2012/27/EU, that makes vulnerable clients a priority when implementing measures for improving energy efficiency.

How the factor influences ENCI: The fact that there are no targeted policies dealing with energy poverty-related issues and protection of vulnerable people is a threat to the emergence of ENCI. Marginalised groups and vulnerable consumers need targeted empowerment measures that will support them and will enable them to participate in the energy market, because otherwise they will most probably stay out of it. However, such measures are currently not available in Bulgaria, which hinders not only the development of ENCI, but the participation of such groups in the energy system.

Affected ENCI types: Types 1 and 2.

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Local examples: In the summer of 2019, Sofia Municipality launched a campaign for the free replacement of old solid fuel stoves, targeted at vulnerable and energy poor consumers. The campaign aimed to cover 20,000 households, willing to replace (free of charge) their old heating appliances with alternative forms of heating (gas, electricity, pellets or connecting to the district heating network). The number of targeted households was reached. The free replacement of old solid fuel (wood and coal) heaters was initiated in order to help vulnerable consumers contribute to a cleaner environment, thus, adding value to the other two important goals, namely breathing healthier air inside the home and out (solid fuel stoves release ash and sulphur into the air) and making the homes better heated as old stoves are highly ineffective.

L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (including rights for active participation of customers in the electricity markets)

How is this factor manifested in Bulgaria: Consumers in Bulgaria have the right to transparent billing information, which presents their energy consumption on a monthly basis in an easily comprehensible way, they can choose their electricity supplier, and have the right to purchase electricity at agreed prices. They can participate in the electricity market as self-consumers of electricity produced from renewable energy sources and sell the surplus electricity to a retailer supplier at a price set by the EWRC.

Regulated prices for all final consumers shall be phased out by the end of 2025.

Bulgaria still has no legal framework on forming energy communities, but according to INECP, several amendments to the existing legislation are planned. They will include provisions for:

- Supporting and promoting local energy communities to actively participate in the energy market and to enable the transition of active customers to a fully liberalised electricity market;
- Establishing a platform, allowing the comparison of offers of suppliers, which shall support the active participation of consumers in the market as well as the transparency of relations in CECs. The measure is expected to cover household consumers and micro enterprises with annual electricity consumption below 100,000 kWh;
- Creating appropriate conditions for establishment of energy communities.

When such legislative amendments will be introduced and how the rights and duties of consumers, prosumers and new producers in the energy market will be regulated and protected, is yet to be seen.

How the factor influences ENCI: The full liberalisation of the energy market in Bulgaria is expected to serve as an opportunity for the establishment of energy communities. Still, the current lack of legal framework that supports such activities hinders their emergence. INECP presents measures that shall promote local energy communities to actively participate in the energy market and to enable the transition of active customers to a fully liberalised electricity market, but they are still in the making and no timeframe when these will become operational is given at this stage.

Affected ENCI types: All ENCI types apart from types 9 and 10.

Local examples: Not applicable as the energy system is centralised and there are no examples of local/municipal legal frameworks, defining the rights and duties of prosumers.

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L4. Bureaucracy and red tape

How is this factor manifested in Bulgaria: Bulgaria is one of the EU countries with the most lengthy and burdensome administrative procedures in all public spheres and this applies also to the energy sector and procedures for obtaining building and/or environmental permits. Currently there is a lack of regulation regarding the establishment of energy communities in Bulgaria as the country has not yet transposed the provisions of two major directives that regulate such activities, namely REDII and IEMD. This makes it really hard for active consumers to become part of the energy system through the establishment of energy communities. While the introduction of such regulations into Bulgarian legislation is inevitable, there are many uncertainties regarding the timing and whether the rules will be retroactive or will apply only to future energy communities. Furthermore, existing regulations for the protection of the environment and protected natural areas might complicate the administrative procedures for renewable energy installations.

How the factor influences ENCI: Lack of regulation for the establishment of energy communities or any other form of energy citizenship could be seen as a threat as well as an opportunity. On the one hand, it is a threat, because there are no clear rules on how to do things when it comes to the creation of such entities and there is a level of uncertainty and instability, stemming from the fact that such regulations will be created in the near future. On the other hand, this gives options to people who want to establish such a community or another type/form of energy citizenship, because they are not obliged to follow regulations regarding CECs and could exploit the fact that business entities such as limited liability companies (which is the legal form of the first energy community in Bulgaria) could participate in business operations, which are beyond the scope of the activities of energy communities.

Affected ENCI types: Types 1, 2, 3, 4, 7 and 8.

Local examples: Many Bulgarian homes have the potential to become energy independent if they install a renewable home electric system. However, to be allowed to do that, people should go through a procedure, dominated by many hurdles. Currently, the regulations in Bulgaria make the process of installing renewable energy systems very slow. While in both Western and Central European states such a process takes several months, in Bulgaria it might take two years to install a renewable energy electric system in a home. The investment costs for such a system in Bulgaria are not different from those in the West, but the procedures are cumbersome, and the administrative fees are very high.

L5. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)

How is this factor manifested in Bulgaria: In 2012, Bulgaria has already achieved its obligatory national target of 16% share of renewable energy in the gross final energy consumption by 2020. Due to legislative changes, which obliged the state to buy electricity at preferential prices only from very small roof installations (up to 30 kW), almost no new renewable energy capacities were built in the country after 2012. In recent years, with the considerable reduction in the cost of panels and the increasing efficiency of technology, interest in such types of projects has returned.

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While Bulgaria has made progress in promoting renewable energy, there may be some legal uncertainties regarding energy citizenship. A few potential areas of legal uncertainties have been identified in a recent study from March 2023 (Bezuhanova, S. et al, 2023). The most pressing issues the study identified are:

- The lack of working energy poverty definition in the active legislation puts energy poor households at risk of non-compliance with support measures in the field of energy efficiency and renewable energy; furthermore, it is possible that existing laws and regulations may not explicitly address the rights and responsibilities of disadvantaged energy consumers, which can also create legal uncertainties;
- The Law on the condominium ownership management lacks specific texts to regulate public relations related to the creation and functioning of energy communities; this problem is aggravated by the challenging administrative procedures for obtaining permits, licenses, or approvals from relevant authorities;
- The risk of energy communities failure due to the poor-quality attempt for a transposition of the Renewable Energy Directive (2018/2001) into national legislation, which finds expression in the literal copying of the Directive into the Renewable Energy Act instead of its transposition.

How the factor influences ENCI: The legal uncertainties can have several impacts on energy citizenship in Bulgaria. They may discourage individuals and communities from actively engaging in energy citizenship activities. They can also lead to increased costs and delays in implementing energy citizenship projects and initiatives. For example, the complex administrative procedures, seeking legal advice, or addressing regulatory gaps can add expenses and time to the process, which in turn could make energy citizenship less attractive or financially viable. Moreover, if the legal framework does not provide clear guidelines, different authorities or stakeholders may interpret and apply regulations differently. Perceiving the legal environment as unstable could also prevent potential consumers from engaging in long-term investments or collaborations.

Affected ENCI types: All ENCI types.

Local examples: In the end of November 2022, energy experts of Greenpeace Bulgaria developed a draft project on Amendments and Supplements to the Law on Energy from Renewable Sources in Bulgaria. The legislative changes they proposed aimed to give people the right to join together in so-called energy communities, as well as the possibility for any end-user (either an individual or an energy community) to have the opportunity to sell surplus electricity produced from renewable sources for own consumption to the electricity company or the free market.

The legal proposal also represents an adequate solution for addressing the energy poverty issue. The texts include various measures to help people produce energy from renewable sources on their own or in communities. Some of them are related to easing procedures for connecting to the electricity grid, removing administrative obstacles and financial support opportunities (Greenpeace Bulgaria, 2022).

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Summary table

	Factors	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition		X				
	Multi-level energy governance structure of a country						X
	Political support for ENCI (mechanisms, networks, etc.)					X	
	Political/democratic culture and traditions		X				
	Inclusion and empowerment policies				X		
	Public participation and multi-level dialogues with non-political actors				X		
ECONOMIC	General economic situation / Inflation rate & purchasing power		X			X	
	Energy prices						X
	Energy market	X					
	Economic policy instruments (energy taxation, state aid, fuel subsidies)					X	
	Financing and investment opportunities						X
	Security of energy supply and security of supply of raw materials and other resources						X
SOCIAL	Level of income / wealth disparity and energy poverty	X					
	Energy literacy, awareness and skills	X					
	Citizen engagement and passivity in society		X				
	Trust in institutions and collective endeavours	X					
	Age, gender, education and class as ENCI factors		X				
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES					X	
	Decentralised energy system and storage					X	
	Digitalisation of the energy system				X		
	Energy efficient buildings						X
	Smart mobility and green mobility						X

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ENVIRONMENTAL	Climate vulnerability					X	
	Availability of resources		X			X	
	Pollution						X
	Conflicts and opportunities about land use for renewable energy		X				
	Biodiversity protection issues connected to renewable installations	X					
LEGAL	Legal framings of ENCI forms	X					
	Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion	X					
	Rights and duties of consumers, prosumers and new producers in interaction with energy market		X				
	Bureaucracy and red tape	X			X		
	Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)		X				
	Total factors per level of barrier/support	8	9	0	4	7	7

Conclusion

The PESTEL analysis of external factors, which either support or hinder the emergence and development of energy citizenship in Bulgaria, has produced some interesting findings. In general, political, economic and technological factors seem to be predominantly supportive, contributing in different ways to a formation of a (potentially) fruitful field for the ENCI cultivation. Environmental factors are ambiguous – while some act as motivation for ENCI, others represent a considerable barrier. The analysis show that legal factors are a strong deterrent for energy citizenship in Bulgaria. This is not surprising for a country, which is on the penultimate place among the EU countries in the Rule of Law Index (World Justice Project, 2021). Social factors proved to be equally discouraging – again a rather inevitable outcome for the poorest EU member state.

Out of 32 factors examined in the analysis, 7 represent a high impact barrier, 7 a middle impact barrier, 3 a low impact driver, 5 a middle impact driver, and 7 a high impact driver. Three factors are ambiguous – under different circumstances they can either hinder or support ENCI.

Major barriers and opportunities to the emergence and/or development of ENCI in Bulgaria

The following seven factors were assessed to represent the most important drivers/opportunities for the energy citizenship in the country:

- Multi-level energy governance structure of a country: Although the process is still ongoing, the liberalisation of the energy market is an immense opportunity for active energy citizenship in Bulgaria.

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By the end of 2025, a number of measures should be in place to stimulate the creation of local energy communities and encourage the consumers to play a more active role. Steps for protection of vulnerable consumers have also been foreseen.

- Energy prices: Despite having some of the lowest energy prices in the EU, Bulgaria is also the country with the highest levels of energy poverty. The energy prices can be a highly motivating factor for participation in ENCI practices, including among the vulnerable households. If provided proper information and support, many Bulgarian citizens would be eager to rethink their energy consumption behaviour and practices and reduce their energy bills.
- Financing and investment opportunities: Different financial mechanisms act as important enablers of ENCI, by providing households the necessary financial resources to cover the costs of retrofitting or renewable energy installations. This potential has not been fully utilised in Bulgaria, as most often these mechanisms focus on increasing the energy efficiency of dwellings. Availability of accessible supporting incentives on the national level could considerably enhance the development of small-scale RES projects and energy communities.
- Security of energy supply and security of supply of raw materials and other resources: The necessity to diversify the energy supply of Bulgaria in the aftermath of the Russian war in Ukraine could serve as an opportunity for the rapid deployment of renewable energy sources, with people feeling motivated to replace the fossil fuels produced energy with renewable energy sources or to start saving resources in order to decrease dependence on certain energy sources (for example the Russian gas).
- Energy efficient buildings: In addition to the availability of financial support mechanisms, media and a variety of social actors provide information and raise awareness about the benefits of retrofitting and the construction of more energy efficient buildings. This also represents a significant opportunity for energy citizenship in Bulgaria.
- Smart mobility and green mobility: The promotion of smart and green mobility opportunities in Bulgaria surfaced out of necessity (high levels of air pollution in cities, especially Sofia, and the high costs of fuel). Different actors, from NGOs to businesses, have enabled the engagement of citizens in transformation of their cities. By using or providing greener mobility options (car-sharing and micro-mobility, i.e. e-scooters, e-bikes) to each other, citizens facilitate the creation and maintenance of energy citizenship networks across the country.
- Pollution: Pollution, and in particular air pollution, has been an exceedingly pressing issue for many Bulgarian cities in recent years. Citizen action against pollution extends from the establishment of organisations that strive to inform the public on the effects of pollution and the potential countermeasures that can be taken, to protests. Practical action is also taken, most notably in the form of clean-up initiatives.

Seven main barriers preventing or delaying the development of the ENCI in Bulgaria are the following:

- Energy market: The still not fully liberalised energy market hinders the development of ENCI initiatives in the country – especially the ones involving self-production of electricity. Citizens who try to build their own installations encounter bureaucratic difficulties, complex and slow processes and legal ambiguities, which discourage many interested in generating their own energy or participating in energy communities/cooperatives.

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- Level of income / wealth disparity and energy poverty: Bulgaria has the highest level of energy poverty in the EU. The lower disposable income of households strongly affects the possibilities for development of renewable energy cooperatives and communities. Low-income and vulnerable households are also more unlikely to upgrade their inefficient heating systems or retrofit their homes.
- Energy literacy, awareness and skills: The knowledge about energy issues in Bulgaria is rather low. Being unaware of the opportunities and benefits that renewable energy offers and knowing little about how to consume energy in a conscious way, Bulgaria citizens are very restricted regarding their ENCI options. Despite the multitude of projects and information campaigns, the energy literacy has not improved visibly over the recent years.
- Trust in institutions and collective endeavours: Citizens' trust in the institutions of representative democracy and national institutions in general is alarmingly low. In addition, many Bulgarians tend to associate communities and cooperatives with communism and hence do not even consider participating. The combination of these two aspects is a very strong hindrance for the development of ENCI and especially of energy communities.
- Biodiversity protection issues connected to renewable installations: Bulgaria is a European hotspot of biodiversity, home to thousands of species of flora and fauna. Forests and agricultural lands amount to over 75% of the national territory, and approximately 20% of the country is protected under the Natura 2000 network. This generates great controversy surrounding the installation of renewable energy plants and hinders the emergence of energy citizenship, especially in rural areas.
- Legal framings of ENCI forms: The current legislation lacks the needed provisions on the establishment and functioning of energy communities – fact that has already drawn criticism from the European Commission and puts Bulgaria in the risk of sanctions in the near future. Although citizens are expected to become actors on the free energy market by 2026, the relevant legislation has yet to be revised to make this possible. This considerably hinders the development of energy communities in the country, as there are no clear rules and procedures that need to be followed.
- Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion: A definition for energy poverty was developed only in January 2023, but has not been yet officially adopted due to the political instability. When finally introduced into the Energy Act, this new definition will enable a more targeted implementation of measures for protection of vulnerable societal groups. Until this happens, the legal situation of marginalised groups and vulnerable consumers will remain a threat to the emergence of ENCI and the participation of such groups in the energy system.

Depending on the circumstances, three factors are at the same time hindering and supporting ENCI in the country:

- General economic situation / Inflation rate & purchasing power: In late 2022 and early 2023, inflation in Bulgaria was well above the average, putting additional strain on already extremely low purchasing power of households. This situation can work at the same time as an incentive and a barrier to ENCI. On the one hand, citizens are likely to avoid making investments in energy efficiency measures, and on the other hand, they might be motivated to reduce the energy consumption or look for other solutions such as joining energy communities, using more sustainable (and cheaper) transport, etc.
- Availability of resources: Due to its geographical position, Bulgaria has considerable potential for the use of solar and wind energy, as well as biomass. This is an excellent opportunity for the development

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of energy citizenship and utilisation of renewable energy sources. A potentially significant threat, however, is the ability of citizens to participate. The RES market in Bulgaria has been so far dominated by large business players and the ordinary citizens have thus far had very limited access to these resources.

- Bureaucracy and red tape: Bulgaria is one of the EU countries with the most lengthy and burdensome administrative procedures in all public spheres and this applies also to the energy sector and procedures for obtaining building and/or environmental permits. Country has still not adopted the necessary legislation regarding the establishment of energy communities. Somewhat paradoxically, this can both hinder and support ENCI. On the one hand, the absence of clear rules obviously discourages many citizens, but on the other hand, it also provides a certain freedom of action, as there are no obligatory rules to be followed.

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7. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN FRANCE

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Introduction

Table 7.1:

Reduction of greenhouse gas emissions	2030: - 40% compared to 1990 2050: Net-zero (- 85% reduction without LULUCF compared to 1990)
Reduction of fossil fuel consumption	2030: - 40% of total final consumption compared to 2012
Renewable energy production and consumption	2020: 23% of total final consumption (not reached) 2030: 32%
Energy efficiency	2030: - 20% of total final consumption compared to 2012 2050: - 50%

The energy transition emerged as topic on the domestic political agenda in France during the early 2010s and the role of nuclear power was and is still to this day a key driver of the energy transition debate (see factor P3). In 2022, pressure from the strong French pro-nuclear coalition and the energy price crisis (from August 2021) solidified the role of nuclear in French energy policy and decarbonisation through Emmanuel Macron's (2017-present) France 2030 Strategy (see factor P7). The current French objectives for the energy transition (see the Table above) are anchored in the Energy Transition for Green Growth Law adopted in 2015 (*Loi relative à la transition énergétique pour la croissance verte*) and the Climate and Energy Law from 2019 (*Loi énergie-climat*). The Energy and Climate Law is currently being revised and will specify new objectives adapted to the EU Fit for 55 package. In terms of implementation, both the French High Council for Climate (2022), and the International Energy Agency (2021), among others, state that France needs to speed up its work on energy efficiency, renewables deployment and emissions reductions, to be able to reach both domestic and EU targets. The French government furthermore puts a lot of emphasis on citizen participation in consultations and debates, but without adequately translating outcomes to policy (see factor P3).

In France, the energy transition debate is oftentimes reduced to discussions on electricity. However, electricity only represents 24% of final energy consumption in France. To achieve its climate objectives, France must phase out fossil fuels that make up around 62% of final energy consumption (Nguyen 2022). So far, France is behind on its renewable energy objective. In fact, France was the only country in the EU that did not reach its 2020 objective. In 2023 the parliament will vote on the new multiannual programming

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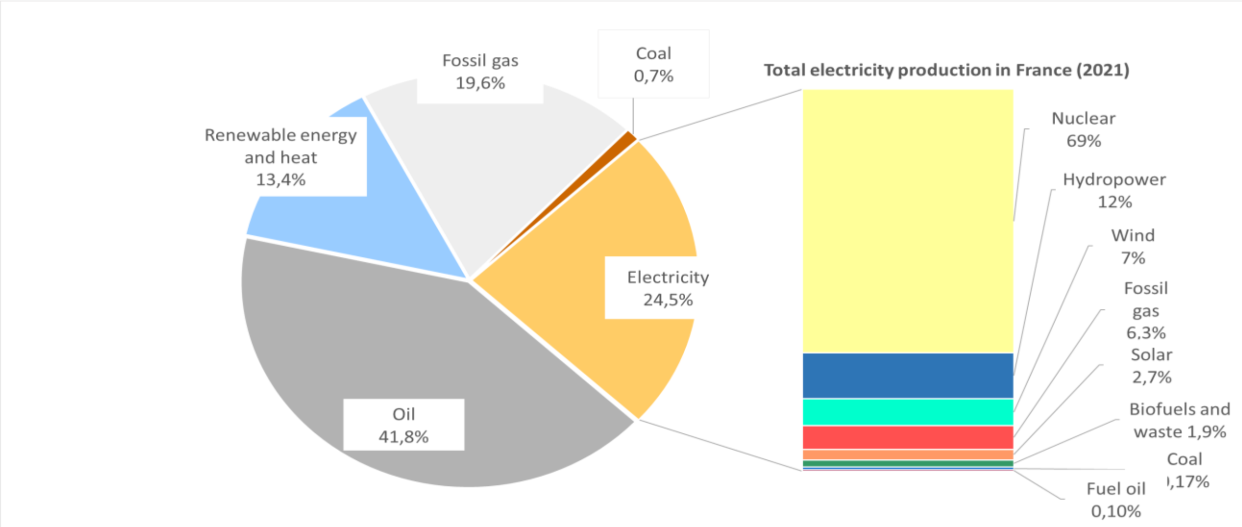
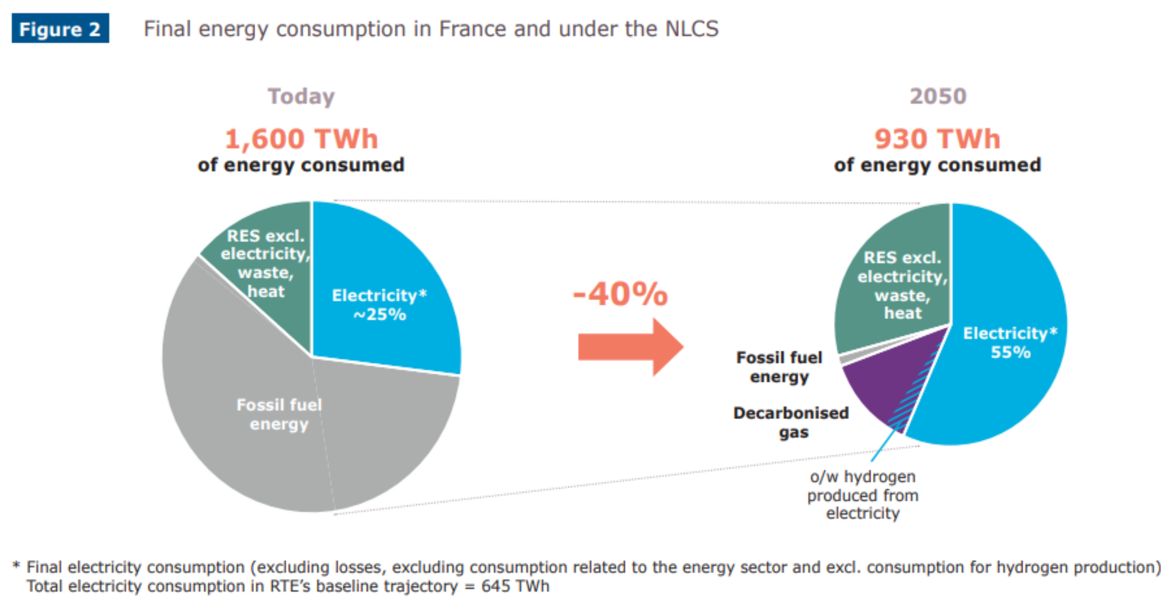
law (see factors P1 and T1) that will give indications on the objectives in terms of shares of each energy source. [Macron has announced](#) that France is aiming for a mix of renewables made up from 40 GW offshore wind, 40 GW onshore wind and 100 GW solar in 2050. In terms of nuclear, 25 additional GW have been announced until 2050, compared to around 61 GW at the beginning of 2023 (see factor T1).

Figure 7.1: France's total energy consumption and total electricity production in 2021.



Source: Nguyen P.-V. (2022) based on data from RTE and the French Ministry for the Ecological Transition.

Figure 7.2: Final energy consumption in France 2020 (to the left) and in 2050 (to the right) according to the objectives in the National Low-Carbon Strategy for 2050 (see factor P1).



Source: [RTE 2022.](#)

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Traditionally, the energy governance structure in France has been highly centralised. Since the 1980s the French energy system has been characterised by the dominance of nuclear power together with a preference for large state-led projects and strong national utilities (i.e. former monopolies that have remained dominant after the liberalisation of the energy market). While the traditional network of political and administrative elites is considered to still uphold key power positions in the French energy governance system, the liberalisation of energy markets (see factor EC3) has opened a window of opportunity for the involvement of local authorities and actors and served to empower other economic actors vis-à-vis the state (Bocquillon and Evrard, 2022). The competences accorded to local and regional authorities in France however only gives them a certain degree of power. Key levers of ENCI, such as energy market regulation, price setting, support schemes for renewable energy and energy efficiency are for example under the control of the central government.

The increasing focus on climate change mitigation has however led the state to empower local and regional actors to contribute to national objectives. In terms of governance, the regional and sub-regional levels are bound by the 2015 Law of Decentralisation (*Loi portant nouvelle organisation territoriale de la République)* to implement their own climate and energy transition goals aligned with the overarching national framework described above.

During the energy price crisis, households, businesses, and organisations have been encouraged by the government to adopt energy sufficiency measures, this is likely to continue in the coming years as sufficiency is becoming increasingly accepted as an important climate mitigation strategy in France (see factor P1). The crisis has also forced the government to implement a cap on gas and electricity prices for consumers, and the vulnerability of households and businesses in the transition has been accentuated (see factor EC1). While support systems such as the energy check and support for low-income households for energy renovations exist, overall, vulnerable groups remain more marginalised than average and/or wealthier citizens in the energy transition (see factor L2). This reveals the fact that energy citizenship mostly relies on the individual capacity to act. There is a lack of collective action and public services in France that would favour inclusive participation of all. Important barriers remain for the scale-up and access to energy communities, renewables self-consumption, and overall deployment of renewable energy (see factors S6, T1, L2 and L3). The new law on the Acceleration of Renewable Energy Deployment (*Loi relatif à l'accélération de la production d'énergies renouvelables*) that was adopted in the beginning of 2023 does not sufficiently consider the citizen dimension of renewables deployment (see factor L4).

Due to the strong centralisation in France, sub-national/local examples are not relevant for all factors. The Occitan region is used as an example of a region that early took a strong stance for renewable energy, in particular solar energy, striving to cover 100% of the region's energy consumption by renewable energy both by reducing demand and by scaling up renewable energy production. The Brittany region is also used as an example, where there is less support from the region, but citizen involvement nonetheless thrives in certain areas. For other factors, the Local example mentions initiatives/network/legislation that applies to all regions or compares different regions. In some cases, a different city or region is mentioned if it stands out in some way.

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Political factors

P1. Key political objectives, targets, and goals for the energy transition

How is this factor manifested in France: The current French objectives (see Table 7.1 in the introduction) are anchored in the Energy Transition for Green Growth Law adopted in 2015 and the Climate and Energy Law from 2019. The key framework for decarbonisation is the National Low-Carbon Strategy for 2050 (*Strategie national bas carbon, SNBC)*. It sets out targets for GHG emissions reduction and reduction in fossil fuel use through five-year carbon budgets per sector and per type of greenhouse gas. For the energy sector, actions are implemented through five-year investment plans in the Multiannual Energy Plan (*Programmations pluriannuelles de l'énergie*, *PPE*). The Energy and Climate Law is currently being revised and will specify new objectives adapted to the EU Fit for 55 package.

Regarding energy savings, the French government adopted an Energy Sobriety Plan in 2022 as part of the response to the energy price crisis that started in the late summer of 2021. The plan outlines voluntary measures to reach the objective of 10% reduction of energy consumption until 2024.

How the factor influences ENCI: The goals, targets, and objectives for the energy transition function as an overarching framework, a societal compass, that provide opportunities for ENCI in the domains of emissions reductions, renewable energy production, energy efficiency, and reduction in fossil fuel consumption. What type of ENCI these objectives may support depends on the strategies chosen and how the objectives are implemented, e.g., more or less centralised energy production, more or less citizen participation in decision making, strategies and incentives for households and businesses to implement sufficiency, efficiency and consistency measures, etc.

In terms of implementation, both the French High Council for Climate (2022), and the International Energy Agency (2021), among others, state that France domestically needs to speed up its work on energy efficiency, renewables deployment and emissions reductions. For example, France was the only country in the EU that did not reach its 2020 renewable energy objective (only 19% was achieved, below the 23% target). The delay in deployment is especially high for wind (see factor S6). Another sector that could be advanced is renewable heat (i.e. solar thermal and geothermal). At the EU level, France has often endorsed modest targets and rejected binding national targets.

Affected ENCI types: Potentially all, in particular reformative types of ENCI. The goals can also spark protests or inspire other transformative types of ENCI, for example if citizens consider the objectives too low or too ambitious.

Local examples: Paris was the first French city in 2007 to adopt a climate plan, consisting of 500 measures to reach carbon neutrality until 2050.

P2. Multi-level energy governance structure of a country

How is this factor manifested in France: Traditionally, the energy governance structure in France has been highly centralised. Since the 1980s the French energy system has been characterised by the dominance of nuclear power together with a preference for large state-led projects and strong national utilities (i.e. former monopolies that have remained dominant after the liberalisation of the energy

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market). While the traditional network of political and administrative elites is considered to still uphold key power positions in the French energy governance system, the liberalisation of energy markets (see factor EC3) has opened a window of opportunity for the involvement of local authorities and actors and served to empower other economic actors vis-à-vis the state (Bocquillon and Evrard, 2022).

The increasing focus on climate change mitigation has also led the state to empower local and regional actors to contribute to national objectives. In terms of governance, at the regional level, France's thirteen regions are bound by the 2015 Law of Decentralisation to implement their own climate and energy transition goals under the regional plans for spatial planning, sustainable development, and equality (Schémas régionaux d'aménagement, de développement durable et d'égalité des territoires, SRADDET). At the sub-regional level, groups of municipalities (intercommunalités) prepare local climate, air, and energy plans (Plans climat-air-énergie territoriauxv, PCAETs). These regional and sub-regional plans have to consider the goals in the SNBC. With the Climate and Resilience Law adopted in 2021 (Loi portant lutte contre le dérèglement climatique et renforcement de la résilience face à ses effets) the links between the national (SNBC and PPE, see factor P1) and the sub-national levels are reinforced through extended concertation between the plans and targets across levels.

Other developments that could serve to disintegrate/challenge the centralised energy production and decision-making power are steps that have been taken, both by the government, citizens and by civil society actors, to democratise decision-making processes, energy production, and climate action (see factors P3 and P4).

How the factor influences ENCI: The multi-level governance structure possibly has an influence on the types and extent of ENCI that occurs within a given territory. The competences accorded to local and regional authorities in France however only gives them a certain degree of power. Key levers of ENCI, such as energy market regulation, price setting, support schemes for renewable energy and energy efficiency are for example under the control of the central government.

Affected ENCI types: Especially organisationally embedded, public, citizen-based and hybrid types of ENCI, as well as social movements (types 3-10). The types of ENCI that follow the government vision of the energy system fall into the category of reformative ENCI (types 3, 5, 7 and 9). On the other hand, types of ENCI that have been developed as a response to government inaction fall into the transformative category (types 4, 6, 8 and 10).

Local examples: The Rouen metropolis local COP21 took place in 2018 and aimed to translate the Paris Agreement's objectives to the local level. Supported by the NGO WWF and the French ecological agency (ADEME), the objective of the local COP21 was to foster local climate commitments from all stakeholders, such as, municipalities, citizens, companies, administrations, and NGOs. Rouen metropolis is a group of 71 municipalities (where the largest city is Rouen) that have close to 500,000 inhabitants, situated in the region of Normandie in the North of France. France enshrined the Paris agreement into law in 2016 and designated regions as leaders of the "territorial" (local) decarbonisation strategy, and large urban areas ("métropoles") were put in charge of local coordination of the transition. The local COP21 included a "COP21 workshop" that was open 6 days a week in the city centre to inform citizens about the climate challenge, a COP21 label to give visibility to local events, a digital platform and a call for citizens' projects funded by participative financing.

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P3. Political support for ENCI

How is this factor manifested in France: The energy transition emerged as topic on the domestic political agenda in France during the mid-00s – early 2010s. Since then, the "green coalition" of French governmental and non-governmental actors, EU energy and climate legislation, and the nuclear disaster in Fukushima have been key to shape the energy transition agenda in France. Regarding political support for ENCI in particular, the "green coalition" of supporters of renewable energy and decentralisation, such as interest groups representing the renewable sector, environmental NGOs, and the green party, and on the government side, the French Agency for Ecological Transition (*l'agence de la transition écologique*, *ADEME*), have been especially influential. However, the incumbent actors representing the top-down and centralised approach to the energy transition have largely succeeded in imposing their narrative (see factor P7) over the "green coalition's competing vision of a bottom-up and decentralised transition (Bocquillon and Evrard, 2022). In 2022, pressure from the strong French pro-nuclear coalition and the energy price crisis (from August 2021) solidified the role of nuclear in the French energy system through Emmanuel Macron's (2017-present) France 2030 Strategy. The launch of a new nuclear programme means that the old objective is likely to be abandoned in the coming months.

France is lagging behind when it comes to renewable energy deployment, even though networks of strong civil society actors are working to improve the situation. In terms of ENCI, it is instead the deliberative, inclusive exercises on the energy transition and the actions taken towards increased involvement of stakeholders that stand out the most. Since the 1990s, energy issues have been put up for public debate in different fora, with a diverse range of actors involved, and with different configurations of rules. Three emblematic exercises have served to foster public debate, politicise the energy transition debate and have resulted in subsequent legislation: the Environmental "Grenelle" (2007) resulted in the Grenelle Laws (2008-2009); the National Energy Transition Debate (2012-2013)[5] became the Energy Transition for Green Growth Law (2015); and the Citizens' Convention for Climate (2019-2020) was adopted in the form of the Climate and Resilience Law (2021). Nonetheless, all three exercises have endured critique. For example, the government has been criticised for watering-down the ambition of the process' outcomes in subsequent legislation, and state actors have been rebuked for taking over the arenas created for debate and for co-opting the messages of non-governmental stakeholders. Because of this, these exercises have had a limited impact on public policy and moreover fuelled distrust against the processes and policymakers (Bocquillon and Evrard, 2022).

How the factor influences ENCI: This factor is closely related to factor P7, as the dominant political narrative on the energy transition shapes policy-decisions. However, ADEME's support for citizen-led and citizen-inclusive initiatives, such as the citizens renewable energy movement Energie Partagée and the Academy of Experts on Active Mobility (ADMA), legitimises citizens' claims and gives them venues to influence decision making, at different levels. The examples of large-scale national exercises of inclusion

[5] "The emergence of local energy production will enable new modes of production and consumption to be shared and collaborative at the level of living areas. Our companies will offer mobility, comfort, information and services, and not just material goods, by putting the real needs of users at the heart of their strategy." Summary of the work of the national debate on France's transition in France, 2013.

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of different stakeholders into decision making on energy and climate policy prove how difficult participatory governance is in practice. While such exercises can serve to open up for public participation and political debate, the way that the participation is designed and with what mandate for policymaking are key concerns for how energy citizenship can be supported through such practices.

Affected ENCI types: Especially type 5, but all types could potentially be affected depending on the types of citizen participation that are supported by political interventions. In the example of ADEME's support of ADMA and Energie Partagée, types 3, 7 and 8 are relevant.

Local examples: The Occitan Region aims to become the first "energy positive" region by reducing energy consumption through sufficiency and efficiency measures and cover 100% of the remaining energy needs with renewable energy until 2050. The Energy Positive Territories network (*TEPSOS*) unites local and regional authorities in their journey towards energy sufficiency, efficiency and renewable energy deployment to reach 100% renewable energy consumption by 2050. The network also addresses the issue of energy in local development through economic, social, democratic and environmental aspects.

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in France: In France, participative democracy has mostly been applied in the fields of environment and urbanism (CNDP, 2022). One major participative element is participatory budgeting (Vie Publique, 2020). Citizens can propose and vote on projects they want to see financed with public funds. The approach has been spreading quite fast (from 7 in 2014 to 400 in 2022) but allocated amounts and participation rates (8%) remain low. Because of the small amounts allocated per project, the potential for transformative change remains limited. Larger and more ambitious projects could be more attractive in terms of citizen mobilisation (Localtis, 2022). Other kinds of participative democracy that occur are neighbourhood committees, local referendum, local citizen initiative right (exists at the municipal level since 2004), local public consultations on environmental projects (such as the one organised on the airport project Notre-Dame-des-Landes). Experiences of local democracy must be valued and seen as a resource for greater scale up of participative and deliberative practices at the national level.

Overall, participatory and deliberative practices are quite weak in France despite the exercises outlined in the factor above. Low unionisation rates, weak practices of social dialogue, and the top-down culture among French policymakers are symptomatic of this and serve to uphold the status quo. One obstacle is the high centralisation of France, which leaves limited room for manoeuvre at the local level, despite the fact that participative governance features more prominently at this level. One of the landmark attempts to remedy part of this situation was the organisation of the French Citizen Convention on Climate in 2019/2020 (see factor P3) following the Yellow Vests protests against unfair energy transition policies (see factor EC4). However, it remained a consultative exercise with no binding element. One core demand of the Yellow Vests was the implementation of a people's initiative referendum, which would be closer to direct democracy.

How the factor influences ENCI: France faces a steady rise of populism, a trust crisis in public institutions (especially at the national level), decreasing participation rates in elections and violently repressed demonstrations. This illustrates public frustration with decision-making. The observation that the current

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governance system needs to be reformed to allow for more citizen participation is widely shared (IDDRI, 2022). The questions on what, to what extent, and how to reform the governance system remain open. There is a need to create long-term public plans for the energy transition with a wide support. This implies rethinking participation as a key element of policymaking and implementation (France Stratégie, 2022). Rethinking participation, which in theory aims to create consensus, may not be very straightforward in the French context with its strong democratic culture of political struggle and conflict.

However, France has a dynamic civil society that pushes for more citizen participation and voices citizen concerns, increasingly so on the energy transition. Freedom of association and expression as well as a rich history of peoples' associations facilitates citizen engagement into social movements. For example, the recently launched initiative "dernière renovation" (last renovation) is a citizen movement that was launched in 2022 to call on the government to implement the Citizen Convention on Climate's measure to renovate all buildings by 2040. "Le pacte du pouvoir de vivre et d'agir" (the pact of the power to live and act) is another example of an alliance of civil society organisations and trade unions against inequalities and for climate action.

Affected ENCI types: In France, this factor supports the emergence of protests against the current energy and governance system (type 10). Although types 2-8 could also be relevant, while not mentioned here, enterprises, public-private collaborations, semi-governmental organisations, and utilities, as well as triple-helix innovation programmes, are also active within the energy transition in the French context.

Local examples: Local development councils are compulsory in PETR (Pôles d'Équilibre Territorial et Rural) and inter-municipalities of more than 50,000 inhabitants. The development councils consist of citizen volunteers and stakeholders from different parts of civil society, and provide a space for dialogue, deliberation, and the elaboration of citizen proposals.

P5. Inclusion and empowerment policies

How is this factor manifested in France: The adoption of the Grenelle law in 2010 translated into policies aimed at directly tackling energy poverty and the establishment of the Energy Poverty Observatory. The observatory mainly monitors energy poverty in France, analyses public policies, and promotes and disseminates information.

Government-led inclusion policies mostly concern the building sector, with specific public support (both financial and technical) for renovation for low-income households. With "MaPrimeRénov Sérénité", the French National Agency for Housing provides subsidies for up to 50% of the total works for deep renovation. Another example is the SLIME programme that aims at supporting municipalities in addressing energy poverty and which is jointly implemented by an NGO (CLER), the French energy agency and the Ministry of Energy, and financed by utilities through their obligations to provide energy certificates (CEE) as mandated by energy efficiency policy.

Inclusion and empowerment of vulnerable groups relies mostly on non-state initiatives, such as Energie Solidaire that finances inclusive projects to fight energy poverty, such as self-renovation programmes. The initiative is itself financed by micro-donations, subsidies, and business donations.

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How the factor influences ENCI: Inclusion and empowerment policies already in place foster ENCI, it is the lack of such policies that remain a threat and barrier to active energy citizenship. For example, current public support for the renovation of low-income homeowners is an opportunity for ENCI, especially since financial support includes mandatory technical assistance. However, total support should cover 100% of expenses to truly favour inclusion of all. For now, the remaining expenses are to be covered by a zero-interest loan that banks have been reluctant to grant so far.

Non-state initiatives such as Energie Solidaire (mentioned above) lack the scale of national programmes and thus remains quite niche. The energy transition already struggles to leave some room for citizens. Overall, vulnerable groups remain even more marginalised than average or wealthier citizens in the energy transition. This reveals the fact that energy citizenship still mostly rests on individual capacity to act. There is a lack of collective action and public services in France that would favour inclusive participation of all.

Affected ENCI types: Successful inclusion and empowerment policies could potentially affect all types of ENCI (especially types 1-8) as such policies can provide the foundations for passive and/or disempowered citizens to become more active.

Local examples: SOliHA GRAND PARIS is an association that has been helping low-income people to renovate, improve and adapt their homes in Paris and the Hauts de Seine for 60 years. The association also a key partner of local authorities in the implementation of their intervention policies on private housing.

P7. Political vision on the future of the national energy system

How is this factor manifested in France: By the end of the heatwave-ridden summer of 2022, in the midst of the energy price crisis and Russia's war in Ukraine, Emmanuel Macron held a speech where he declared that he believes that we are living in a time of great upheaval, where the world faces a possible "end of abundance". The speech was referring to the fact that we appear to be entering into a period where fossil fuels no longer are cheap and accessible. In the move away from fossil fuels, France strives to be a leader. This means both ensuring security of supply and tackling climate change. To succeed, the coming years will be decisive to shape France's energy future (Nguyen, 2022). In 2023, no less than six plans/roadmaps are in the making at the national level under the flag of France's new commitment to a coordinated and integrated governance of the transition, i.e., "ecological planning".

In the strategy "France 2030", the road towards a fossil free society and France's climate and energy objectives (see factor P1) are outlined: increase energy efficiency and sufficiency through renovation of housing, renewal of the car fleet and decarbonisation of the industry; produce more carbon-free energy through the massive deployment of renewables and the launch of a new nuclear programme; become a leader in green hydrogen, with the goal to have at least two gigafactories of electrolysers by 2030; produce almost 2 million electric and hybrid vehicles; and the first low-carbon aircraft. Several consultations are held, such as a national debate on the new nuclear programme, as well as a national consultation on the future energy mix including an online consultation, regional meetings, and a youth forum. sufficiency through renovation of housing, renewal of the car fleet and decarbonisation of the industry; produce more carbon-free energy through the massive deployment of renewables and the launch of a new nuclear programme; become a leader in green hydrogen, with the goal to have at least two gigafactories of

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electrolysers by 2030; produce almost 2 million electric and hybrid vehicles; and the first low-carbon aircraft. Several consultations are held, such as a national debate on the new nuclear programme, as well as a national consultation on the future energy mix including an online consultation, regional meetings, and a youth forum.

In line with the legacy of the French energy system, the new nuclear programme has come to the forefront of discussions. The plans are to extend the production at all existing nuclear reactors where that is possible, launch six new reactors and develop small innovative reactors with better waste management.

How the factor influences ENCI: Just like the key political objectives, the political vision functions as an overarching framework that can provide opportunities for ENCI in different domains. While public consultations have been held, the current vision largely serves to entrench the hegemonic approach of a top-down, centralised governance of the energy transition in France (see factor P2).

The discussion on nuclear and renewable energy is often described by experts as a "sterile" discussion in France, where the two options are posed against each other (see factor S6). A new bill on the acceleration of renewable energy has been voted in the beginning of 2023 (see factor T1 and L6), but the effects for ENCI are difficult to discern at this stage (critiques mentioned in factor L4). Locally governed renewable energy and "renewable energy communities" are however not mentioned. In contrast, the Ministry of Ecological Transition assembled a working group in 2021 that resulted in an action plan and 10 key measures for the development of citizen renewable energy projects, including the adoption of a national target to develop 1,000 new locally governed projects by 2028 (from 290 in 2022).

Affected ENCI types: Potentially all, especially the reformative types. When it comes to citizen-based, co-created and organisationally fostered ENCI, such as citizens' renewable energy production (types 7 and 8), it will depend on how the planned renewable capacity will be governed and owned.

Local examples: The Occitan region adapted an energy autonomy plan in 2016 with the objective: "to transform our energy model in depth by ensuring that everyone, whatever their resources and field of activity, has the means to take part in this change and to achieve the objective set by the Region of covering almost half of our energy needs by the production of local renewable energy by 2030, and 100% by 2050."

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in France: Inflation rose by 6.2% in France between November 2021 and November 2022. The price increase varies across products. Prices on essential goods has seen price increases by over 10%: food prices rose by 12%; and energy prices by 18%. The price increases on essential goods have a higher impact on low-income households who spend higher shares of their revenues on these items. The introduction of a "tariff shield" in October 2021, i.e. the freezing of regulated tariffs for gas and electricity is however estimated to have halved the inflation effect, especially relieving the burden on the lowest-income and most elderly households. Consequently, the inflation rate in France has been lower

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than in other European countries. The situation is nonetheless hard for a big part of the population, especially rural households on whom the effects of rising fuel prices have a large impact.

Between 2020-2023, the exceptional measures introduced by the government to tackle the COVID crisis and the energy price crisis amounts to close to 11% of GDP. Nonetheless, purchasing power is expected to continue to recede in 2023. It is expected that the current inflation will erase the gains in purchasing power under 2021. Overall, the impact of the energy price crisis of the French economy is similar to that of the first oil shock in 1973. Including the European Central Banks' increase in interest rates, the crisis is estimated to have decreased GDP growth. Compared to the initial forecast of 4% growth for 2022 and 2% for 2023, it is estimated that growth rate would be closer to 2.6%, and 0.2% respectively (OFCE, 2022).

How the factor influences ENCI: The tariff shield can be criticised for a lack of targeting. However, in the absence of solid financial and technical support schemes towards renovation, higher energy prices risk worsening energy vulnerability of many, including among the middle class. The tariff shield is unsustainable in the medium term, but in the face of energy prices that are likely to remain high in the years to come, the end of this scheme will have to be carefully designed by policymakers.

Despite the tariff shield, sufficiency policy and government campaigns put in place to lower the price pressure worked quite well, with a decrease by 10% of electricity consumption over the last semester of 2022. Still despite the tariff shield, energy poverty is increasing and is more prevalent among renters, and citizens younger than 44 years old. Close to 70% of households restrict heating use, 60% declared not being able to restrict more than they already do. Inflation and the price crisis are damaging citizens' ability to live decently, the State's capacity to foster structural change with green investment, and the creation of a more favourable environment for citizen engagement. So far, most measures have been focusing on short-term, individual change that is likely to leave many households and businesses behind.

Affected ENCI types: Potentially all. Price incentives can stimulate (financial-economically) motivated forms of ENCI. If this factor comes with strong effects of (unequal distribution) and vulnerability, it may serve as a politicising factor, leading to both mobilisation for transformative ENCI and against the energy transition and ENCI in general.

EC2. Energy prices

How is this factor manifested in France: In 2011, regulated tariffs were suppressed for large and medium companies as part of market liberalisation process (see factor EC3), but maintained for small consumers (households and businesses below 36 kVA). Regulated tariffs include a market supply component. Two times a year, the regulator can revise the regulated tariffs. The electricity tariff hike was limited to 4% in 2022 with the tariff shield (see factor EC1), and to 15% in 2023. The increase suggested by the regulator was +35% due to the price surge on the EU electricity market. France is one of the EU member states with the highest share of households under regulated tariffs (67% at the end of 2021).

Other contract types can be either fixed or vary with market prices. In 2019, the revised EU electricity directive included a provision to incentivise electricity suppliers to offer dynamic tariffs reflecting real time prices to limit consumption peaks. According to the French energy ombudsman, such offers are interesting to limit consumption but are not adapted to all consumer types, especially households. Regulated tariffs

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are valued by consumers for their stability. When consumers leave regulated tariffs for another offer, they mostly choose an offer indexed on regulated tariffs and fixed tariffs. Only 30% of consumers now believe that they will save money if they leave regulated tariffs. This is half less than one or two years ago, before the energy price crisis.

Regulated tariffs for gas also coexist with market offers and are supposed to disappear for individual households and condominiums (shared properties) in June 2023. Meanwhile, they were also frozen at the level of October 2021 in 2022, and should increase only by 15% in 2023.

How the factor influences ENCI: The energy price crisis highlighted the need to smooth out the consumption curve for electricity to limit peak consumption and the associated price surge, thus providing opportunities for ENCI. In France, a large government campaign to shift some households' consumption patterns away from peak hours has been widely advertised on TV and social networks. However, there is not that much consumption that can be shifted to the night at the household level. 65% of households already reduced consumption because of inflation, mostly due to budget restrictions. The main energy use is still space heating during winter. Sufficiency can contribute to reducing these needs, but it should be combined with green investments to improve houses' energy performance.

When it comes to the generalisation of dynamic contracts, it needs to be very easy to understand and implement if households are targeted, with clear social safeguards and simple rules. Otherwise, to support ENCI, one avenue that is worth exploring is the subsidisation of energy up to a lifeline limit, with expensive tariffs beyond. It would combine social justice with energy bill support while incentivising energy demand reduction. Experiments are being held in Germany with this model. However, it raises equality issues due to vast differences in energy use depending on household composition and the energy efficiency of the building.

Affected ENCI types: Potentially all (see factor EC1).

EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in France: Since the liberalisation of retail markets for households in 2007, consumers can freely choose their supplier. Regulated tariffs offered by historic suppliers still have the lion's share with 66% of residential consumers that contracted such tariffs (see factor EC2). Affordability and stability are key concerns of consumers, especially in the current energy price crisis where the increase of regulated tariffs was limited by the government.

The crisis has brought on a series of bankruptcies of alternative suppliers who did not properly hedge against rising wholesale spot market prices[6]. This has led to calls for going back to the historic supplier. Other alternative suppliers were sued by consumers' associations because of deceptive marketing practices such as changing contract prices without proper consent of their clients. Legal certainty is about

[6] This is a fault of the electricity suppliers, who have only taken advantage of the system by buying electricity at a regulated price (ARENH) and not investing in production capacity. This is a concrete limitation of the liberalisation model.

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to become a key sales element for consumers. The current crisis might well damage the public image of alternative suppliers. Interest for green energy contracts (even if more expensive) is higher among people with jobs at management-level ("cadres") than in the average population.

As previously noted, France is behind on renewable energy development (see factor P1). It is a missed opportunity to foster local governance for renewable projects and renewable energy communities, despite the objective to develop 1000 of these projects by 2028 (only 290 exist in 2022).

How the factor influences ENCI: Liberalisation of the retail market does not necessarily support energy citizenship. Price stability, affordability and legal certainty are key criteria for consumers. Navigating retail offers can be challenging. In order for retail contracts to be an opportunity for ENCI, simplicity and clarity should prevail.

Despite market liberalisation for the production of electricity, the lack of citizen projects shows that further measures are needed to support their development, for example, preferential financing mechanisms, obligations to open project governance and financing to neighbouring entities (e.g., citizens, municipalities, businesses), fiscal incentives for citizen finance, and building up local renewable engineering capacities, etc. Furthermore, the public network operators should be sufficiently staffed to avoid delays of grid connection and invest in network expansion to match with the new transmission and distribution needs of a more decentralised system.

Affected ENCI types: Primarily types 1 and 2, but also 7 and 8.

Local examples: In the process of implementing the EU directives on the internal electricity market, the state retained the ownership of the transmission network and local authorities retained the ownership of distribution networks. 95% and 96% of the distribution networks are nonetheless operated by Enedis (for electricity) and GRDF (for gas). Enedis is fully owned by the French public electricity production and supply company EDF. Some 5% of distribution networks are run by local distribution companies.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in France: The EU Energy Taxation Directive sets the minimum rate for taxation of electricity, gas, and oil products. Under EU law, these products are also subject to value added tax (VAT), and the emissions of certain sectors are covered by the EU Emissions Trading System (ETS). A domestic "carbon tax" or carbon component (*contribution climat-énergie*) was introduced in 2014 and integrated into fossil fuel excise taxes, proportional to their carbon content (however, with numerous exemptions). The carbon component has however been frozen since 2018 due to the massive social protests by the Yellow Vests Movement incited by the rise in fuel prices (see factor P4). In total, the carbon tax (40%) and the EU ETS (23%) covered 63.2% of French GHG emissions in 2021 (OECD, 2022).

In 2021, relative to CO2 emissions, electricity was three times more taxed than fuel and twelve times more than heating oil and fossil gas (Observatoire Electricité, 2022). A key challenge for France, as for other EU member states, is to reform the ecosystem of economic policy instruments in order to incentivise the phase-out of fossil fuels. State aid is one of the tools that can serve to boost clean alternatives, for example through investments in energy renovation and public transport. Currently, France is providing more state

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aid to fossil fuels than renewables.

How the factor influences ENCI: Economic policy instruments can provide opportunities for ENCI. For example, price signals can incite energy savings, energy efficiency or shifts in modes of transport. However, distributional impacts must be considered in order to avoid social backlash. Furthermore, state aid can be used in many different ways. Currently, France (together with Germany) are trying to influence EU state aid rules to boost European industry as an answer to the new American industrial policy (the Inflation Reduction Act). This could pose both opportunities (increased production of green technology in Europe) and threats to certain types of ENCI (favouring incumbent actors and going against ENCI ideals of inclusion and democratisation). Lastly, fossil fuels subsidies are often viewed as a source of policy incoherence, inciting protests and social movements, or event disengagement in the transition and/or distrust of governments.

Affected ENCI types: Potentially all (see factor EC1).

EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in France: In 2021, climate investments by households, companies and public authorities reached €84bn, an increase of €18bn from the pandemic year 2020. The biggest increase of climate investments was in the sectors of electric and hybrid vehicles, renewable energies and in the retrofitting of buildings – in part caused by the post-pandemic recovery, and in part by tightened regulations (primarily in the automotive sector) and increased state support (I4CE, 2023). The national recovery and resilience plan was key to the increased state support. When the plan was adopted by the European Council in July 2021, France dedicated nearly half (46%) of its overall €40bn envelope coming from the EU to support climate objectives, primarily directed towards building renovation and sustainable transport (see factors T4 and T5). However, it remains unsure whether 2021 numbers and priorities can be maintained due to Macron's loss of an absolute parliamentary majority and the ensuing energy price crisis (Nguyen, 2022). Furthermore, despite the recent growth, climate investments remain insufficient. Depending on the chosen transition path (more or less sufficiency), an additional 14-30bn annually would be required as a minimum (I4CE, 2023).

As a response to the energy price crisis, France has spent around €100-110bn primarily on climate-damaging responses and non-targeted measures (fuel discount, opening of a new LNG terminal, and gas price freeze). However, these measures do not comply with France's green transition objectives. France is expected to design a coherent investment scheme that combines short (protecting the most vulnerable citizens to ensure a just transition), medium (France as a leader in the energy transition) and long-term imperatives (meeting climate targets) (Nguyen, 2022). The Energy and Climate Planning Law (*Loi de Programmation Energie-Climat, LPEC*) scheduled for summer 2023, will need to respond to the public investment needs in order to meet the new EU objective of reducing net greenhouse gas emissions to 55% below 1990 levels by 2030 (I4CE, 2023).

How the factor influences ENCI: This factor has described the general state of climate investments in France. Different schemes (see factors T4, T5 and L6) can be developed to support ENCI to different extents.

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Together with the public funds available, the design of different schemes (see factor P5) will determine the availability of ENCI practices for different segments of the public, i.e., the degree to which ENCI is mainstreamed or limited to particular privileged groups. Without sufficient financing and ENCI-adapted regulatory frameworks, individuals and organisations will struggle to materialise their ENCI ideals and suffer from heavy financial risks (see in-depth case study, Railcoop). It can as such both be seen as an opportunity and a threat.

Affected ENCI types: Potentially all (see factor EC1), primarily reformative types of ENCI.

EC6. Security of energy supply

How is this factor manifested in France: Traditionally, energy security has been a key element in French energy discourse. Nuclear energy has been presented as the main solution to ensure energy autonomy ever since the launch of the nuclear programme following the oil crisis in 1973. It is true that France's big nuclear fleet (around 70% of electricity production) has made domestic electricity production much less dependent on imported gas and oil (Bocquillon and Evrard, 2022). In 2021, 55% of the energy consumed in France was produced on French territory. However, the aging reactors and the impact of climate change on water resources used in nuclear production (see factor EN6) has during the last year revealed the weaknesses of the system. At the same time as Europe has faced an unprecedented situation of gas supply shortages, large parts of France's nuclear fleet have been down for maintenance work that had been postponed during COVID. Adding to this were discoveries of safety issues on certain types of reactors. In November 2022, 26 of 56 reactors were down and nuclear power was down to 31GW. During 2022 France, which for the last 20 years has been Europe's largest net-exporter of electricity, had to import electricity from neighbouring countries. In the coming years, it is likely that work to extend the lifetime of existing reactors will intensify, and thus continue to limit production capacities.

Hydropower is another large source of electricity production in France (around 12% of electricity production). With climate change (see factors EN1 and EN6), the vulnerability of the French electricity system will continue to be an issue. At the same time, gas resources continue to be scarce in Europe. Currently 10% of power generation comes from gas in France, compared to 20% at EU level. To ensure its energy transition and its desire for an industrial renaissance (see factor T1), France will have to tackle these power generation constraints (Nguyen, 2022).

The deployment of renewables is another key issue for France's security of supply (see factors S6, EN2, L4 and L5). France's delay in accelerating renewables has contributed to the country's energy vulnerability since the beginning of the energy price crisis (and gas supply crisis) in 2021.

How the factor influences ENCI: Scarcity poses price incentives and puts a premium on or poses necessities of energy savings, energy citizenship and renewable energy production, oftentimes on the reformative side of the spectrum. In France, the Energy Sobriety Plan adopted in 2022 is one such example (see factor P1). At the same time, scarcity and higher prices opens up opportunities for transformative-seeking ENCI, as far as it calls attention to and political urgency of issues of unequal distribution and vulnerability.

France has chronically underinvested the energy transition, which is why the country has found itself in

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this situation (I4CE, 2023). Short-term investment decisions being made, such as the investment in a new floating LNG terminal and long term contracting with other suppliers (e.g. the US), risks locking France in a fossil fuel dependence even longer. Furthermore, such investment decisions create incoherence with climate and energy transition goals potentially leading to legitimacy problems with a negative impact on ENCI.

Affected ENCI types: Potentially all (see factor EC1).

Local examples: In terms of energy security, the Occitan region aims to reduce their energy consumption as much as possible with sufficiency and efficiency measures, and cover 100% of the region's energy consumption with 100% locally produced renewable energy until 2050.

Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in France: In terms of level of income (GDP per capita), France came in 10th place in the EU in 2021, landing slightly above EU-average.[7] Primary inequality, measured in household disposable income before redistribution, is slightly below the median of European countries. Redistribution plays a bigger role in reducing primary inequality in France than in other European countries. This is due to the volume of social benefits and their targeting towards lower incomes, that both exceed the European median. Furthermore, taxes are more redistributive in France than in the EU at large. This can primarily be explained by their volume, as there is room for improvement in targeting (France Stratégie, 2020).

Regarding wealth inequality, measured in net personal wealth, the top 10% of the population hold 59% of the wealth, whereas the bottom 50% hold 5% (World Inequality Database, 2021). The richest 10% in France have seen their average annual standard of living increase between 2010-2019 three times more than that of the middle class. The tax reforms carried out during the first presidential term of Emmanuel Macron have contributed to this trend. (Observatory of Inequalities, 2022).

These numbers can be compared with data on energy poverty. In 2021, 20% of French households said that they suffered from cold in their home, and 36% said this was due to financial reasons. In 2021, 7.1% of households had arrears on their utility bills, compared to 5.5% in 2020. In 2020, 18.2% of the population were at risk of poverty or social exclusion (EPAH). These numbers have increased with the energy price crisis (see factor EC1).

How the factor influences ENCI: Higher levels of income allows for more investments in ENCI actions, if

[7] The countries included in the comparison are the 27 EU Member States, three EFTA countries (Iceland, Norway and Switzerland), five EU candidate countries (Albania, Montenegro, North Macedonia, Serbia and Türkiye) and one potential candidate country (Bosnia and Herzegovina)", EU average = 100, France average = 104, Data from 15 December 2022.

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accompanied with other factors such as energy literacy, skills, and engagement. At the same time, greater inequalities can contribute to feelings of distrust in institutions and collective endeavours (see factor S4). Furthermore, low-income households have less capacity to invest in energy efficiency measures for a variety of reasons and face greater barriers towards practicing active ENCI. In order to fight energy poverty and empower vulnerable customers in the energy transition, as well as to create broad societal support, policies and investment schemes must target and support these citizens to ensure access to clean solutions (see factor P5).

Affected ENCI types: Especially types 1, 2, 7 and 8.

Local examples: There are regional differences when it comes to energy poverty. Households in the Grand Est (24.3%), Bourgogne-France Comté (24%), Hauts-de-France (18.8%) and Aubergne-Rhône Alpes (18.6%) are especially affected. This can in part be explained by the colder climate in these regions, but factors such as, the level of average income, the average surface and type of housing, the year of construction and the energy used must also be considered.

S2. Energy literacy, awareness, and skills

How is this factor manifested in France: Access to information and support on the energy transition remain very unequal. Popular education courses exist that try to remedy this, but they are still quite inaccessible. Mass access to information is however facilitated by social networks but the bulk of their audience is likely to be younger citizens that use social networks to a larger extent. The citizens' energy movement, Energie Partagée, among others, works to inform the public about citizen energy. As an example, they have produced a comic book that outlines the history of energy to encourage everyone to get involved in local and renewable energy production.

The 2021 energy barometer shows that knowledge about the energy market (see factors EC3) remains low. 30% of people in charge of the energy bills in their households did not know if they had a fixed tariff or a market-based tariff. 27% had never heard of fixed tariffs (Energy Barometer, 2021). While 78% of the French population already have a smart meter installed (in 2020), 34% of the population are against installing one in their home. The main reasons stated were that smart meters are not useful, because of their radiation, their unreliability, for data protection reasons, because of the price, and since it eliminates job opportunities. While 9 of 10 claim to know the functionality of smart metres, only 67% think it will allow them to better monitor their consumption, and only 38% think it can help them save money (Energy Barometer 2021).

Regarding the transition in general, and climate change in particular, in a 2021 poll, 76% of the French population considered it necessary to change habits and adopt a different lifestyle. However, the perception on the capacity of the French society to carry out such a transformation was divided (Cautrès et al., 2021).

How the factor influences ENCI: It is difficult to measure energy literacy. The sources cited above are an attempt to outline the situation in France. The higher the energy literacy, the larger the likelihood that consumers will become active energy citizens. In contrast, the lack of knowledge on the efficacy of renewable energy and the energy efficiency measures leads to distrust and low level of acceptance of new

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technologies and innovative solutions in the energy field. Education and information campaigns are crucial to correct any misconceptions about energy transition and to mitigate the concerns about the perceived impacts, benefits, and costs, but information is only one barrier, financial resources, technical assistance, trust in institutions etc., also play a vital role in supporting the development of ENCI.

Affected ENCI types: Potentially all, but especially types 1, 2, 7 and 8.

Local examples: Smart meters are often portrayed as a key solution to increase energy literacy, however, as noted above, there are citizens that are against having them in their homes. In the city of Bordeaux, for example, citizens mobilised through social media, through letters, petitions to politicians and court cases, which brought the installations to a halt. “People felt it was like big brother who was entering into their homes and monitoring when they were going to bed and when they were having a shower and when they were making love to their husbands, it was just unbelievable the rejection that came out of it.” The city administration identified the lack of citizen consultation and involvement as the weak point in the installation process.

S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in France: France has a very dynamic civil society which has been active in embracing the climate struggle in recent years (see also factor P4). Some examples are the powerful Réseau Action Climat (Climate Action Network) that gathers 27 national climate NGOs and 10 local and regional NGOs, and the NGO Fresque du Climat that organises popular education on climate change with great success. “Notre affaire à tous“ was established in 2015 and is dedicated to the implementation of climate justice through legal action. Together with the Fondation pour la nature et l'homme, Oxfam France and Greenpeace, Notre affaire à tous launched a trial for climate inaction against the French state and won in October 2021, what has been named the Case of the Century “l’Affaire du siècle“. In 2023, they plan to ask for financial penalty for continued inaction. Moreover, many collectives have been set up by and for students and young graduates and public servants.

Numerous collective and coordinated NGOs actions have been set up over the years for different ENCI-related issues. For example, Pact for the transition, established in connection to the municipal elections in 2020 to foster citizen and local representatives engagement in the transition; Territorial alternatives, a campaign launched in 2017 to encourage citizens to call their representatives to action, communicate about delays and progresses in policymaking, and foster local transitions; and Renovate, an alliance for energy renovation of housing.

Beyond information and activism, citizen-led projects are emerging, based both on cooperative models (for example, Railcoop and Mobicoop) and citizen funding facilities for the transition (e.g., Time for the Planet). These citizen-based initiatives share core features of highly democratic governance and transparency and use new digital platforms such as Discord to facilitate citizen involvement.

How the factor influences ENCI: The above-mentioned initiatives just illustrate some examples of France’s vibrant civil society, that is particularly pronounced in big cities. They underline the extent to which civil society is an enabling factor for ENCI, and the willingness and desire to invest personal time to

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foster change. In France, climate action has primarily been carried out by citizens so far and such initiatives often remain ahead of their time when it comes to scaling-up. For example, Railcoop has not (yet) succeeded to secure financing to start the operation of their first passenger trains, mostly due to a lack of willingness from banks and lack of public guarantees.

Government action should be oriented towards supporting this dynamic, instead of slowing it down, by ignoring it (at best) or restraining it (at worst, for example by not acknowledging citizen finance as a financial counterpart to public financing). However, despite being a dynamic environment, climate action remains very homogenous socially, predominately made up of young or retired citizens with high education and/or coming from the middle to upper class. Although this type of organisation increasingly cooperates with more traditional social NGOs, greater links should be tied with both rural and urban working-class struggles, including Yellow Vests and anti-racism movements, to support more inclusive and just ENCI.

Affected ENCI types: Potentially all.

S4 Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in France: In France, the decline of trust in institutions and fellow citizens has been well documented and studied for over ten years by prominent economists such as Yann Algan in his book *La société de defiance, comment le modèle social s'autodétruit* (Society of defiance: how the social model is self-destructing) published in 2007. Since then, a barometer has been evaluating the trust of French people in politics, elected representatives, institutions, and other citizens every year. The paradox is that while the French tend to be satisfied with their personal lives and relationships with family and close circles, they seem to suffer from a deep lack of cooperation and reciprocity with the rest of society, i.e., beyond their acquaintances and people they personally know. The rest of society includes political and legal institutions, trade unions, businesses, and other market forces. French trust in these actors is lower than in other developed countries. Lack of trust is attributed to the hierarchical structure of society, characterised by distant and conflict-ridden social relations.

How the factor influences ENCI: This factor poses a threat to ENCI because low trust leads to lower cooperation, in addition to impacting physical and mental health (Algan 2007). Schools could play a role in fostering new social relations. Lack of trust also contributes to the rise of populism and the extreme right (whose voters are particularly showing distrust) which hinders policies in favour of ENCI. The disillusion that came from the Citizens' Convention on Climate (see factor P4) show how government initiatives towards ENCI can serve to entrench distrust.

Affected ENCI types: Lack of trust affects all types of ENCI, perhaps especially those initiated or favoured by government actors or other actors mentioned above.

S6. Not-in-my-backyard syndrome

How is this factor manifested in France: Onshore and, to a lesser extent, offshore wind power has received a lot of opposition in France. According to estimations, between 70-90% projects are contested

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in court. At the same time, polls at the national level show that between 70-80% of the population are in favour of wind power. But only 41% would agree to live next to a windfarm. Since debate is very polarised and polls are notoriously difficult to trust, it is difficult to get a clear image of the extent of NIMBY-ism in France.

Movements like the Federation for Sustainable Development, represents part of the anti-wind power movement. The federation unites around 1400 local associations against wind power. In the development of the new Law to Accelerate the Deployment of Renewables, experts have noted that onshore wind is presented as a problem in the draft. One factor to this could be the unbalanced deployment across the territory. In 2019, three regions had 60% of the installed wind capacity. Other factors cited are the preference for nuclear power, the requirement of local political acceptance, and biodiversity concerns (Enevoldsen and Sovacool, 2016). Furthermore, citizen ownership and influence over renewable energy production in France remain low, which could be another explanatory factor (see factor L6). In 2018, citizen cooperatives made up less than 3% of total installed capacity in France.

The opposition to wind power has prevented various governments to deploy this source of renewable energy compared to some of its neighbouring countries, such as Germany. To illustrate this trend, Emmanuel Macron has decided to postpone the 2030 onshore wind turbine targets to 2050 as the technology is seen as controversial. The local level is also reluctant and tends to slow down the roll-out of wind turbines. For example, by not administrating legal authorisations to projects that have been validated and have undergone environmental procedures.

Since the mid-2010s, opposition to wind turbines has also developed into a political trademark for part of the political class in France. By this group, wind power is often presented as a technology in opposition to nuclear power, as if the two energy sources could not co-exist. The way that Macron spoke about onshore wind during the speech where he launched the France 2030 strategy is a telling example of this. “No one wants to see our remarkable landscapes, our heritage listed sites, damaged by large white canvases. And no one wants to see any national treasure disfigured. However, it is possible to reconcile the development of wind power with the protection of our landscapes, our natural and cultural heritage.”

How the factor influences ENCI: NIMBY-ism is a threat to the deployment of large-scale infrastructure in general. The specific resistance towards onshore wind deployment in France influences the energy choices that will be made.

Affected ENCI types: Types 7, 8, 9 and 10.

Local examples: As a counter example, in 2014, the first citizen owned wind park was inaugurated in the Brittany region. The project was initiated by the citizen-based association *Éoliennes en Pays de Vilaine* and took 10 years to be carried out. The association gathered 1000 citizens to co-finance the project, that is now run as a cooperative together with actors in the social and solidary economy, and a renewable energy investment company initiated by the Brittany region. Since its set-up in 2003, the association has been part of the development of the ecosystem of energy citizen community in France by establishing networks with other actors to promote awareness-raising, and develop capacity building on technical, legal and financial parts related to citizen energy production.

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Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy

How is this factor manifested in France: National Low-Carbon Strategy for 2050 (see factor P1) names the energy sources that France intends to use in its decarbonised energy system: biomass (agricultural waste and waste products of wood, wood energy, etc.), heat from the environment (geothermal energy, heat pumps, etc.) and carbon-free electricity (renewable energy and nuclear) (see factor P7). In 2023 the parliament will vote on the new Multiannual Energy Plan (see factor P1) that will give indications on the share of each energy source. Macron has announced that France is aiming for a mix of renewables made up from 40 GW offshore wind, 40 GW onshore wind and 100 GW solar in 2050. For nuclear, 25 additional GW have been announced. In the beginning of 2023, France's nuclear capacity is at around 61 GW.

In the French 2030 strategy (see factor P7), France strives to become the leader in carbon-free hydrogen and develop state-of-the-art renewable energy technologies. €1bn will be invested in the development of renewable energy technologies. Developing French and European innovation and industries is a key axe of action. This will have an impact all along the innovation ecosystem: from raw materials, education, research, business, and industry. Innovation is also emphasised in the French Recovery and Resilience Plan, with more than €4.5bn in investments. Together with Spain and Portugal, France has announced the plans for a hydrogen pipeline.

Another key area for decarbonisation is heating. Heating represents more than 40% of France's final energy consumption. In 2021, 21% of that heat came from renewable sources, primarily from solid biomass. France aims to increase its renewable energy heat consumption by +25% until 2023, and +40-60% until 2028 (compared to 2017). The Heat Fund is a public aid that supports renewable heating for collective housing, local communities, and businesses. Since the start in 2009, almost €8bn have been invested.

In February 2023, the government launched a new plan to accelerate geothermal heat (in 2021 it only accounted for 1% of final heat consumption in mainland France). The plan aims to increase by 40% the number of deep geothermal projects launched until 2030 and double the number of geothermal heat pump installations in private homes until 2025. To reach these objectives, the French government will, among other things, develop a training offer, improve financial support for project promoters and users, raise awareness among local actors and simplify regulations (see factor L4). The financial support for households (irrespective of income) is raised to €5000 from March 2023.

How the factor influences ENCI: The decarbonisation of the energy sector provides opportunities for ENCI. However, the way in which these technologies are developed, and which types of technologies are chosen conditions the potential for citizen participation. Technologies like hydrogen and offshore wind are more or less out of the scope of ENCI (at least the types that relate to direct involvement in ownership, financing, and governance of renewable energy) and tend favour centralisation of the grid. Whereas there is a higher potential for land-based wind power, solar power, and renewable heating, for example.

Affected ENCI types: Types 1 and 3 as consumers, 2 and 4 as active energy producers. France's ambition to develop innovation industries could support ENCI all along the spectrum in education, research, business, and industry sectors.

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T2. Decentralised energy system and storage

How is this factor manifested in France: The French choice of developing a large nuclear capacity has translated into a highly centralised energy system (see factor P2). While the introduction of Feed-in-Tariffs in 2000 was a turning point for an increasingly decentralised energy production, the legacy of the centralised system has slowed down the deployment of renewables (see factor P1) (Bocquillon and Evrard 2022). In 2021 the French electricity mix consisted of: nuclear (69%); hydro (12%); wind, solar and biomass (12%); and gas, fuel oil and coal (7%). The majority of the electricity mix is thus of a controllable and predictable nature. As France is preparing to accelerate the deployment of renewables (see factors P7 and T1), this must be met with investments in the network to ensure its capacity to integrate different renewable and intermittent energy sources into the system.

The intermittent nature of wind and solar energy, their unequal geographical distribution, and new uses of electrical power, are key challenges to consider in the development of the electricity grid. To cope with these challenges, RTE, the French transmission system operator, is working to increase the flexibility of the grid through demand-side response, storage solutions and adjustments to the grid. The state is supporting companies and start-ups to this end. The projections of 15.6 million electric vehicles by 2035, requiring around 10% of France's energy consumption, is seen as an opportunity to use the vehicle batteries as storage units in the future decentralised and flexible system.

In terms of technology, France will need additional solutions for grid management in the coming decades. Limited domestic industry in the electro-digital sector and a dependence on Asia both for critical raw materials and technology, poses constraints on this development. A 2020 government report suggests that imposed eco standards and recycling are key to overcome these hurdles in the coming years.

How the factor influences ENCI: Decentralised distribution networks are important pre-conditions for citizens to produce their own renewable energy and being able to distribute it. This can enhance prosumerism and energy efficiency and thus serve as an opportunity for certain types of ENCI (see below). However, affordability is an important threshold for citizen involvement.

Decentralised networks can support citizen engagement to different extents, depending on political and technological choices made that determine to what extent small-scale renewables production is encouraged. In the French context, goodwill of citizens and businesses is also a prerequisite as current legislation does not allow for flexibility to be imposed on consumption. Financial compensation can therefore be used as an incentive.

With an increasingly decentralised system, consumers have a larger choice when it comes to energy consumption and investments. Facilitated by the digitalisation of the energy system (see factor T3), new energy distribution platforms, such as Ekwateur, consumers can choose where and in what type of energy they want to invest.

Affected ENCI types: Type 1, 2, 3, 4 and 8.

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T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants)

How is this factor manifested in France: France has a great potential to deploy digitalisation and smart-grids for the energy transition due to the widespread use of electric heating and leadership in times-of-use pricing (IEA 2021). The high installation rate of smart meters is a first promising step towards the development of smart grids. In early 2020, 78% of all electricity meters in France were smart meters. While the pandemic postponed installation, the installation rate has picked up again in 2022. Enedis (the main operator of the public electricity distribution network in France) stated that 92% of all French households have a smart meter. From the start of 2023, households who have refused to install a smart-meter and have not reported their consumption will have to pay around €50 per year. Starting from 2025, the installation of smart meters will no longer be free of charge. For gas, the installation of the smart gas meters, Gazpar, should be finished during 2023. Since 2010, the French regulator, *Commission de régulation de l'énergie* (CRE), has been working on the development of expertise on smart grid deployment in France, for example through regional roundtable dialogues and smart grid demonstration projects (see local example below).

Regulation needs to be adapted to technological changes and innovation. The 2019 Energy-Climate Law (see factor P1) therefore introduced a "regulatory sandbox" in the energy sector. This allows the CRE to grant exemptions to the conditions of access and use of networks and facilities for testing innovation that would require changes in the regulatory framework. Furthermore, the CRE also chairs a Foresight Committee of key stakeholders, which consists of 37 members: business leaders; representatives of institutions and non-profit organisations; academics and intellectuals. The Foresight Committee runs three working groups on the energy mix, energy networks and consumer behaviours and digital revolutions.

How the factor influences ENCI: Despite the large cover of smart meters for both electricity and gas, the low level of knowledge of how it works (see factor S2) point to a lack of maturity of smart technology and grids in the French context. The technologies nonetheless provide opportunities for ENCI in terms of better energy demand management in households and businesses. Complimentary digital technology, such as the Ecowatt mobile application could create opportunities for ENCI and the flexibilisation of the electricity system. The mobile application was initiated by RTE and ADEME and works as an electricity weather forecast. It provides real-time information on the level of consumption in France to encourage individuals, businesses, and communities to limit their consumption, specially to curb demand during peaks.

Affected ENCI types: Primarily type 1 and 3.

Local examples: FLEXGRID is a deployment programme for the optimisation of energy systems in the Provence-Alps-French Riviera region. A 100% renewable, virtual power plant is part of the projects financed by the programme.

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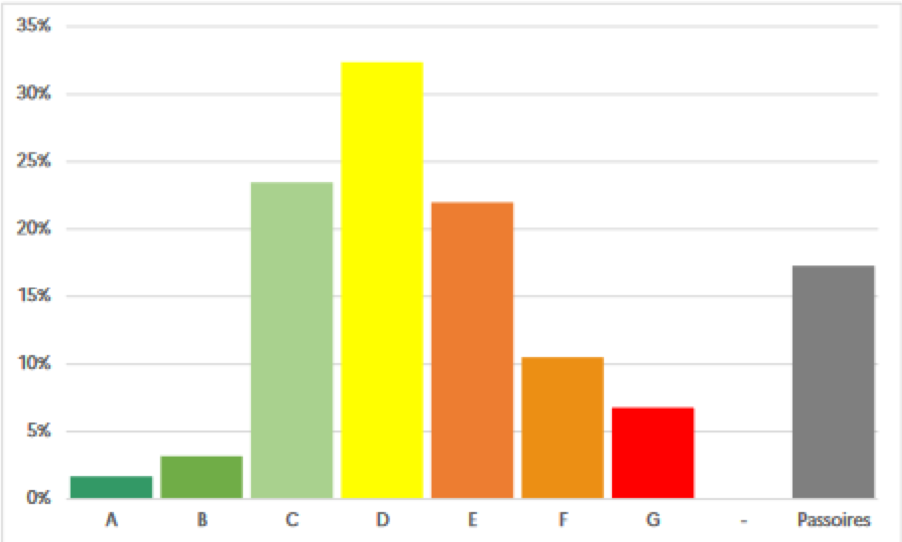
T4. Energy efficient buildings

How is this factor manifested in France: In 2019, the residential building sector represented 31% of final energy consumption in France. Electricity makes up 34% of the energy consumed in residential buildings, followed by gas (29%) and renewables (biomass, geothermal and solar thermal (23%)). 17% of the residential stock is considered as a worst performing building (F and G energy class), representing 5.2 million homes in 2022. Only 5% of the housing stock has a high energy efficiency class (A or B) (ONRE, 2020).

Figure 7.3:

Graphique 1 : répartition des étiquettes DPE des résidences principales
En %



Note : passoires = logements classés F ou G.
Champ : ensemble des résidences principales au 1er janvier 2022, France métropolitaine.
Sources : Fidéli 2020 ; base des DPE décembre 2021-mars 2022 de l'Ademe. Calculs SDES

The vast majority of the current housing stock will still be standing by 2050. The government acknowledges energy renovation as the key lever to reduce building energy consumption. The technology is mature, but deployment is hindered by persistent financial and implementation barriers. The 2015 Energy Transition for Green Growth Law (see factor P1) set a renovation objective of the entire stock to a "low consumption building" standard (80 kWh of primary energy consumption/m2/year) by 2050, and a target of 500,000 deep renovations per year (MTES, 2016). The 2021 Climate and Resilience Law introduces a definition of deep renovation (achievement of A or B class) and a renovation obligation for rented buildings (ban of G class in 2023, of F in 2028, of E class in 2034) (Effy, n.d.; PAP, 2022). This quite ambitious regulatory framework (compared to other EU Member States) is complemented with technical assistance facilities (SLIME programme, France Rénov) and public subsidies (MaPrimeRénov, as mentioned in factors P5 and L5).

Despite this comprehensive policy mix, more ambition is needed to achieve the renovation objectives. Renovations are insufficiently efficient: most renovations performed consist of single works renovations. Only 57,000 deep renovations took place in 2021, 7% of total renovations (ANAH, 2022). In order to ensure that the building sector is able to deliver, one of Macron's electoral promises must be fulfilled: a law

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programming climate investments that would set in stone how much money will be allocated per sector over the next five years or more should be adopted in 2022 in order to give more visibility and predictability to the actors in the sectors involved.

How the factor influences ENCI: Energy efficient buildings are an opportunity for ENCI. The current energy price crisis has triggered an increased awareness of and interest in energy renovation among citizens. The public information online portal *France Rénov'* totalled 5.5 million visits between January and August 2022 (Armand, 2022). Deep renovation can cut energy consumption by 60 to 90%, increase comfort and well-being.

Affected ENCI types: In particular types 1 and 3.

Local examples: Beyond national schemes, regions also offer specific support. For example, Haut-de-France Pass Renovation offers third party financing for low-income households to support deep renovation in a mostly rural area, and grant loans based on an innovative financing offer that considers expected savings. The Bourgogne-Franche-Comté region offers a subsidy of up to €7,000 to low-income households who want to undertake a deep renovation for their home.

T5. Smart and green mobility

How is this factor manifested in France: The French Recovery and Resilience plan invests around €7bn towards green mobility: €4.4bn to modernise its railway network; and €2bn to build new clean transport infrastructures. The transport sector is the sector that emits the most GHG gases in France, and emissions are growing. With the EU agreeing on the end of the sale of combustion engine vehicles by 2035, major changes will be needed in the years to come to convince public opinion on the feasibility of such a turn (Nguyen, 2022).

Opinion polls conducted prior to the French elections in 2022 showed that the French are more sceptical towards electric vehicles and alternative mobility sources in comparison to other EU Member States. Furthermore, individual car ownership is still the norm in France, and the issue of car dependence and rising fuel prices were well highlighted by the Yellow Vest Movement (see factors P4 and EC4). The French government is still traumatised by the extensive protests in 2018-2019 and was quick to realise the inflammatory nature of an energy price surge in France (Nguyen, 2022). This could explain the reluctance of the current French government when it comes to discussing the reduction of car speed on highways and instead deciding to subsidise the reduction of gasoline prices.

The decision to not introduce a biannual technical control for two-wheelers is another example of the French government's reluctance regarding constraining measures on incumbent transport modes. After discontent of biker federations, the government instead announced that they would aim to create an incentive structure to reduce the environmental impact of two-wheelers.

In the same vein, as a response to the energy price crisis the French government has introduced different financial incentives to reduce emissions from personal transport, for example, a plan promoting carpooling and a financial bonus for long distance carpooling. Another example is the sustainable transport package that includes a tax-exempt benefit for up to €700 for employees in the private sector.

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How the factor influences ENCI: In 2022, 1,102,975 light rechargeable electric and hybrid vehicles were in circulation in France, including 346,865 registered that year. The shift from thermic cars to electric vehicles does contribute to lower carbon emissions, air, and noise pollution, and is an opportunity for reformative types of ENCI. However, replacing thermic cars by electric cars without implementing sufficiency policies, risk being highly resource consuming and thus a threat towards the sustainability aspects of ENCI. Massive scale-up electric light mobility options could pose the same problem. Affordability of such technologies is another threat.

Affected ENCI types: Mostly reformative types 1 and 3, but has the potential to be transformative, types 2 and 4.

Local examples: Strategy for sustainable transport in the Loire region.

Environmental factors

EC1. Climate vulnerability

How is this factor manifested in France: France's temperature has increased 1.9°C since 1900, exceeding the global average for warming. 2022 was the hottest year ever measured in France. Since measurements started in 1900, 8 of 10 hottest years in France have occurred after 2010. Furthermore, in comparison to the average annual rainfall, a deficit between 15-25% was recorded in 2022 (compared to 1991-2020 normal). For the month of May a 60% deficit was noted and in July a deficit of 85%. Those are the driest months ever recorded in France since the start of measurements in 1959. The costs of natural disasters during 2022 have been estimated to €10bn, these numbers are expected to rise in the coming years.

By using the IPCC method to estimate temperature increases, a recent study has estimated that France can expect an average temperature around 3.8°C higher in 2100 than 1900. The estimate has been made using a moderate scenario of greenhouse gas emissions that is the most in line with current trends and climate commitments. In this scenario, summers would be on average 5°C warmer with strong impacts on ecosystems and human activities, for example agriculture. Heatwaves and droughts will be more frequent and intense, as well as floods and other extreme weather. A key challenge would be the maintenance of water resources (see factor EN6).

How the factor influences ENCI: Increasing extreme weather events can mobilise citizens, draw attention to the needs of ENCI, and create support for it. However, if extreme weather events are not placed in a larger context of climate change and the human impacts, it might not have the same results. Similarly, there might be a competition for resources between climate mitigation and climate adaptation which could pose a threat for individual, organisational, public, and collective types of ENCI, especially if the focus is purely on technical solutions.

Affected ENCI types: Potentially all.

Local examples: A recent study based on IPCC scenario modelling, finds that eight French regions are among the 10% of the world's most threatened areas when it comes to physical climate risks, primarily

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causing damage to different types of physical infrastructures. Eight climatic events were considered: river and surface flooding, coastal flooding, extreme heat, forest fires, drought related land movement, extreme wind and freeze-thaw. The most affected regions will be Hauts-de-France (121st in the world), followed by the Provence-Alpes-Côte d'Azur region (176th) and the Grand Est (200th).

EN2. Availability of resources

How is this factor manifested in France: In terms of fossil fuel production, France does not have any large reserves of coal or petrol. The exploration and production of fossil fuels that does take place on national territory is governed by the mining code and the environmental code and carried out under mining titles issued by the State. In 2017, a bill ending the search and exploitation of conventional and unconventional fossil fuels was adopted by the National Assembly. Last year's gas shortages however gave room for some debate on the potential for French production of shale gas to ensure energy security (see factor EC6).

64 oil and gas fields are currently in operation. In 2020, 0.7 Mtoe of petrol was extracted in France, primarily in the Aquitaine and Paris basins. For fossil (and bio) gas, the production was at 2.4TWh GVC in 2020, and 214 facilities with an injection capacity of 3.9TWh per year were connected to the national gas network. The French reserves of crude oil (18.7 Mtoe) and natural gas represent 28 years of exploitation at the current rate, and only three months and a half of national consumption.

France has a large potential for renewables. Offshore wind is a particularly promising energy source because of the France's vast coasts. It is estimated that France has the production capacity of around 300,000 MW of offshore wind. To date this energy source has however been underemployed. Solar photovoltaics is similarly promising but is often rejected at the local level. ADEME evaluates that the capacity for photovoltaics of wastelands and car parks alone, amount to 53GWc.

How the factor influences ENCI: The geographical potential for renewable energy provides an opportunity for ENCI, but cannot be considered alone. The political, economic, technological, social, and legal context largely shapes in what ways and to what extent citizens can engage in renewable energy production. Factors that have an impact are for example the degree of centralisation of the energy system and the support for renewable energy production both politically and from the public.

Affected ENCI types: The potential for renewable energy production could potentially impact all ENCI types.

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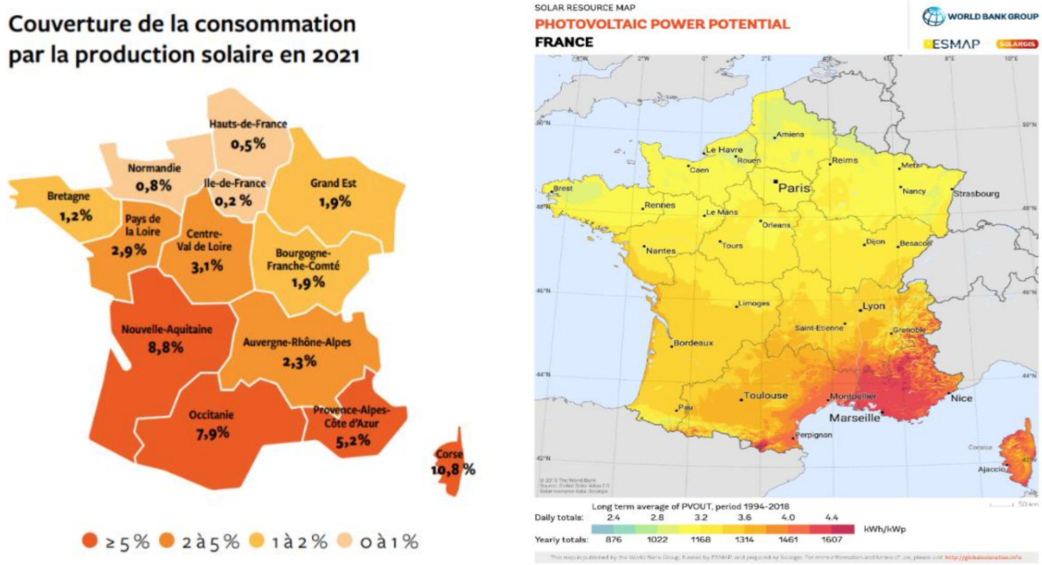
Subnational/local examples: See maps of the percentage solar energy of total electricity production per region (to the left) and the photovoltaic power potential of France (to the right). Even if the Provence-Alpes-Côte d'Azur region has the largest potential, the political support and incentives are more developed in the Occitan region and Nouvelle-Aquitaine.

Figure 7.4:



EN3. Air pollution

How is this factor manifested in France: While air quality overall has improved in France during the past 20 years, France has not managed to curb air pollution in its large metropolitan areas. Air pollution is estimated to cause around 40,000 premature deaths in France per year. The French government has been fined several times by its domestic administrative court. Furthermore, the European Commission has referred France to the Court of Justice of the European Union two times for its failure to respect the legally binding values of PM_{10} particles and nitrogen dioxide. These types of pollution primarily come from the combustion of fossil fuels for heating, electricity production, transport, industrial production etc.

Noise pollution is another consequence of the fossil fuel system, especially connected to different types of transport. Paris is a European hotspot for noise pollution, with more than 5.5 million inhabitants that are exposed to road traffic noise at 55 decibels or higher. A study conducted by the Paris regional health agency in 2019 estimated that noise decreases life expectancy of Parisians by 10.7 months. A 2021 study estimated that the loss productivity caused by disturbed sleep in France costs up to €147bn per year. At the national level, around 25 million (of 67.75 million) French residents said that noise impacted their lives.

How the factor influences ENCI: As described above, air pollution and noise pollution are tangible problems for large parts of the French population. Investments in infrastructure and subventions for soft mobility can support citizens to change modes of transport while the gradual prohibition of the most polluting vehicles push citizens to change.

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There are also citizen movements that organise themselves against noise pollution, one such example is the national association "Ras le scoot", i.e. "Feed up with scooters". The association is made up of several local groups whose aim is to challenge elected officials and do advocacy work, at local and national level, to reduce the nuisance (danger, air and noise pollution) of scooters and motorcycles.

Affected ENCI types: Potentially all.

Local examples: In 2015, the Paris metropole initiated the development of low-emission zones and has gradually restricted the use of the most polluting vehicles in the metropolitan area. All vehicles are mandated to show a sticker that categorises them according to their emissions. Parallel to this development, different financial incentives have been put in place for less polluting transport, for example electric bikes. Paris has furthermore invested €350 million (2015-2026) to make the city more bike friendly. The Bike Plan includes, among other things, the development 180km of new bike lanes.

Regarding noise pollution, Paris inhabitants were invited to participate in a public consultation that contributed to the plan for 2021-2025, as a follow-up to the 2015-2020 Environmental Noise Prevention Plan. Lower speed limits throughout Paris, limiting transit traffic and the development of public spaces in favour of active modes of travel and public transport were among the 30 actions proposed.

EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in France: Two examples of conflicts about land use connected to renewable energy in France are agrivoltaics and biogas production.

Agrivoltaics refers to the practice of combining agricultural production with the production of electricity from solar photovoltaic panels as a secondary activity, providing additional income for farmers. The Law on the Acceleration of Renewables Deployment (2023) includes sections on an accelerated deployment and regulation of agrivoltaics. This has gotten reactions from, among others, the Peasant Confederation (Confédération Paysanne) who argue that argivoltaism is a way for energy production companies to make profits from agricultural land and farmers, and that it will destroy rural livelihoods, attractiveness and biodiversity. They are not against the deployment of photovoltaics per se but prefer the deployment to take place on industrial roofs, in car parks and industrial wastelands.

The new law also includes a number of measures in favour of the experimentation of low-carbon gas production, such as biogas. Biogas has furthermore been presented as a potential source of energy autonomy by the French government in the light of the Russian invasion of Ukraine and the limited supply of fossil gas. The increase from 200 biogas plants in 2010 to 1300 in 2022, and the announcements of further regulatory simplification and calls for tenders for major biogas projects has however been criticised. Land grabbing, competition between food and energy crops, air and water pollution, soil impoverishment, odours, property depreciation, to name a few. Citizen mobilisations are on the rise, and the Brittany's farmers' confederation and the Capseb (Convergence for a social and ecological peasant agriculture in Brittany) are even calling for a moratorium on methanisation.

How the factor influences ENCI: Conflicts over land use connected to renewable energy can be a threat to ENCI. The example of agrivoltaics is contentious topic in general considering risks that renewable energy

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production competes with food production, this is especially visible in France where farmers are a strong interest group. However, farmers are not a heterogeneous group in France and there exist divergences between different farmers' associations, such as the example of the Peasant Confederation mentioned above who are very negative towards agrivoltaics and the influential National Federation of Farmers' Unions who are pleased with the "balanced" text in the recently adopted law. The conversion of "unproductive" or polluted areas, as mentioned above, could be a less contentious opportunity for ENCI.

Affected ENCI types: Potentially all, but especially types 7 and 8.

Local examples: The new Law on the Acceleration and Renewables Deployment will make the installation of photovoltaic shades in car parks with a surface of more than 1,500m^2 mandatory. This will impact car parks for example shopping centres, hospitals, and factories. The hospital in the city of Evreux, Normandie, is a frontrunner in this regard. Since the beginning of 2023 the parking lot of the hospital is equipped with 4,400 solar panels that will cover approximately 25% of the hospital's electricity use.

EN6. The impact of water resources in energy production and the increasing scarcity of drinking water

How is this factor manifested in France: In July 2022, France suffered from an 84% rainfall deficit on average. More than 100 municipalities were deprived of drinking water and restrictions on water use were widely spread. Two thirds of the country were experiencing a drought crisis according to the drought classification system.

France uses around 32.3 bn m^3 fresh water each year (2018). The cooling of power plants uses 16bn m3 per year (water consumed and returned directly after use). This is the largest source of freshwater use, even before the supplying water to channels (5.4bn m3), drinking water (5.3bn m3), agriculture8 (3bn m3) and industry (2.5bn m3).

During the warm summer of 2022, a number of nuclear plants could not produce at full capacity as river temperatures grew too high to cool the plants and due to legislation in place that prohibits use of freshwater for energy production in certain situations. When planning for upkeep of the current nuclear fleet and the development of new nuclear (see factor P7 and EC6) there is a need to consider the impact of a hotter climate. Nuclear plants close to the sea with the prospects of sea level rise must be considered as well.

The hydroelectric sector (12% of French electricity production) was also struggling in 2022, making the electricity generation crisis in France even tougher. The rainfall deficit since the beginning of the year and the severe drought had an impact on waterways and dams, resulting in a 35% decrease in hydroelectric production in July 2022 compared to the previous year, and 40% in the month of August.

How the factor influences ENCI: Social movements can be motivated by the environmental problems caused by water use linked to energy production and scarcity of drinking water. Furthermore, the specific

[8] However, if water consumed and not returned to the hydrological cycle is considered (5.3 bn m3), agriculture stands for 45%, cooling of electricity plants 31%, drinking water 21% and industrial use 4%.

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prospects of risks of nuclear production and climate change may provide an opportunity for citizen support for renewable energy production.

Affected ENCI types: Potentially all, especially types 7, 8, 9 and 10.

Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in France: This is a non-exhaustive list of legal definitions that relate to different types of ENCI.

Energy communities: Renewable Energy Community (REC) and Citizen Energy Community (CEC) were transposed into the French Energy Code in 2021 (Art.L291-1, 291-2; 292-1, 292-2, 293-3). According to REScoop's evaluation the question of eligibility is key in the French case. For REC's there are strong restrictions on companies but for CEC there are no restrictions to participation.

Public participation in decision making: Public participation in environmental matters is enshrined in Article 7 of the Environmental Code and ensures that the public should have a say in projects that apply to the criteria listed in Art.L122-1. In 1995, France institutionalised citizen participation, sometimes referred to as the "right to debate" and created a commission responsible to ensure access to information and early consultation on projects with significant environmental impact. An intervention by the National Commission of Public Debates is mandatory for large-scale projects but voluntary for projects with smaller impact.

Dialogue with interest groups and associations: The National Council for the Ecological Transition is the forum for dialogue on the energy transition and sustainable development and is consulted on the creation of new bills on these topics. The Council consists of social partners, civil society groups, interest organisations and public authorities at different levels. Its existence, functioning and composition of organisations is enshrined in the Environment Code, Energy Code and through different decrees.

How the factor influences ENCI: *Energy communities:* Legal recognition and equal or preferential treatment of energy communities in in energy policy and economy, strengthens citizen based organisational forms and ownership. There is a risk that CECs could co-opted by traditional energy market actors. The lack of monitoring could risk misuse of both REC and CEC definitions, ultimately leading to mistrust.

Public participation: Opportunity of access to information and participation to all "those affected by the project", but such participation risks creating mistrust if the results of a consultation are not binding or adequately taken into consideration.

Dialogue with interest groups and associations: Creates a space for civil society and citizen interest groups provide input to decision making, but risks creating mistrust of outcomes are not considered.

Affected ENCI types: the examples mentioned above especially affect reformative types 5 and 7.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

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How is this factor manifested in France: In France there are several legal measures dedicated to support vulnerable consumers and to alleviate energy poverty. One such example is the Energy Voucher, that was created by the 2015 Energy Transition for Green Growth Law. The energy voucher is awarded "to households whose reference tax income is, taking into account their composition, below a ceiling" (Art. L.124-1 of the Energy Code). For a person living alone the ceiling is €7,700 per year in reference income tax and for a couple with two children it is €16,170. The voucher can cover electricity, natural gas, heat, liquefied petroleum gas, domestic fuel oil, wood, biomass, or other fuels for heating or hot water production.

Another example is the disconnection ban implemented by the EDF, covering 70% of all consumers. The disconnection ban has not however been implemented by all suppliers. There is also specific support for home renovations for low-income households through "MaPrimeRenov Sérénité" (see factors P5 and T4).

How the factor influences ENCI: The legal measures above provide a basis for ENCI for low-income households and vulnerable consumers.

Affected ENCI types: Especially type 1.

L3. Rights and duties of consumers, prosumers, and new producers in interaction with the energy market

How is this factor manifested in France: Individual self-consumption and collective self-consumption (see also factor L5) stems from the Self-Consumption Act 2017-227. They are defined in the Energy Code, articles L315-1 to 315-8. The amended Directive on Common Rules for the Internal Market for Electricity of 2019 was transposed into the French Energy Code in 2021, which strengthened and expanded provisions for collective self-consumption, for example for social housing.

Even though decentralised energy generation is insufficiently developed in France (see factor P1 and L6), Enedis (the main distribution network operator, see factor EC3) is continuously developing the public electricity distribution network, to accommodate more and more renewable energy in France. At the end of September 2022, France counted 600,000 photovoltaic installations of a range of capacities, an increase with 20% from 2021. Of the 600,000, 208,000 were for individual self-consumption. The requests of connecting photovoltaics to the grid have been increasing over the past years. During the third quarter of 2022, Enedis recorded requests for a total capacity of almost 1.1GW (compared to 0.8GW during the third quarter of 2021 and 0.6GW in 2020).

Remaining issues is the ability of consumers to adapt to production (demand side response, and there are additionally legal issues regarding the status of producers who want to inject power into the grid.

For consumer protection, the National Energy Ombudsman (Energy Code, Art.L122-1 to 122-5) offers free public access to an online comparison tool of electricity and gas offers for domestic and non-domestic consumers who subscribe to an electrical power less than or equal to 36 kilovolt-amperes or whose annual reference consumption of gas is less than 300,000 kilowatt hours per year. The sorting criteria include the share of renewable energy. But consumer participation in the electricity market is too often reduced to the right to change supplier..

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How the factor influences ENCI: For now, this factor represents several threats to ENCI, for example by reducing the scope of empowerment of citizens to the confines of the market. Furthermore, larger financial and technical support are needed to foster citizens participation in renewable projects and renovation. Demand flexibility based on passive systems (for example remote piloting of water boilers, washing machine set by default to run during off-peak times) could furthermore be an opportunity for ENCI.

Affected ENCI types: Type 1 and 3.

L4. Bureaucracy and red tape

How is this factor manifested in France: Reflecting the opposition towards wind turbines (see factor S6), the IEA notes that authorisation procedures for onshore wind are very restrictive in France, for example classifying wind turbines as a potential threat to heritage, landscaping, and nature protection. The law on coastal protection is a barrier for renewables deployment in coastal regions. Moreover, spatial constraints, including for defence and civil aviation purposes have also posed problems.

The new Law on the Acceleration of the Deployment of Renewable Energy came about to ease bureaucracy and speed up commissioning in different ways. For example through the simplification of procedures for network connections, the recognition of overriding public interest to obtain a derogation from biodiversity protection, and the simplification of the permit process for geothermal energy. The Energy Transition Network (*Réseau pour la transition énérgetique, CLER*) calls the new law "too timid". It neither presents any major changes to the decision-making power granted to mayors to determine areas for acceleration or exclusion of renewable energies, nor does it provide adequate resources, support, or obligations for the territories. Citizen appropriation is also absent from the text. Environmental NGOs similarly critique the new law, stating that the parts on land-based wind production are insufficient to reach France's objectives for renewables and emissions-reduction. Critiques have also been raised along the lines of risks for the protection of biodiversity.

How the factor influences ENCI: Overall, accelerating renewable energy deployment by removing administrative/legal barriers and simplifying administrative procedures is an opportunity for citizens' energy projects. However, the acceleration of administrative procedures is often accompanied by a reduction of participative measures.

Affected ENCI types: Types 1, 2, 3, 4, 7 and 8.

Local examples: Island and coastal communities in Brittany face many barriers to develop wind turbines. The rule that it must be at least 500 meters from a dwelling, the Coastal Law (that prohibits any new construction in the 100 meters closest to the sea[9]), Natura 2000, protected areas and historic monuments, all contribute to big administrative hurdles. With the lack of staff in public administration to treat such issues, the process to circumvent these laws is often difficult and lengthy.

[9] The Coastal Law limits the urbanisation and development of the coastal area according to the following rules: (Art. L. 146-4 and L. 146-6 of the Urban Planning Code) in the coastal strip of 100 metres from the highest water level, construction is prohibited outside urbanised areas, **except for certain constructions or activities necessary for public services** or for certain activities requiring the immediate proximity of water.

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L6. Support schemes for renewable energy sources

How is this factor manifested in France: Regarding electricity generation by photovoltaics, citizens are supported with a purchase obligation for a part of the electricity produced (Energy Code, Art. L311-1 to L314-13). Feed-in tariffs are set by the French national energy regulator (Commission de Regulation de l'énergie) and evolve every three months. For example, a PV installation of 3 kWc generates 18 c€/kWh when all the production is sold or 10 c€/kWh when only selling the surplus. The feed-in contract with a fixed price holds for a duration of 20 years. The state also offers an investment subsidy for the installation of solar panels for self-consumption, and reduced VAT for installations with a capacity equal to or below 3 kWc. Under certain conditions (including capacity below 3 kWc and network connection) revenues from the sale of this electricity is not subject to taxation. Above 3 kWc, it is subject to taxation as industrial and commercial profits.

In 2019, the European Commission issued formal notice to France regarding EDF's dominant position in the hydropower sector and the ensuing non-compliance with the use of tender procedures for hydropower concession. France has been in breach of the law since 2010 because the hydroelectric concessions are coming to an end and must be subject to a new procurement regime that complies with European law, which France refuses to do. Under the Energy Transition for Green Growth Act (2015), local communities can be a concession partner. There are examples of citizen-led hydropower production, but the production of citizen-led hydroelectricity remains relatively small compared to wind and solar.

How the factor influences ENCI: Investment subsidies and incentives solar installations favour energy citizenship, but mainly for homeowners. In the case of financial support for solar PV, it may even be required to be an individual homeowner. When it comes to renovation or instalment of solar PV for shared properties, it can become complicated. In this case, specific investment support and technical assistance might be required, as well as simplified processes appropriate to collective decision-making to better support ENCI.

Besides the condition of homeownership that excludes part of the population from the schemes, specific support for low-income is necessary. More inclusive support schemes could also favour larger community-scale projects, but specific investment support is still lacking (see above and here) to properly favour ENCI.

Affected ENCI types: Especially the reformative kinds of ENCI, types 1-8 are supported by this factor.

Local examples: The Grand-Est region grants specific support for solar PV and solar thermal projects for NGOs and businesses.

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Summary table

Factors		High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition				X		
	Multi-level energy governance structure of a country		X				
	Political support for ENCI (mechanisms, networks, etc.)		X				
	Political/democratic culture and traditions	X					
	Inclusion and empowerment policies				X		
	Political vision on the future of the national energy system				X		
ECONOMIC	General economic situation / Inflation rate & purchasing power	X					
	Energy prices				X		
	Energy market				X		
	Energy taxation, state aid, fuel subsidies		X				
	Financing and investment opportunities	X					
	Security of energy supply		X				
SOC	Level of income / wealth disparity and energy poverty	X					
	Energy literacy, awareness, and skills		X				
	Citizen engagement and passivity in society					X	
	Trust in institutions and collective endeavours	X					
	Not-in-my-backyard syndrome		X				
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES					X	
	Decentralised energy system and storage	X					
	Digitalisation of the energy system				X		
	Energy efficient buildings						X
	Smart and green mobility				X		

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ENVIRONMENTAL	Climate vulnerability				X		
	Availability of resources					X	
	Pollution				X		
	Conflicts and opportunities about land use for renewable energy		X				
	The impact of water resources in energy production				X		
LEGAL	Legal framings of ENCI forms					X	
	Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion					X	
	Rights and duties of consumers, prosumers and new producers in interaction with energy market			X			
	Bureaucracy and red tape	X					
	Support schemes for renewable energy sources				X		
	Total factors per level of barrier/support	**7**	**7**	**1**	**11**	**5**	**1**

Conclusion

The biggest barriers for the development/emergence of ENCI in France:

- The steady rise of populism, the trust crisis in public institutions (especially at the national level), the decreasing participation rates in elections and violently repressed demonstrations are barriers for ENCI. The public frustration that these trends testify to highlights the need for a reformed governance system that allows for more citizen participation, where the views of citizens are better taken into consideration. Rethinking participation, which in theory aims to create consensus, may not be very straightforward in the French context with its strong democratic culture of political struggle and conflict.
- The strong degree of political centralisation leaves little room for manoeuvre for local and regional authorities, even though positive examples exist in some regions. Similarly, the strong degree of centralisation of the energy system has created a delay in the deployment for renewables and decentralisation of the energy system, and barriers for grid connection for local production.
- The energy price crisis has had a big impact on French inflation and purchase power. Despite the tariff shield, energy poverty is increasing. These trends are damaging citizens' ability to live decently, the State’s capacity to foster structural change with green investment, and the creation of a more favourable environment for citizen engagement. So far, most measures have been focusing on short-term, individual change that is likely to leave many households and businesses behind.
- Inequalities in standard of living and wealth inequality are increasing. Growing inequalities can

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contribute to feelings of distrust in institutions and collective endeavours. Furthermore, low-income households have less capacity to invest in energy efficiency measures for a variety of reasons and face greater barriers towards practicing active ENCI.

- Insufficient climate investments. During the energy price crisis France has spent around €100-110bn primarily on climate-damaging responses and non-targeted measures (fuel discount, opening of a new LNG terminal, and gas price freeze).
- The delay in deployment for renewables, not sufficiently implementing policies to reach energy efficiency, and emissions reductions.
- Authorisation processes for renewables projects, especially for wind turbines, are very restrictive in France, and the public opposition for land-based wind power is strong.

The biggest opportunities for the development/emergence of ENCI in France are:

- The energy price crisis has incited energy savings, and energy sufficiency as a tool for climate mitigation is becoming more accepted in France. Demands for energy renovations, membership in energy communities and self-consumption of renewable energy are also on the rise. The energy price crisis has also made the green coalition of actors that push for a more decentralised and bottom-up transition grow stronger.
- France's vibrant civil society which has been active in the climate struggle in recent years, consisting both of NGOs, social movements, and cooperatives. Important pressure from civil society pushes for more citizen participation and voices citizen concerns, increasingly so on the energy transition. Freedom of association and expression as well as a rich history of peoples' associations facilitates citizen engagement.
- France has an ambition to be a leader in the transition and in climate mitigation in Europe. Recently announced investment plans and strategies (France 2030) could provide ample opportunities for all types of ENCI.
- The geographical potential for renewable energy provides an opportunity for ENCI, especially for wind power and photovoltaics.
- Early legal recognition of self-consumption, largely adequate transposition of RECs and CECs, and an institutionalised "right to debate", are all opportunities for ENCI and could be developed further.

The overall evaluation of ENCI situation in the country: More factors are on the opportunity-side in the summary table (17 vs. 15); however, the factors assessed as barriers are assessed to have a bigger impact.

References

Disclaimer: All references are directly linked in the text.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101022492.

8. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN GERMANY

Authors: Ariane Debourdeau, Martina Schäfer, Claudia Buse (Technische Universität Berlin – TUB)

Introduction

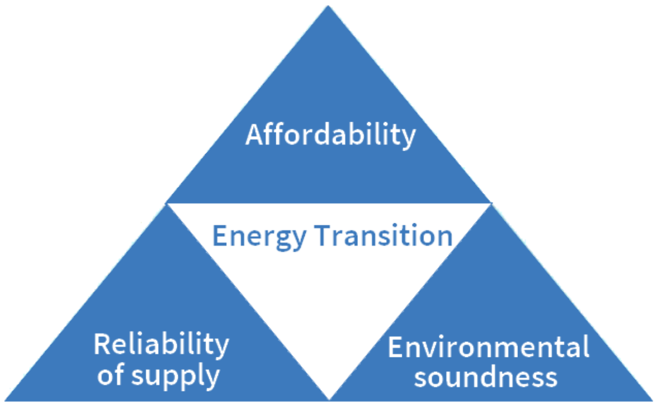
The term "*Energie-Wende*" has been coined in 1980 by researcher from the Öko-Institut to describe an energy system that could function without fuel and nuclear power. In that respect, the energy transition has somehow a long tradition in Germany, which played a pioneering role in it until the middle of the 2010s.

Current focus in national energy policy

In 2019, the Federal Government passed the Climate Action Programme 2030 and the Federal Climate Change Act – renewed in 2021[1] – to achieve Germany's climate goals towards the year 2030. It contains measures for all sectors and introduces a national emissions trading system for the heating and transport sectors, which are not covered by the European emissions trading system. The measures contained in the Climate Action Programme 2030 will shape German energy and climate policy up to 2030 and beyond. The Federal Climate Protection Act also contains the Federal Republic of Germany's commitment, made at the UN Climate Action Summit 2019 in New York, to pursue the long-term goal of reducing greenhouse gas emissions to net zero emissions by 2050.[2]

The topic of energy and climate policy is of critical importance for an industrial nation like Germany, and affects other fields of policy, in particular economic, environmental and social policy. The triad of energy policy goals (reliability of supply, environmental soundness and affordability) therefore is and will remain a key benchmark for Germany's energy policy, as represented in Figure 8.1, translated from the Integrated National Energy and Climate Plan 2019.

Figure 8.1: Triad for Goals of the German energy transition



Source: Integrated National Energy and Climate Plan 2019.

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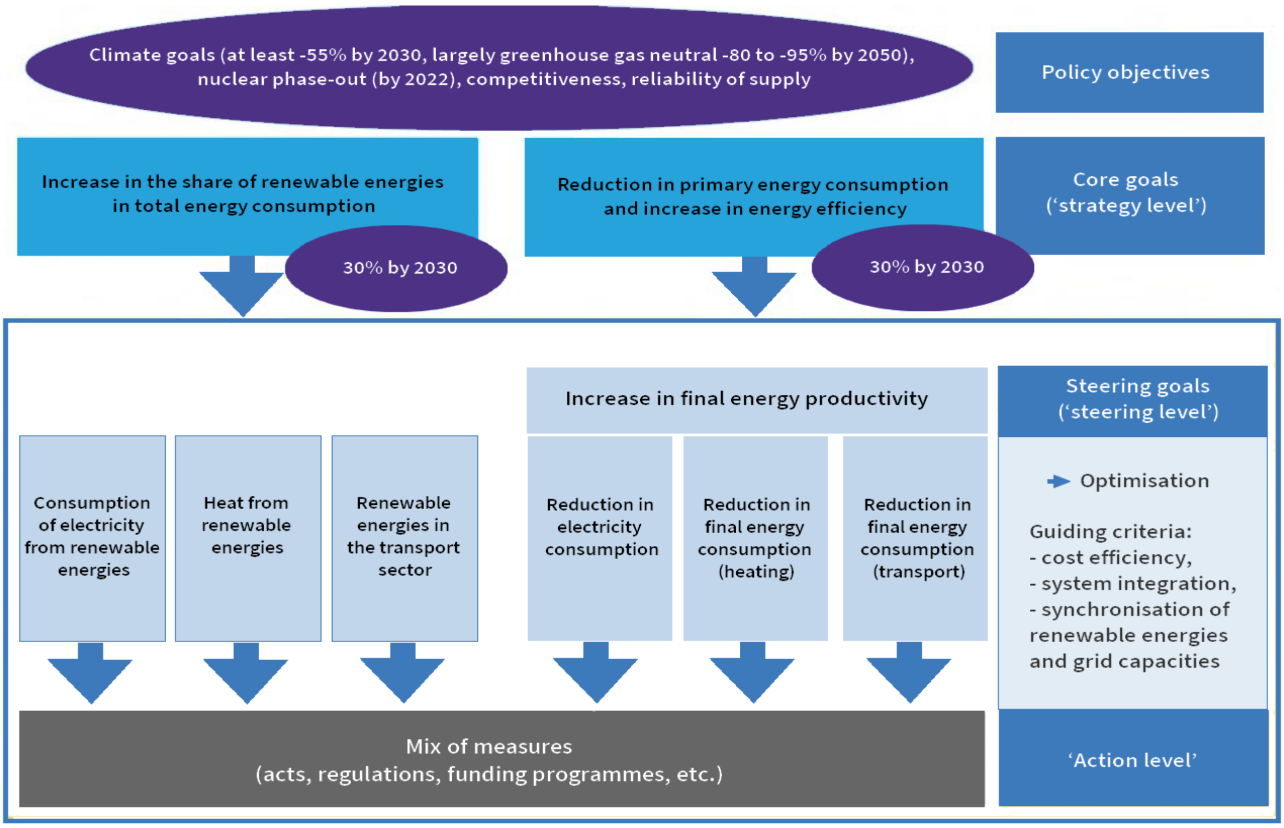
This triad results in the following 2030 Goal-based architecture, synthesised in Figure 8.2.

Figure 8.2: 2030 Goal based architecture



Source: Integrated National Energy and Climate Plan 2019.

Current energy mix and the short- and long-term goals (share of different energy sources, energy mix targets for 2030 and 2050)

The reforms that have been undertaken since the beginning of the Russia-Ukraine conflict largely reaffirm the German prior commitment to achieve climate neutrality by 2045. This recent package includes notably the coal phase-out by 2030 and requires electricity supply to be nearly climate neutral by 2035, whilst 80% of gross electricity consumption must come from renewable energy by 2030. In 2022, it was about 46%. Their share must therefore almost double within less than ten years. Wind and solar energy must be expanded three times faster than before - on water, on land and on the roof. The development of green hydrogen is also part of the large planning for making the energy mix basically composed of renewable energy sources.

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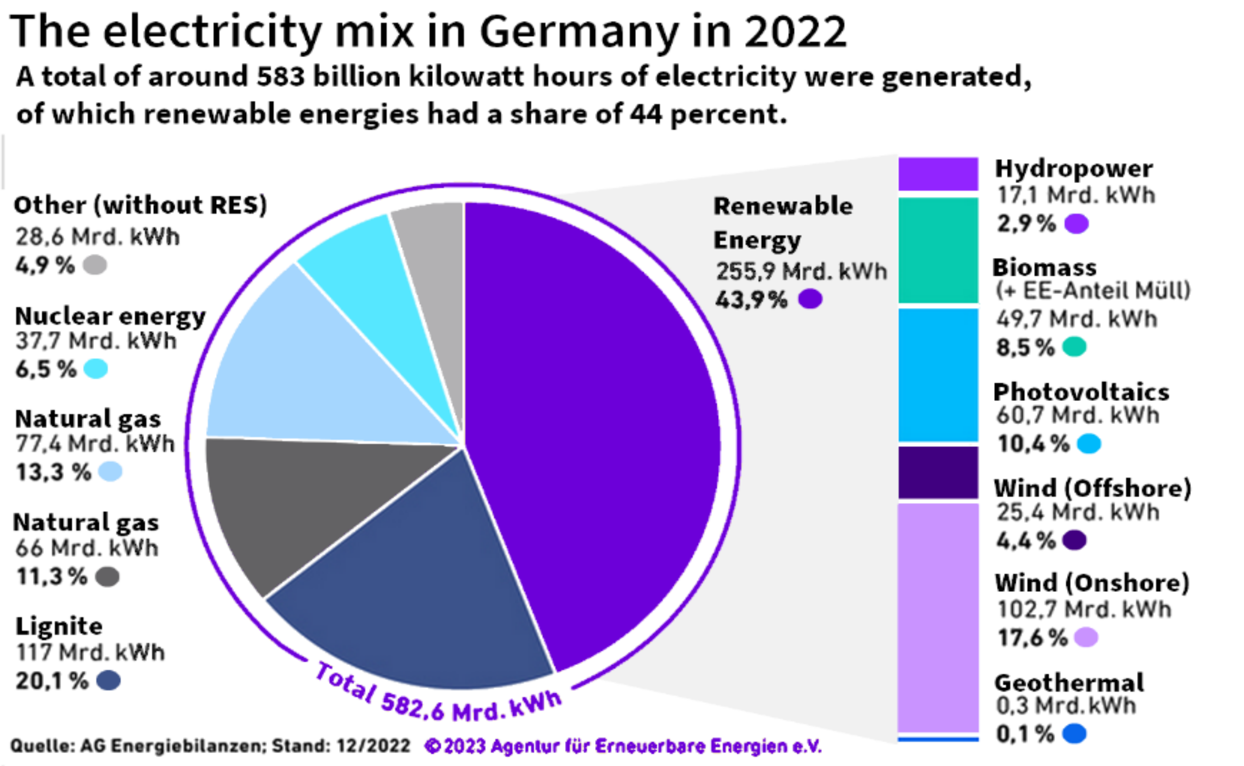
Figure 8.3: German Energy Mix in 2022



Source: Integrated National Energy and Climate Plan 2019.

Energy governance/ownership (governance and regulatory structures, market, main actors)

Energy governance: The Federal Government and the Länder engage in continuous coordination on the implementation of the energy transition. Twice a year, the Federal Chancellor and the Federal Minister for Economic Affairs and Climate Action (BMWK) meet with the heads of government of the Länder for discussions on the status of the energy transition. In addition to this, the relevant federal and Länder ministers also come together for an annual conference where they set their priorities and agree upon the next steps to be taken as part of the energy transition. The institutional coordination is complemented by a continuous co-operation and exchange on technical level.

Governance and regulatory structure: On federal level, the Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (BNetzA) serves as the most important regulatory authority for overseeing the regulation of transmission and distribution networks. BNetzA ensures compliance with the Energy Industry Act and its respective ordinances. To achieve that goal, BNetzA has a legislative function by specifying the regulatory regime and it has also various monitoring, investigation and enforcement tools. Regulatory authorities also exist at state level. They mainly deal with smaller electricity networks that fall outside the scope of BNetzA (that is, networks with less than 100,000 connected customers and that do not cross state borders). The Federal Office for Economic Affairs and Export Control (BAFA) is entrusted with conducting a variety of tasks to promote the efficient and economical use of energy, and

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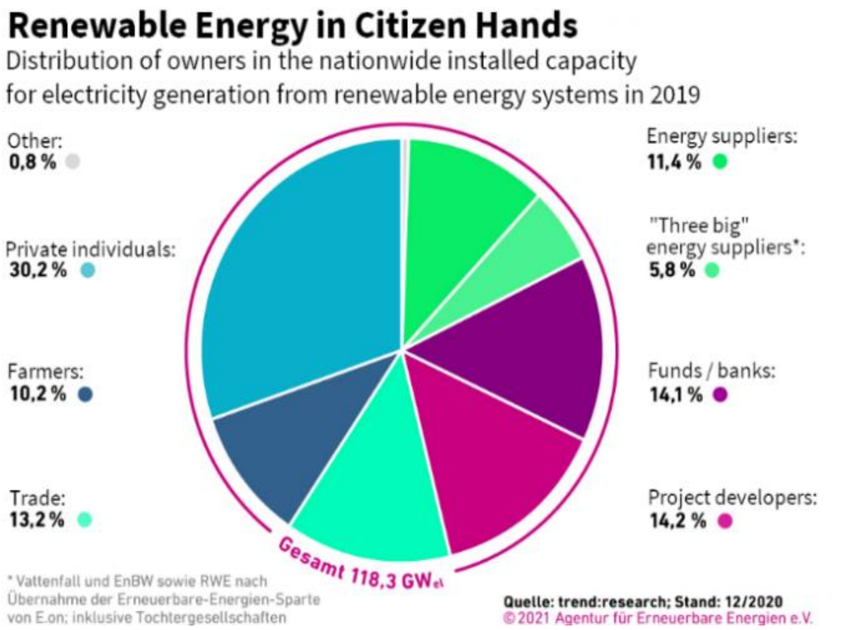
the further expansion of renewable energy. This includes the granting of exemptions to energy-intensive companies from having to pay the RES Act surcharge. The Federal Cartel Office (BKartA) is the competent authority regarding merger control in the electricity sector and competition law infringements.[3]

A partitioned market: A limited number of companies are involved in the generation of electricity from fossil fuels in Germany. Notably the: RWE, LEAG, Vattenfall and EnBW are the largest players but they face more competition from renewable power plants. The renewables segment however is much more fragmented than that of the fossil fuels. In addition, some electricity is generated independently: industrial self-producers usually operate gas power plants, while domestic self-producers typically operate solar panels. Most of the electricity is supplied: on electricity exchanges, bilaterally to electricity wholesalers (so-called "direct marketers") or suppliers of end users, directly to corporate or private end users. The weight of the "big four" tends also to be counterbalanced by the increasing role played by the municipalities, notably through the re-municipalisation process.

Figure 8.4: Renewable energy in citizens´ hands?



Furthermore, within the frame setup for the energy transition, citizens are playing a greater role, especially with regard to the ownership of the renewable energy sources, as underlined in Figure 8.4.

The role of citizens in relation to energy use

The new RES Act 2023 provides a relevant framework to enhance the development of cooperatives and communities, and therefore, the various related forms of ENCI, notably by ensuring their democratic content and the related citizen control and by preventing possible abuses. Considering citizens willingness to take part in the energy transition, especially through collective ownership of RES, this might become an important driver for further developments of citizen energy in the coming years.

However, some aspects of ENCI support are still lacking in the new German regulations, and especially regarding the energy poverty issue, which is barely addressed and could prove to be a major barrier for part of the German citizens.

Some progress has been realised to extend the scope of the possible forms of ENCI, notably through for example, tenant energy, which allows tenants to become more active in the energy transition (see below subsection L6), though they are not owning a roof on which they can install solar panels.

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Brief introduction of the local examples

Two main sorts of examples are included in this PESTEL analysis: First, some highlights on specific federal states (*Bundesländer* or *Länder*) that differ from the federal union in their energy policies/regulation; second, two distinct local levels cases i.e. a district (*Kreis*) and a municipality.

Highlights on federal states specificity: German federal states (*Länder*) are developing rather different energy policies which are regularly compared and ranked.[4] Therefore, we made the choice not to focus on a specific *Land*, but to highlight specific features of some *Länder* energy policies that are particularly relevant to the understanding of a specific factor. By doing so, we describe as accurately as possible the factors that affect ENCI in Germany by mixing a global picture with *Länder* specificities.

Climate energy action in Marburg-Biedenkopf district: In 2007, the district of Marburg-Biedenkopf set itself the goal of becoming independent of nuclear and fossil fuels by 2040. Since the end of 2011, the climate protection concept was available, showing how this goal can be achieved in the electricity and heating sectors. Since 2012, the "Master Plan 100% Climate Protection"[5] is building on this climate protection concept and goes even further. By 2050, 90 to 95% of greenhouse gases and 50% of energy are to be saved. Elaborated with the collaboration of the citizens,[6] this Master Plan pursue these climate policy goals intensively by introducing process management for the short-, medium- and long-term implementation of ecologically and economically sensible measures. It aims at exploiting the potential for increasing energy efficiency and energy saving and at promoting sustainable lifestyles among consumers as well as sustainable economic activity in local businesses.

Wolfhagen, a 100% Renewable municipality: The town of Wolfhagen was one of the first German cities to re-municipalise its electricity grid. In 2003, the then "*Stadtwerke*" (municipal utility) director convinced the local politicians to take advantage of E.ON's expiring 20-year concession contract and reclaim control over the distribution network. After three years of intense negotiations, a deal was reached in 2006. Shortly after, the city set the objective of becoming 100% powered by renewables by 2015. In 2013, in order to make sure that citizens could benefit from the switch to renewables, the town supported the creation of the Wolfhagen citizens' cooperative ("*BürgerEnergieGenossenschaft Wolfhagen*"). A quarter of the energy utility shares was sold to the cooperative (which now owns 40%), and the municipality – as the owner the rest of the shares - used the money for building the needed infrastructure. Wolfhagen can thus be seen as a pioneer municipality in Germany.

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Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)

How is this factor manifested in Germany: The Climate Action Programme 2030 is sending a clear signal: “every individual will find his or her way in the transformation, including those on a low income”. The corresponding support programmes are thought to be attractive for the citizens, especially with incentives to switch to climate-friendly options. Citizens are meant to consider this for their next vehicle purchase or their next heating upgrade. Municipalities shall integrate the Climate Action Programme in the next decision on public transport or the next district development whilst federal states shall care for the next electricity grid and the next wind farm. The 2020´s are considered by the government to be the decade for rigorous implementation of the energy and transport transition. Support will then have to decline in the foreseeable future but in turn, regulation and price incentives will be further strengthened.[7]

The climate measures have been significantly reinforced after the decision undertaken in April 2021 by the Federal Constitutional Court (BVerfG), after a support that the German Association for Solar Energy (*Solarförderverein Deutschland*), German Federation for the Environment and Nature Conservation (BUND) and others sued.[8] The Court ruled that the provisions of the Climate Change Act of 12 December 2019 on the national climate protection targets and the annual emission volumes permissible until 2030 were incompatible with fundamental rights insofar as sufficient requirements for further emission reductions from 2031 are missing. By doing so, it declared the 1.5-degree limit of the Paris Climate Agreement constitutionally binding which contributed to reinforce and rise the climate and energy goals for Germany.

In the new RES Act 2023, the transformation to a sustainable and greenhouse gas-neutral electricity supply based essentially on renewable energies was firmly anchored as a goal. To achieve it, the share of electricity from renewable energies in gross electricity consumption is to be increased to at least 80% by 2030. Therefore, expansion paths and tender volumes for the individual technologies defined in the RES Act 2023 are significantly increased compared to its previous versions. The future expansion is based primarily on the use of solar and wind energy. For onshore wind energy, an expansion rate of 10 GW per year from 2025 onwards should ensure that a total of around 115 GW of wind energy capacity is installed in Germany by 2030. In the area of solar energy, the target for 2030 is an installed capacity of photovoltaic systems totalling 215 GW. The framework conditions for rooftop and ground-mounted systems are significantly improved by several individual measures for expanding their use. In addition, to accelerate the expansion of rooftop PV systems outside of tenders (installed capacity < 750 kWP), the remuneration for all new systems increased from 30 July 2022. In addition, the degression of the statutory remuneration rates will be suspended until the beginning of 2024 and then switched to a half-yearly degression. Furthermore, in the RES Act, the quantitative limit on annually subsidised tenant electricity projects was lifted. In the future, the expansion of solar energy will be divided equally between roof-mounted and ground-mounted systems.[9]

How the factor influences ENCI: Many measures are clearly considering the role played by the citizens in the energy transition, by stating that each resident/civilian of Germany should be able to “do its bit” toward the achievement of carbon neutrality. The large set of measures adopted between 2019 and 2023

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aims at relaunching the energy transition and accelerate it while offering the possibility to citizens to jump in through many possible ways (electric mobility, more climate-friendly heating systems, individual renewable installations, tenant photovoltaic model, etc.). Therefore, this factor can be considered as an opportunity for further development of ENCI in Germany.

Affected ENCI types: Type 1, 2, 3, 4, 7, 8 are encompassed by this factor, yet they are tendentially more oriented toward a reformative outcome-orientation rather than transformative one, partly due to the individual focus adopted in most of the policy measures.

Local examples:

Marburg-Biedenkopf, 100% Renewable energy sources (RES) district: The national goals must inevitably be implemented at regional and municipal level, so that municipalities and districts in particular are called upon to develop individual strategies for achieving these goals. The Marburg-Biedenkopf district is an exemplary case of the concretisation of energy transition political objectives and of their further developments at the local scale. To this end, various instruments are made available at the federal level to support such a development. In addition to the establishment of direct funding measures for the expansion of renewable energies, the Climate Protection Initiative of the Federal Government for the Environment, Nature Conservation and Nuclear Safety (BMU) has been providing targeted support for strategic future development since 2009 - including funding for integrated climate protection concepts for municipalities and districts. In addition to these top-down activities, however, a movement has also emerged from within the regions, which has led to the development of so-called 100% RES regions in recent years. Since 2008, the district of Marburg-Biedenkopf has been one of these 100%-RES regions in Germany, which now number 78, with the self-imposed goal of achieving a full supply of renewable energy in the electricity and heating sectors by 2040. This goal and the associated forward-looking commitment make the district of Marburg-Biedenkopf one of the pioneers of the energy transition in Germany.

Berlin Climate protection and energy transition acts: Berlin has set itself ambitious climate protection targets: to be climate neutral by 2045. As intermediate steps, the Berlin Climate Protection and Energy Transition Act (EWG Bln) stipulates that the total amount of CO_2 emissions in Berlin must be reduced (compared to the year 1990) by at least 40% by 2020, 70% by 2030 and 90% by 2040. The Berlin Energy Transition Act, which came into force in 2016, provides the legal framework for Berlin's climate protection policy. With this law, the climate protection goals and the instruments to achieve them are legally anchored and thus made a permanent task. The Berlin Energy and Climate Protection Programme 2030 (BEK 2030) contains the concrete strategies and measures on the path to climate neutrality and thus represents the “roadmap” and the central instrument of Berlin's energy and climate protection policy. Its approximately 100 measures represent the diversity of climate policy in Berlin and address both climate protection and adaptation to the unavoidable consequences of climate change.

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P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)

How is this factor manifested in Germany: "Energy policy is largely determined by the national level, which, beside legislation, offers programmes to support the development of renewable energies (and so do state levels)" (Schmidt et al. 2020).[10] In June and July 2022, the German Parliament adopted the largest revision of energy policy for decades, the new legislation including the revisions of the RES Act, the Offshore Wind Energy Act (WindSeeG), the Energy Industry Act (EnWG) and other energy-related acts, as well as introducing the Wind Energy Area Requirements Act (WindBG). To support a massive expansion of RES, the new RES Act 2023 anchors in law the principle that the use of renewable energy is of overriding public interest and serves public security, on purpose of simplifying and accelerating planning and approval processes, which should also increase the role of municipalities in these processes.

The expansion paths are also underpinned by measures that are targeting various governance levels. For example, the Onshore Wind Energy Act (*Wind-an-Land-Gesetz*) prescribes targets for each federal state to ensure 2% of Germany's surface area will be reserved for onshore wind power by 2032 (more than twice the area currently designated). More, the 13 larger states must designate 1.1-1.8% of their surface area to onshore wind power by 2027 and reach the targets of 1.8-2.2% by 2032. Even the three city states (Berlin, Hamburg and Bremen) must use 0.5% of their area for wind power by 2032 (0.25% by 2027). Depending on their wind conditions and nature protection areas, certain states will only have to reach slightly less than the 2% share, while others must achieve slightly more. States can make deals among each other to fulfil their obligations. The minimum distance rules between wind turbines and residential areas will be allowed to remain in force, but only if the federal state fulfils its contribution to national wind power buildout targets. Furthermore, the participation of the municipalities in onshore wind and photovoltaics was extended, and the policy environment for citizens' energy projects and for the expansion of roof-top PV installations improved.

How the factor influences ENCI: The current paths for the governance of the energy system represents rather an opportunity than a threat for the development of ENCI as part of the global strategy to develop the use of RES. The new RES Act 2023 increases the level of constraints on the federal states through targets to be met in 2027 and 2032, which should indirectly support citizen energy projects, all the more since their acceptance is higher than non-participative projects. Municipalities and citizens are also expected to play a greater role in the energy transition, which might also foster ENCI.

Affected ENCI types: Types 1, 2, 3, 4, 7, 8, in various degrees.

Local examples:

Bavaria 10 H-rule for wind turbines: In Bavaria, the strictest distance regulation in Germany, the so-called "10 H-rule" in force from November 2014[11] until November 2022 ruled that the distance between new wind turbines and nearby residential areas must be at least ten times the total height of the wind turbine. With an average total height of 190 m for wind turbines in Bavaria, this means a minimum distance of almost 2,000 m to residential areas in built-up districts. The 10 H-rule was completed with the insertion of a temporary "*Länderöffnungsklausel*" into the Building Code. Bavarian state is the only one that introduced binding minimum distances for wind turbines. Municipalities had the option of designating areas with lower distances to settlements through urban land use planning

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– which has been used in no more than 20 Bavarian municipalities, in which the minimum distance for the wind turbines planned was undercut. The introduction of strict minimum distances at the end of 2014 led to a drastic reduction of the expansion of wind energy in Bavaria. According to an econometric causal analysis, approved turbine output fell by at least 60% in 2015 and 2016 (Stede, May 2019)[12]; more, in 2018, the number of new installations in Bavaria fell by around 93%.[13] Even the possibility for municipalities to allow construction below the minimum distance did not prevent this collapse.

Klikk-aktiv - climate protection in small communities through voluntary climate protection mentors in Rhineland-Palatinate[14]: The Rhineland-Palatinate Energy Agency supports small communities in the pilot regions of the Palatinate Forest, Middle Moselle Valley and Eastern Eifel in identifying and activating local climate protection mentors, thus linking climate protection and voluntary commitment. Together with the volunteer climate protection mentors, possibilities for action are identified and concrete projects are initiated. The project team supports the municipalities from information on suitable funding and its application to project implementation and management. By sustainably anchoring climate protection in small communities, their future viability is strengthened. The “Klikk-aktiv” project strengthens regional value creation and the future viability of municipalities and also revitalises voluntary work. The target is: 30 participating municipalities with climate protection mentors; 75 projects and measures initiated; 15 supported funding applications; 3 processes initiated in other federal states; CO_2 savings of 500 t per year. After the pilot phase in the three model regions, the approach will be extended to the whole of Germany so that processes can be initiated in other federal states. In this way, the topic of climate protection can be anchored nationwide in small municipalities with fewer than 5,000 inhabitants and a contribution can be made to the energy transition. For this purpose, a guideline is being developed that contains the central project results and approaches for transferability to the municipalities.

P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in Germany: Citizen participation is an instrument to strengthen citizens' trust in politics and administration. Based on the coalition agreement, the Federal Ministry for the Environment (BMUV) has launched a series of participation processes, and notably the “citizens' dialogues on the Integrated Environmental Programme 2030”, “Climate Protection Plan 2050” and “Resource Efficiency Programme” (ProgRess), in all of which citizens were randomly selected to participate and were able to voice their demands and views. The results of the dialogues were consistently characterised by commitment and expertise. Many other citizen participation processes were carried out so far at the federal level, such as: *Mitreden U* - online participation on environmental issues; Global citizens' dialogue on the 21st UN World Climate Conference 2015 in Paris; Citizens' dialogue “*GesprächStoff - ressourcenschonend leben*” on the Resource Efficiency Programme (ProgRess II); Participation process Climate Protection Plan 2050; Citizens' dialogue on the Integrated Environmental Programme 2030; Citizen participation in the search for a final storage site for radioactive waste; Online dialogue on the White Paper on Urban Greening; “Our climate! Our Future!” Youth dialogue on the 23rd World Climate Conference. At the local scale, the number of participation processes in connection with renewable energies is increasing and particularly (but not only) in rural areas, where the energy transition is becoming increasingly visible, where participation is feasible with relatively little effort due to manageable

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dimensions. Yet, as stated by Holstenkamp, “ambitious citizen participation is obviously still the exception rather than the rule. As a rule, however, citizens' meetings are not dialogue-oriented, so that they are rarely suitable for resolving site conflicts” (Holstenkamp 2018).[15]

How the factor influences ENCI: Participation can in general be seen as an opportunity for the citizens to involve in the energy policy at both the federal and local levels. The citizens’ participation to policymaking has taken a greater importance at the federal level during the last decade, enhanced by the growing number of digital forms of participation to energy-related policy. However, the participation processes are not all similar and they are still underused, particularly at the local level, whilst they could contribute to solve some conflicts related to the RES projects, as underlined by Holstenkamp (2018). Furthermore, the outputs of such participation processes vary a lot in terms of the ways through which citizens contributions are taken into account.

Affected ENCI types: Mostly type 5 and 6 on the individual side, types 9 and 10 on the collective side.

Local examples:

BEK 2030 in Berlin: From 16.02. to 16.03.2022, the 2nd public participation phase of the further development of the Berlin Energy and Climate Protection Programme (BEK) has been opened to the citizens of Berlin, in which suggestions and comments on the further development as well as concrete measures could be submitted and evaluated. Participation was requested through the participation platform of the state of Berlin, mein.berlin.de!

“Open local Government” in the Marburg-Biedenkopf district: Since 2014, the Marburg-Biedenkopf district administration wants to become an open local government. And first, the creation of a specialist service “Citizen Participation & Volunteer Promotion” aimed at systematically and actively integrating civil society into the work of the administration. As an example of this pioneering role, the citizens' dialogue on biodiversity developed by the district administration together with many volunteers was recently recognised by the Federal Ministry for the Environment as an exemplary participation process. Another example of how the district administration already implements open administrative action is the cycling dialogue, which defined a coordinated network of cycle routes for the entire district.[16] The aim was to involve the experience and competence of those who use bicycles in everyday life and/or leisure time or on the way to school and work and to collect their suggestions, hints and wishes on a participation platform and in a series of public events, resulting in a priority list for the implementation of investment measures. Through citizen involvement, the issue of road safety has taken on greater importance than it was originally the case – impacting the prioritisation of investment measures. In addition, citizen participation has been consolidated and institutionalised by establishing a cycling forum and by involving continuously experts and competent citizens in the working groups on school cycling, quality management, cycle lanes and everyday cycling (Laumer 2018).[17]

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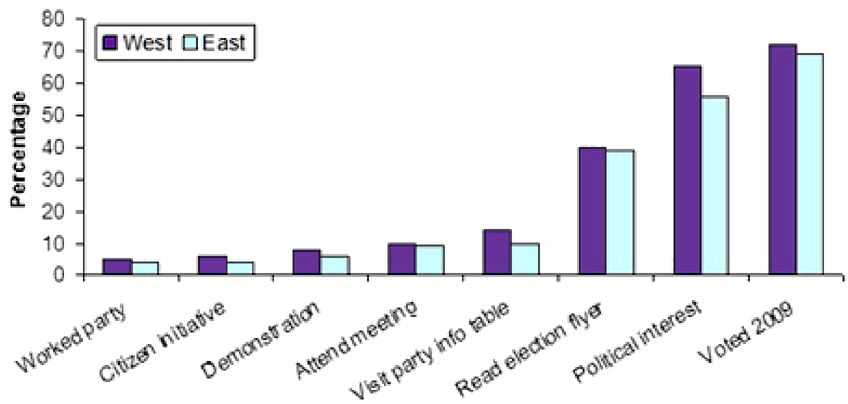
P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in Germany: As a representative democracy, Germany conceives citizen participation as based on parliamentary and deliberative processes and direct democracy, in which the citizens are free to choose whether they want to participate or not. Since the fall of the Berlin wall, participatory procedures have been given a growing role and contributed to a progressive unification of the democratic culture across Germany, as stated in the following Figure 8.5.

Figure 8.5: Participation in West and East in 2009[18]



Source: 2009 German Longitudinal Election Study; government statistics for the 2009 election.

This unification path is also stated in terms of engagement. In 2019, 28.8 million people were involved in voluntary work - that is 39.7% of the population aged 14 and over. The engagement rate has increased in a range of 10 percentage points over the last 20 years. The engagement rates in Eastern and Western Germany have gradually converged since 1999: in 2019, it was with 37% in Eastern Germany (including Berlin) only 3.4 percentage points lower than in Western Germany (40.4%). In 1999, this difference was still 7.9 percentage points (Simonson et al. 2019).[19] Citizen's involvement represents an important political matter, that is supported by many governmental and non-governmental and civil actors, such as – among many others - the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth, the National Network for Civil Society, the German Foundation for Civic Engagement and Volunteer Work, the Actively Engaged City network, foundations like Robert Bosch, Körber, Bertelsmann, Breuninger and Joachim Herz, etc. Several programmes are also running to support democracy culture, such as the programme "Live Democracy!" which supports 16 Democracy Centres at the level of the federal states level or the Federal Programme "Local Partnerships for Democracy" that supports towns and cities, municipalities and rural districts throughout Germany in developing "partnerships for Democracy" based on local or regional alliances that promote democracy, shape diversity and prevent extremism.[20]

This rather positive picture of citizen engagement in Germany is also valid for the energy issues, including from an historical perspective: the anti-nuclear movements was and is still particularly strong in Germany, and it has influenced radically the development of energy communities and cooperatives as well as that of RES.

How the factor influences ENCI: This factor undoubtedly supports the development of many forms of ENCI, from the energy communities and cooperatives to the social movements. There is a strong culture of engagement and participation in Germany, in which the energy issues are given an important role, notably with regard to the antinuclear and environmentalists movements that emerged in the 1970's.

Affected ENCI types: All types of ENCI might be affected by this factor. Types 5, 6, 9 and 10 can be considered as particularly salient with regard to citizen participation.

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Local examples:

The Citizens' Energy Transition Forum Hessen is a programme of the federal state energy agency (LandesEnergieAgentur (LEA) Hessen. The Citizens' Forum aims at shaping the energy transition together with the municipalities and local people and at jointly searching for concrete solutions through energy projects, providing citizens with information on processes and regulations, explaining complex issues, tailoring the citizens' dialogue to the individual municipality, clarifying conflicts - using neutral moderation or mediation to ensure a factual and constructive exchange, communicate transparently and inform the public about all aspects of a project - also through accompanying press work, to obtain a well-founded overview of the topics under discussion - and thus to enable a structured approach to the course of the project, to bring in suitable experts to contribute their knowledge at citizens' events, to involve all interested parties in planning projects at an early stage - and thus to secure room for manoeuvre.[21]

"Climate Dialogue" event series in the Marburg-Biedenkopf district: In autumn 2021, the district of Marburg-Biedenkopf launched its "Climate Dialogue" event series. The district welcomed over 160 participants to the first event with the well-known German climate expert Prof. Dr. Mojib Latif. With this series of events in 2022 and 2023, the district intended to inform about the state of scientific knowledge on climate protection and climate change, show alternative courses of action and encourage people to become active themselves. For instance, the first event in spring was a lecture on hydrogen, since the district has been entitled to become a hydrogen model region. The best-selling author Prof. Dr. Harald Welzer followed with a lecture on the topic of sustainable lifestyles and the culture of cessation. The third event dealt with the aspect of citizen energy, decentralised energy transition and citizen participation in renewable energies.

P5. Inclusion and empowerment policies

How is this factor manifested in Germany: In Germany there are relatively few policies that directly address energy poverty (Cludius et al. 2018).[22] General programs offer low interest and easily accessible loans; however, they are not directly targeted at households at risk of energy poverty and it is not clear who exactly takes up these programs. If all types of households would participate, these policies would tend to be progressive (Schumacher et al. 2016); however, it is unlikely that households with smaller financial means do so to the same extent.

Nationally, renovation of social housing is mandated under the Housing Support Act (WoFG), which is not directly aimed at households in energy poverty, but does result in household savings for energy costs. Targeted measures are more clearly articulated on local levels. With regards to electricity, a measure specifically addressing low-income households is the Electricity Saving Check (*Stromspar-Check*), where trained advisors (often previously long-term unemployed) visit households, offer advice and install small electricity saving equipment.

The RES Act 2023 entails a first attempt towards a more just energy transition: The Federal Parliament has abolished the renewables surcharge that consumers pay on the power price. Planned for 2023, the government moved the end of the surcharge forward to 1 July 2022. While it was originally meant to lower electricity prices to incentivise consumers to switch to electric cars and heating systems, it currently

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mainly works as a relief measure for consumers suffering under high energy prices.

Furthermore, in order to alleviate citizens from the sharp rise in energy costs associated with the Ukraine war, the Federal Government has launched relief packages amounting to almost €300 billion. Yet, the “electricity price brake” and the “gas and heating price brake” apply to all electricity customers from January 2023, which does not specifically target energy poverty. The measures directed towards specifically affected citizens remain thus limited.[23]

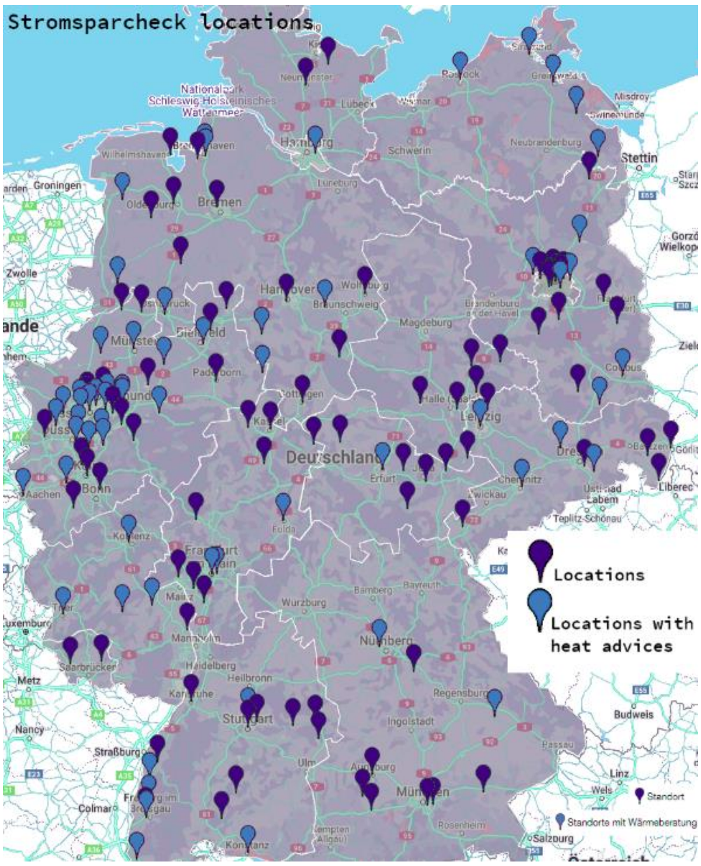
How the factor influences ENCI: The lack of measure addressing energy poverty is a threat for ENCI, since they hinder the empowerment of the most vulnerable citizens. The lack for targeted measures is often underlined in the literature, notably in comparison with other EU countries (Cludius et al. 2018).[24] The recent measures, such as the removal of the surcharge on power price did not really met its objective, since it has been merged with other emergency measures to face the energy crisis induced by the Ukraine war. All in all, inclusion and empowerment policies are not fully developed and regarding energy poverty issue, the state tends to delegate it to social welfare organisations than addressing it consistently.

Affected ENCI types: Basically type 1, to some extent types 2, 3, 4.

Local examples:

Stromsparcheck: Since 2008, the German Caritas Association and the Federal Association of Energy and Climate Protection Agencies in Germany have been responsible for the implementation and further development of the project content. The Electricity Saving Check is available in more than 150 cities and municipalities. Households with low incomes can register for it at their local office. People who receive social benefits such as unemployment benefit basic income support, child supplement or housing benefit are eligible. They provide practical tips on how households can save energy and protect the climate through behavioural changes alone - without any structural measures. In addition, they bring energy, heat and water-saving items worth up to €70 on average, which are installed directly. These “instant aids” include LEDs, switchable socket strips, refrigerator thermometers, flow limiters, water-saving shower heads, hygrometers, timers and draught stoppers.

Figure 8.6: Stromsparcheck



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Free energy advice in the district of Marburg Biedenkopf: The district of Marburg-Biedenkopf, in cooperation with the Hesse Consumer Advice Centre, offers free energy consultations for citizens who receive "Unemployment Benefit II" (ALG II). Interested persons receive helpful tips on how to save energy in their everyday lives. The energy counsellors also take a close look at the large household appliances - refrigerators, washing machines and dishwashers. If one of the appliances stands out because of its particularly high electricity consumption, it can be exchanged for an appliance of the highest efficiency class free of charge using funds from the district's Future Package. The district of Marburg-Biedenkopf is particularly concerned that citizens who do not have much financial leeway also receive professional advice on how to save energy and thus reduce their energy consumption.[25]

P8. Geo-political challenges (war in Ukraine, gas and oil supply…)

How is this factor manifested in Germany: Until the start of the Russian war against Ukraine, Germany imported a large share of fossil energies from Russia - mainly natural gas but also hard coal and oil. The Federal Government decided to end this energy dependency on Russia as quickly as possible and to put the energy supply as a whole on a broader basis. Russian hard coal used to account for around 50% of German consumption which turned into zero mid-August 2022. The share of Russian gas in Germany before the war was about 55%. However, due to the increased natural gas supplies from Norway and the Netherlands as well as additional liquefied natural gas imports, the share of Russian gas supplies fell progressively to zero in September 2022. Though the emergency plan alert level is in effect since June 2022, Germany has succeeded in becoming independent of Russian energy and securing its energy supply by acting quickly. Every citizen can contribute to this by saving energy. The Federal Government continues to work in becoming less dependent on fossil fuels - for more climate protection and a more secure energy supply.

How the factor influences ENCI: The fossil fuels price level since the beginning of the war have raised and present massive economic and politic challenges for Germany and its citizens, especially the less wealthy who are particularly impacted by the high energy prices. This general threat has become an opportunity for ENCI, since German people were asked by the government to support its policies through energy savings, which were thus given a political dimension they did not had previously. The energy crisis also pushed forward the energy transition towards energy sources and climate-friendly mobility, initiating a new impulse for the development of ENCI. Last but not least, temperatures in public facilities have been significantly lowered, water temperatures in swimming pools, etc., also contributing to the general mobilisation of the population towards energy saving – as underlined in the second local example.

Affected ENCI types: All types of ENCI are affected.

Local examples:

First results of the Energy saving measures at TU Berlin: In its January newsletter, the TU Berlin informed its members about the aggregated energy-saving results for December 2022. Compared with December 2021, total energy savings of 26% were achieved in December 2022. Savings for December 2022 relative to December 2019 are also calculated to provide a comparison with the period prior to COVID-19 pandemic:

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Electricity:	18% compared to 2021,	22% compared to 2019
Teleheating:	27% compared to 2021,	29% compared to 2019
Gas:	41% compared to 2021,	37% compared 2019
Total savings:	26% compared to 2021,	27% compared to 2019

Those savings in electricity and heating in winter months were achieved in particular as a result of an early closure of the university between 16.12.2022 and 4.1.2023, but also due to changes in opening hours, reduced heating and other measures implemented by many TU members. Savings of over 30% were achieved in many buildings, and in some cases, savings even exceeded 50%.

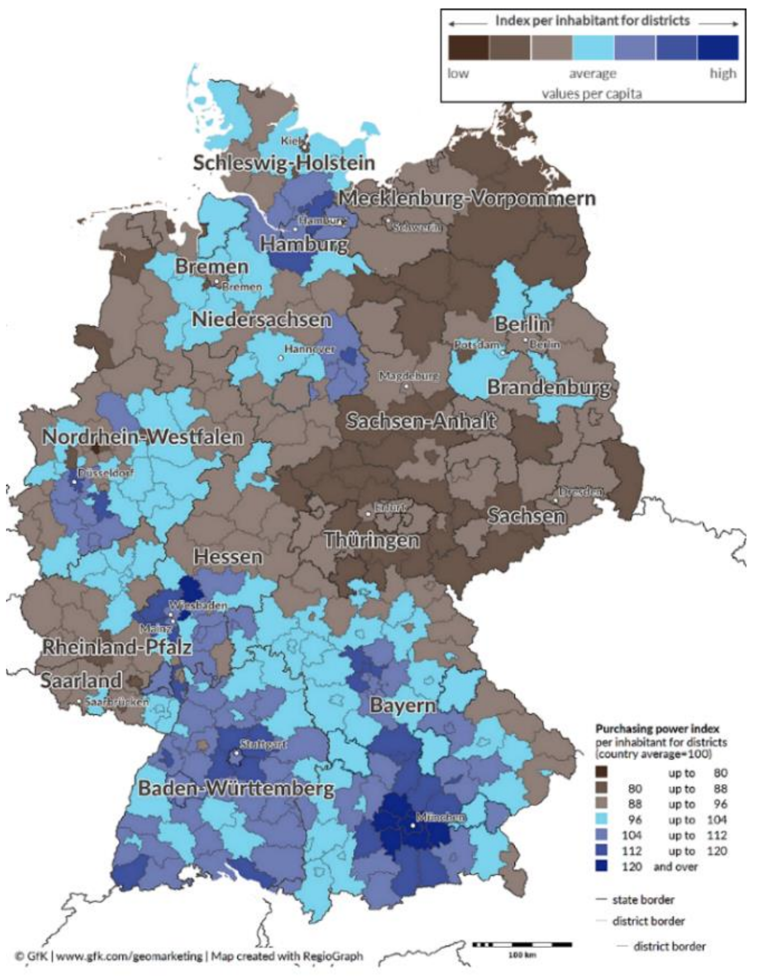
Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Germany: Purchasing power in Germany is rather high, even within the EU since it is ranked 8th of in 2022 – whilst only 16 are above the average.[26] According to GfK's,[27] German citizens had €24,807 per person for consumer purchases, living expenses, recreation and saving in 2022. Yet, the amount of purchasing power available to consumers differs widely from region to region: e.g., the inhabitants of the Starnberg district have 40% more purchasing power than the national average.

Displaying power purchase per districts in 2022, Figure 8.7 underlines that some differences in terms of power purchase still exist between the (former) Eastern and Western Germany. However, those differences in terms of general economic situation do not impact automatically the energy system, for instance in terms of RES. Indeed, the eastern German states have a slightly higher average score than the western German states. The eastern German states can show greater success

Figure 8.7: Purchasing power in Germany in 2022[28]



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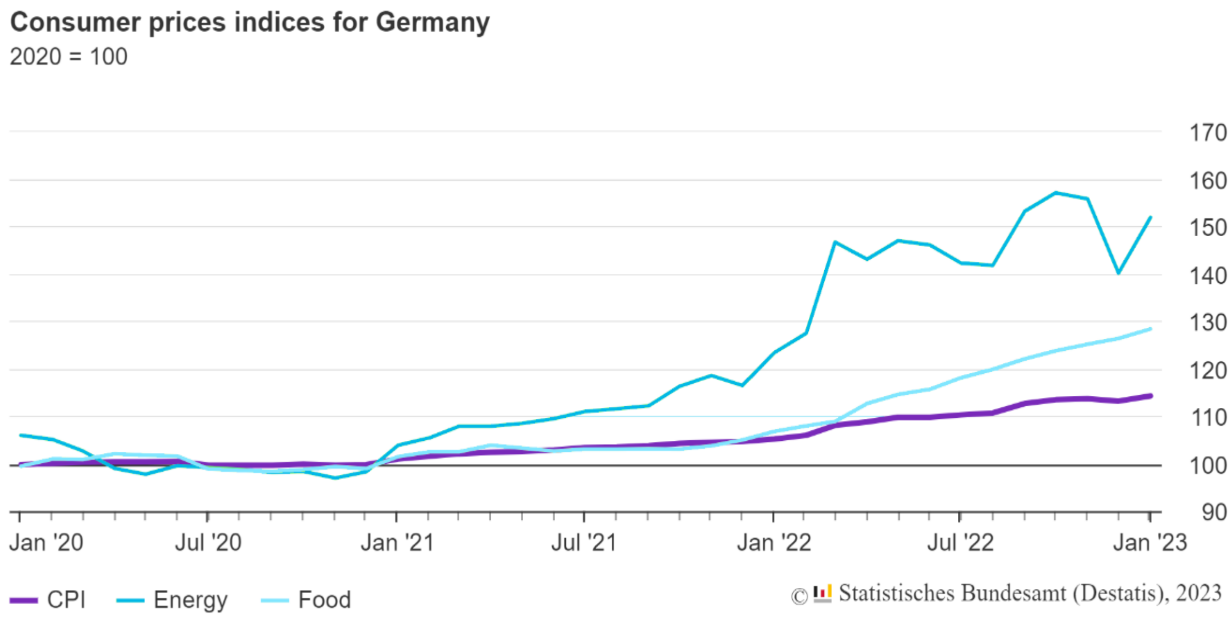
above all in the use of renewable energies and in economic and technological change; in contrast, the western German states make greater efforts on average to use renewable energies (Stede, May 2019).[29]

Figure 8.8: Consumer prices indices for Germany



Source: Destatis, 2023.

Consumer prices in Germany rose by 7.9% in 2022 on an annual average compared with 2021. The Federal Statistical Office (Destatis) reports that the year-on-year rate of price increase thus was markedly higher than in the previous years. In 2021, it had been +3.1%. As shown in Figure 8.8, the prices of energy products were markedly up by 34.7% in 2022 year on year, following a 10.4% increase in 2021. Food prices rose 13.4% in 2022 compared with 2021. In 2021, the rate of price increase had been +3.2%.

How the factor influences ENCI: The general economic situation in Germany tends to be more an opportunity than a threat for ENCI. That said, the purchase power cannot be considered as impacting directly the emergence of ENCI. It functions more as a global context, in which the citizens feel enough financial security to engage in the energy system, or at least to stay active with regard to the energy transition.

Affected ENCI types: Type 1, 2, 3, 4, 7, 8. Yet the ways those types are affected remain difficult to assess precisely.

Local examples:

Mecklenburg-Western Pomerania technological and economic success in RES: The Sixth comparison of renewable energies in the federal states (Göke et al. 2021)[30] underlines, as in the previous study, that the former German Democratic Republic (GDR) state of Mecklenburg-Western Pomerania records (together with that of Hamburg) the greatest technological and economic successes. Mecklenburg-Western Pomerania performs particularly well in terms of the number of companies in the renewable

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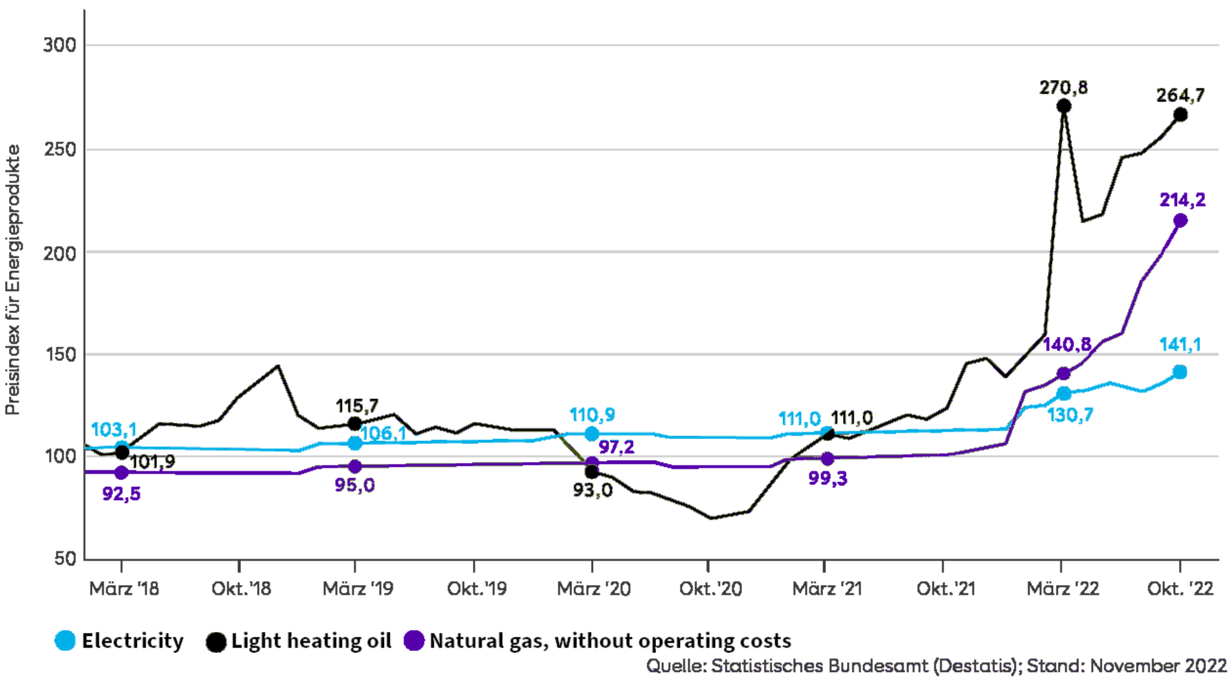
energy sector, the turnover of this sector and direct and indirect employment. This ranking of a former GDR state underlines that the power of purchase and the economic development related to energy transition are not necessarily converging. The higher percentage of wind energy mainly depends on the lower population density in some rural areas of Eastern Germany where the construction of big wind parks is possible more easily than in densely populated Federal states.

EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in Germany: Electricity prices in Germany have gone up 60% since 1995. Some of this is attributable to renewables, as solar energy in particular was relatively expensive - which is currently no longer the case. Since 2013, the rise in electricity prices has flattened off considerably. In the years 2013 to 2020, only 2.5 Ct/kWh were added in total. Over this period, this corresponded to an increase of 1.2% per year, which was even slightly below the average inflation rate.

As underlined in Figure 8.9, energy prices have increased drastically since the beginning of the war in Ukraine, thus significantly impacting both the energy system and the ways the price factor influences ENCI (Doms 2021).[31]

Figure 8.9: Prices index for energy products in Germany 2018-2022 (Priceindex = 100 in 2015)



Source: Destatis, 2022.

The energy prices are particularly impacting the vulnerable households but has also affected the middle-class, since they also induced a relative high inflation rate. Beyond the actual reduction in power of purchase, energy prices thus impacted the consumption patterns of all German citizens, making them more inclined to save energy or to invest in an electric car (> 832,000 new passenger plug-in cars registered

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in 2022, compared to over 681,000 in 2021).

How the factor influences ENCI: The main criticism against Germany's energy transition is, energy prices, which are often considered as having a regressive effect. Although poorer households spend less on energy in absolute terms, this expenditure accounts for a larger percentage of their disposable income. Low-income households are relatively more burdened by the level of electricity prices than households with higher incomes. The former spent an average of about 5% of their household income on electricity. Wealthier households, on the other hand, spend only 1.5% on electricity - even though they consume much more electricity. The situation is similar for expenditure on heating and hot water. This trend has been critically increased with the energy crisis related to the Ukraine war. More generally, the actual impacts of energy prices on ENCI are hard to decipher. On the one side, the very high prices for oil and fuels may foster new practices towards energy transition, especially in the mobility and heating sectors. On the other side, it may increase the number of vulnerable households, increasing the threat of a 2-speed energy transition.

Affected ENCI types: Considering that the energy prices affect directly the individuals as well as the organisations, the primarily affected types are the 1, 2, 3, 4.

Local examples:

The "We save energy - Join in!" campaign in Marburg-Biedenkopf district: The city of Marburg, the district of Marburg-Biedenkopf and the municipal utility company of Marburg launched in late 2022 a new regional information campaign: We save energy - join in! (*Wir sparen energie – Mach mit!*) aimed at saving energy, not only because of rising energy costs and the concerns of many people in winter, but also for climate protection. In addition to tips for everyday life, the campaign also provides citizens with an "Energy Saving Box", which contains a practical aid for each of the energy-saving topics: energy-saving shower head, LED bulb, energy-saving power strip, room thermometer, shower clock and more. The tools for uncomplicated energy saving in the box have a total value of around €50, of which the half is subsidised. There is also a website set-up for the campaign: www.kleinerdreh.de. All energy-saving tips are presented, completed by further information as well as useful videos and links - as well as a download area with the poster motifs for saving energy - as ready-made templates to print out yourself, post and forward.

EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in Germany: Compared with other parts of the EU, the German electricity market is largely liberalised. A large number of stakeholders are acting in the various sectors of the German electricity market i.e., generation, transmission, distribution and supply. The liberalisation induced massive changes and the number of suppliers has increased considerably, as well as the trading volumes and the competitive offers for customers. The big four utility companies (E.ON AG, RWE AG, Vattenfall GmbH and EnBW AG) are still the key players within the electricity market, in which they undertake

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generation, distribution and supply of electricity, though a large number of smaller supply companies also exist. In the transmission sector, key players (i.e., the transmission supply operators or TSOs) are TenneT TSO GmbH, Amprion GmbH, 50 Hertz Transmission GmbH and TransnetBW GmbH. Most generation companies and TSOs, with the exception of TenneT, are privately owned. Distribution supply operators (DSOs) and supply companies are mostly owned by municipalities, and some in private-public ownership. The German electricity market sector remains characterised by a strong vertical integration. However, one remarkable ongoing trend initiated in the early 2010´s is re-municipalisation *(Rekommunalisierung*), underpinned by the expiry of many of the so-called “concession agreements” with municipalities granting the exclusive right to build and maintain distribution lines in the municipal area, which has led to a shift in vertical integration. Concession agreements formerly held by the Big Four have usually not been renewed, allowing municipal undertakings to successfully bid for and take over the concession and the operation of the distribution grid.[32]

How the factor influences ENCI: The Big Four energy suppliers are playing an important role, notably in keeping a rather centralised energy system. However, the German energy market allowed already in the early 1990´s the emergence of decentralised RES and their ownership by citizens through cooperatives. Furthermore, in Germany the re-municipalisation movement has led cities to create fully-integrated energy companies (covering the whole value chain of production, distribution and supply), where citizen cooperatives have sometimes been offered financial ownership and voting power.

Affected ENCI types: The Type 1, 2, 3, 4, and 7 and 8 are the most affected, since they are more or less directly impacted by the state of liberalisation of the energy markets.

Local examples:

Wolfhagen re-municipalisation of the local grid: “In Wolfhagen, in Northern Hesse, the local “*Stadtwerke*” (municipal utility) supported the creation of a citizen cooperative which now owns 25% of its capital and contributes to the strategic orientations taken by the utility, with two representatives of the cooperative being part of the nine-member supervisory board of the Stadtwerke. Interestingly, the 14,000 inhabitant’s town was also one of the first German cities to re-municipalise its electricity grid. In 2003, the then *Stadtwerke* director convinced the local politicians to seize the opportunity of E.ON’s expiring 20-year concession contract to take control over the distribution network. After three years of intense negotiations (due to E.ON’s resistance and the need to clarify a lot of regulatory and technical issues), a deal was finally reached in 2006. Today, the Stadtwerke makes a profit every year, the number of employees has nearly doubled and it has won international prizes for its innovative projects on energy savings. Since 2005, some 284 municipalities have followed Wolfhagen’s lead, including Hamburg, the second largest city in Germany, in regaining power over the energy sector (Bolle 2019; Steinfort 2019).”[33]

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in Germany: As underlined in the REScoop comparator, support schemes have been adapted in the new RES Act 2023 in favour of renewable energy communities (RECs), and by taking RECs into account when designing eligibility/participation requirements. REC projects are now exempt from the tendering process. This includes wind turbines on land owned by ‘citizen energy

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companies' with an installed capacity of up to and including 18 MW. All solar systems with an installed capacity of up to and including 1 MW are exempted, and solar systems owned by citizen energy companies with an installed capacity of up to and including 6 MW are exempted from tenders. These thresholds make the most of what is allowed under the new State Aid guidelines on Climate, Energy and Environmental Protection.

Form of support for community production projects:

- Feed-in tariffs are available for installations under 100 kW;
- Guaranteed market premium are available for installations under 1 MW.

Above 1 MW, citizen energy companies receive a price according to the winning bids from the tenders under the normal competitive bidding process (i.e. tender). In this sense, they do not need to worry about submitting a bid for their project.

A special measure has also been recently adopted to promote solar power: since 1 January 2023, new photovoltaic systems (including all components: PV modules, inverters, if applicable electricity storage, necessary substructures, etc.) with a peak output of 30 kW will no longer be subject to VAT. This regulation also applies to balcony power plants. In addition, the income tax on solar yields is waived for plants up to this size, retroactively from 1 January 2022.

How the factor influences ENCI: This factor is supporting the RECs forms of ENCI, all the more with regard to the measures that have been adopted to prevent misuses of these supporting schemes. Indeed, important elements have been integrated into the tendering exemption for RECs, mainly to prevent corporate capture and abuse, as this was previously a big problem to allow RECs to participate in auctions. First, the definition of RECs has been significantly narrowed, notably to require a high level of citizen involvement and control. Second, a limit to how often a REC can use this tendering exemption has been introduced. Specifically, only companies who have not commissioned any plants of the same technology and the same segment (segment = either ground mounted or roof top above 1 MW) in the previous three years are entitled to be exempted for the particular project of the same technology and the same segment. The above limitations should help prevent abuse, while also providing RECs with a lane to access renewables support, without having to compete against larger more professional project developers. Oriented towards the development of RECs and preventing the abuses, the new schemes for supporting RECs are clearly an upgraded opportunity to further support the development of ENCI in Germany. Regarding the recent measure for promoting PV installation, these are new opportunity, of which duration remains however uncertain.

Affected ENCI types: Basically type 8 and type 7. Measures for PV installations are affecting also types 1, 2, 3, 4.

Local examples:

The Kassel Stadtwerke launches citizen participation via their own photovoltaic crowdfunding: Especially in the cities, many people do not have the opportunity to install their own photovoltaic system because they do not have their own roof surfaces. The *Kassel Stadtwerke* decided early 2022 to make it possible for everyone to participate, by launching a citizen participation model in the form of a photovoltaic crowdfunding called "*SonnenTeam*". In this way, all electricity customers of the municipal

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utility now have the opportunity to participate in the financing of new photovoltaic plants. This is possible as an investor in Stadtwerke Eco GmbH in the form of a subordinated loan of between 500 and €5,000. This is a wholly-owned subsidiary that was founded, among other things, to finance renewable energy plants. Investors received an interest rate of up to 1.5 per cent on their paid-in capital. The loan has a term of five years, according to the *Stadtwerke*. In addition, the investors receive solar power from the plants they financed. The first photovoltaic system in which citizens can participate is a nearly 750-kilowatt photovoltaic system on the roof of the Kassel Transport Company (KVG) carriage shed in the Wilhelmshöhe depot. Most of the solar power will be consumed directly by the local transport company. In this way, the citizens are simultaneously participating in the energy and transport turnaround and making local transport even cleaner (Kappler 2019).[34] This example underlines quite well to which extent municipalities and Stadtwerke can also develop specific business models and favourable economic opportunities to enhance ENCI.

EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Germany: Germany has developed, and further develops series of funding programmes aimed at enhancing the energy transition from the citizens side. Some are particularly noticeable such as:

Funding programmes for RES:[35]

- Solar PV: German state supports PV with various programmes for the use of solar energy either for one´s own needs or for feeding it into the grid. A PV system can be funded by the “Federal funding for efficient residential/non-residential buildings” via the Credit Institute for Reconstruction (KfW) development bank[36] or by funding or feed-in tariff under the RES Act. When the maximum eligible costs for the renovation to an efficient house is reached or exceeded, the loan “Renewable Energies - Standard (270)” is eligible.
- Wind power: Private individuals or non-profit organisations - such as citizens' energy associations - planning a small-scale wind turbine can receive funding from KfW, provided that part of the electricity generated is fed into the grid or sold. The promotional programme for citizens' energy associations offers further advantages. Under this programme, up to 70% of the costs for the planning and approval of wind energy projects, up to a maximum of €200,000, are subsidised. This does not apply to projects that have received RES funding or a contract in an RES Act tendering procedure.
- Heat pumps: Switching to renewable energies is worthwhile for homeowners. The installation and retrofitting of heat pumps in one´s own home is funded as an individual measure via the Federal Support for Efficient Buildings - Individual Measures (BEG EM) with a minimum of 25% and a maximum of 40% of the costs. Funding is available for heat pumps serving at least one of the following purposes: Space heating, combined hot water preparation and space heating, the supply of heat to a building network, and the retrofitting of hybrid heating systems with heat pumps.
- Solar thermal systems: Those systems are part of heating technology and can be funded as an individual measure through the Federal Promotion for Efficient Buildings (BEG EM) with 25% of the investment costs. Anyone who replaces their old fossil-fuel condensing oil heating system with a

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heating system that uses renewable energies, including solar thermal energy, can expect to receive up to 50% funding, up to a maximum of €60,000 per residential unit.
- Biomass: Pellet boilers, heaters or stoves are part of the heating technology and are subsidised as an individual measure via the Federal Subsidy for Efficient Buildings (BEG EM) with at least 10 and up to 35% – when replacing an old oil, gas, coal and night storage heating system – of the investment costs.

Funding programme for energy advice: The BMWK pays up to 80% of the fee for energy advisors for residential buildings.

Funding programme for energy-efficient renovations: The costs of energy-efficient renovation alone shall not be covered only by private households. The BMWK supports them, for example, with the BEG EM programme.

Funding measures from the National Climate Protection Initiative, which are specifically addressed to municipalities and/or citizens at the municipal level.[37]

How the factor influences ENCI: The funding opportunities encompass the majority (if not all) of aspects of energy transition and as such, they can be seen as a key opportunity for the development of ENCI. The amount of funding represents a significant incentive to invest in RES and energy efficiency.

Affected ENCI types: Mostly types 1, 2, 3, 4, 7 and 8, which are directly relying on the available funding to develop their projects for energy transition.

Local examples:

Energy saving fund from BEG Wolfhagen: in 2012 the cooperative *BürgerEnergie-Genossenschaft Wolfhagen* was created. BEG Wolfhagen now owns 25% of Stadtwerke Wolfhagen, has over 800 members, and has an estimated worth of more than €3 million. The cooperative gives citizens direct control over the operations and direction of Stadtwerke Wolfhagen. The BEG Wolfhagen has also developed an energy-saving fund that receives profits from Stadtwerke Wolfhagen. The fund enables citizen-led initiatives that aim to increase energy efficiency and speed up the process of decarbonisation. This example underlines how new forms of financial supports can be brought by the municipalities actively engaged in the energy transition.

EC7. Sub-national (regional, municipal, local, etc.) innovation systems: energy sharing

How is this factor manifested in Germany: The federal structure and the large number of municipalities and districts initiatives have made the territorialisation of energy transition in Germany rather successful. However, recently, more actors (Theesfeld et al. 2021)[38] are involved in citizen energy-related initiatives are claiming for introducing the concept of "energy sharing" in the German energy landscape: citizens could then co-finance wind or solar power plants in their neighbourhood and purchase the electricity produced themselves. However, the existing structures for the promotion of renewable energies and the lack of adequate framework for energy sharing platforms currently do not facilitate this. Such a new framework would require the creation of an adapted market framework aimed at stimulating grid-serving behaviour of renewable energy communities, where electricity production and consumption are spatially close to each other, in the energy system. Financial incentives could also contribute to the setup of energy

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sharing, such as reduced ancillary electricity costs or a premium payment to promote economically viable models. One means of shifting the load of household electricity demand could be a two-tariff model, in which a higher tariff applies for third-party purchases than for self-supply. Other strategies to increase self-consumption could be the integration of storage or technologies for sector coupling such as heat pumps or electric cars (Aretz et al. 2022).[39]

How the factor influences ENCI: The energy sharing concept is a key part of the re-territorialisation of the energy system, which could contribute to further developments of ENCI concomitantly with RECs and thus enhance local and decentralised energy markets. This could represent a further incentive to become energy citizen, energy sharing operating as a multiplier for an energy transition in which citizen are entitled to be active players.

Affected ENCI types: Affected ENCI types are type 1, 2, 3, 4, on the individual side and 7 and 8 on the collective side, since the energy sharing involves both individual users and local energy communities.

Local examples:

EWS Schönau pioneer virtual power plant (VPP): In 2017, 25 residents from Schönau decided to engage in creating a Virtual Citizen Power Plant. Every household in the group contributes the renewable energy it collects – for instance, through solar panels or thermal power stations – to the virtual power plant. At any given time, every group member can see how much energy is available in this VPP, as well as how much they are producing and using, individually and collectively. They can then adjust their own energy consumption accordingly. First using as much green energy as they are producing themselves; then, as much as has been made available by the other members; and finally, selling any leftover back to the grid. If every member of the group chooses to do this, they are effectively drawing no electricity from the grid and become independent from the energy market. For now, the group is regional but there's no reason the model couldn't extend to anybody who wants to participate. And while such energy sharing efforts are now underway in communities across Europe, Schönau's Virtual Citizen Power Plant is distinguished by its digital decentralisation and smart technology, i. e. the app EWS developed, so that any participant of the VPP can follow in real time the energy production and use among them. There are other advantages: German energy laws wouldn't allow individuals to sell the energy they produce from solar panels that are more than 20 years old, but the VPP makes this possible. The EWS also replaced the old electric meter with a high-tech smart meter, and installed an efficient ion battery at a cost of nearly €10,000, allowing the participants to store the energy they produce for when they need it. The model is a success, demonstrating that energy sharing within communities (and beyond) can lower energy costs by creating more competition and increasing the share of renewables.

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Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Germany: The average monthly gross income of households in Germany amounted to €4,979 in 2021.[40] Wealth in Germany is unequally distributed: In 2017, the top 1% owned around 18% of the wealth in the country, which is as much of the cumulated wealth of the poorest 75% of the adult population. According to the German Institute for Economic Research (DIW), Germany is one of the countries in the euro area with the greatest wealth inequality.[41] In terms of income distribution, Germany comes off somewhat better in a European comparison, just below the EU average but the income per person is the highest of the larger EU countries and Germany shows the lowest unemployment rate (Wagstyl 2017).[42] Like in most European countries, incomes drifted apart during the first half of the 2000s, but in Germany, the drift was disproportionately severe. At the same time, atypical employment increased as wel.[43]

In Germany, expenditure on electricity roughly doubled between 2000 and 2015, while gas prices have risen by around 80%. The price of household electricity is almost 50% above the EU average. As energy is an indispensable good, consumers do not have the choice of forgoing the supply of electricity, gas and heating oil and low-income households are particularly under pressure in this regard. In 2014 around 350,000 households had their electricity turned off (Strünck 2017).[44] Due to the war in Ukraine, energy prices are rising rapidly and larger parts of the society are struggling with the cost of energy (Henger, Stockhausen 2022).[45]

How the factor influences ENCI: Incomes and wealth in Germany are relatively high, which can be seen as an opportunity for ENCI. Higher incomes make it easier for people to invest their money or free time in activism or install PV on their roofs for example. But this aspect is at the same time a threat for ENCI, because the distribution of incomes and especially of wealth is particularly unequal in Germany compared to other EU countries, which is a significant barrier for ENCI in Germany. Low-income groups may therefore be cut off of energy citizenship while at the same time being at the highest risk of energy poverty. Energy cooperatives for example often require a, albeit low, entry fee, which nevertheless seems to be a barrier for many and in general there is an overrepresentation of higher income groups in energy cooperatives in Germany (Amri-Henkel, Hofmeister 2018).[46] Energy saving measures are also harder to implement for low-income groups, as they are not able to purchase energy saving appliances. However, low-income households generally consume less energy to begin with (Kleinhückelkotten et al. 2016).[47]

Affected ENCI types: All ENCI types are affected.

Local examples:

Solocal Energy solar collective DIY: The project Solocal Energy from Hesse initiated DIY-groups (*Selbstbaugruppen)* which are groups made up of approximately six people in which they can jointly and in solidarity install solar panels on their privately owned roofs while Solocal Energy provides them with guidance and instructions during the whole process. This is an empowering experience for the citizens involved in these projects, who get to assemble their own solar panels together with other lay persons which is a great learning opportunity for most of the participants. Unfortunately, this project is only open for people who have their own property and enough financial means to afford to purchase solar panels.

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The project also helps with the installation of balcony power stations, but these may not be affordable for low-income groups.

S2. Energy literacy, awareness and skills

How is this factor manifested in Germany: In Germany, there is a relatively high level of willingness to behave in an environmentally friendly manner. For example, four out of five (citizens) pay attention to energy efficiency when buying household appliances or light bulbs. When asked about transport behaviour, almost a third stated that they (almost) always travel by bike, public transport or on foot (Fischer et al. 2022).[48] More than two-thirds wish for the government to advance the energy transition. This is also reflected in the increasing acceptance of the construction of new wind power and solar systems in their own living environment and the willingness to make a financial contribution to climate protection measures, to invest in climate-friendly technologies and to change energy related behaviours (Wolf et al. 2022).[49] However, there may be a problem in regard to information gathering. Citizens receive information about the energy transition primarily from the mass media and to a lesser extent via various online channels or directly from actors from politics, science and civil society. There are complaints about information deficits and, eventually, there are considerable deficits with regard to knowledge about renewable and fossil energy sources (Arlt et al. 2022).[50]

Presumably, the energy crisis resulting from the war in Ukraine had a major influence on the energy awareness and majority would like the faster expansion of renewable energies through simplified planning and approval procedures, but there is also a call for overcoming the dependence on Russian gas supplies by diversifying gas imports (Wolf et al. 2022).[51]

How the factor influences ENCI: First and foremost, this factor influences the type 1 ENCI ideal-type and implies that a majority in Germany does want to do their bit. Nevertheless, heat and electricity prices have reached historic levels and are a financial burden for many households. Energy efficiency measures play an important role in reducing household energy requirements, but the implementation of energy saving measures is made more difficult in Germany by the lack of an intelligent measuring infrastructure. Accordingly, the rapid expansion of an intelligent metering infrastructure is of utmost importance for leveraging future energy-saving potential through behavioural changes (Khanna et al. 2022).[52] In general terms, energy awareness is relatively high in Germany and can have presumably a positive influence on ENCI.

Affected ENCI types: All ENCI-types are affected, but especially 1. Do Their Bit.

Local examples:

Bewirk.sh – information platform towards deep energy literacy: The bewirk.sh government-funded initiative from Northern Germany focuses on the individual citizen and their awareness and literacy on energy and sustainability issues. The organisation does educational work that addresses global climate change and possibilities for individual action. The focus is on the individual with their responsibility for living together on earth sustainably. The goal of the initiative is to motivate and enable individuals to be part of a lived democracy and a society with citizens who are active in their community, their city district or their neighbourhood and act together for the energy transition and protecting the climate.

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S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in Germany: The largest increase in volunteers in Germany between 2014 and 2019 can be seen in the areas of environment, nature conservation or animal welfare (Kausmann, Hagen 2022).[53] The Global Earth Strike on 20 September 2019, organised by Fridays for Future Germany, attracted over a million people in Germany (Buzogány, Scherhaufer 2022).[54] Paradoxically, the German energy transition mobilises civic engagement in two opposite directions. On the one side, self-organised groups and associations run their own renewable energy plants and actively advocate climate protection, on the other, there are citizens' initiatives campaigning against wind farms, grid expansion, and biomass plants. Forms of activism in favour of the energy transition include "voting, party memberships, sending letters, protest actions, cultural hackings, memberships in non-governmental associations, energy cooperatives, interest groups, as well as the attendance of structured participation processes". Collective action is becoming more professionalised, individualised and creative as tangible energy plants become a key element of community energy initiatives and generally becomes more project-oriented, such as the construction of collective photovoltaic systems (Radtke et al. 2020).[55]

How the factor influences ENCI: Strong citizen engagement and an interest to become active on environmental and energy issues is an opportunity for ENCI in Germany. People in Germany become active by volunteering in diverse projects or going to climate protests. Civic engagement on the energy transition takes place on local as well as national levels, encompassing bottom-up as well as top-down initiatives. There is a movement in favour of supporting the energy transition and especially civic engagement in the form of community energy or '*Bürgerenergie*' is becoming more prevalent. There were more than 800 energy cooperatives in Germany in 2017 (Kahla et al. 2017).[56] Community-owned energy initiatives such as energy cooperatives open up the opportunity to directly engage in the transformation of the energy system for individuals or local businesses, offering an opportunity to collectively participate in tangible, project-oriented activities (Radtke et al. 2020).[57]

Affected ENCI types: The collective types are the ones affected by this factor i.e., type 7., 8, 9 and 10.

Local examples:

Berlin citizen energy cooperative: *BürgerEnergie Berlin* (BEB) is an energy cooperative from Berlin that brings together local citizens to work together for a sustainable, climate-friendly and citizen-owned energy system in Berlin. It is a free, cross-party association of citizens. Their goal is to enable citizens to take part in the decision-making processes regarding the energy supply in Berlin, which is directly linked to their goal of making it sustainable and renewable. They aim to reach that goal by putting the energy supply (more precisely the electricity grid) in Berlin in the hands of its citizens with the help of the cooperative. While they are mainly focussed on the citizens of Berlin and the energy supply in Berlin, they aim to set an example as an energy cooperative promoting renewable energy in the whole country and possibly further.

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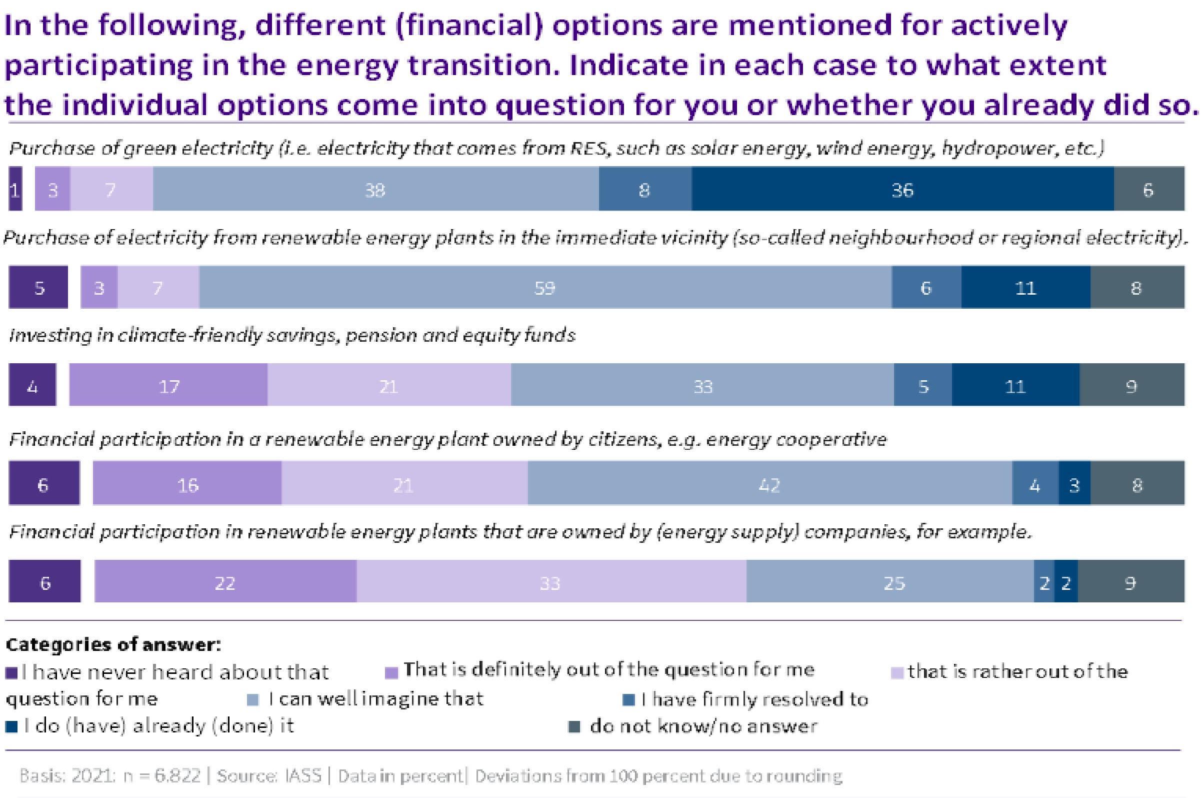
S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Germany: The majority of the population in Germany trusts important social institutions, although trust in the parliament, the Federal Government and the European Parliament is significantly lower than the trust in the judiciary (Karnick et al. 2022).[58] Compared with the democratic integration of other European countries, Germany ranks in the middle (Blinkert, Klie 2019).[59] Trust in regard to energy related issues is comparably a bigger concern, as the implementation of the energy transition so far has been rated negatively. Citizens perceive the energy transition as chaotic and distant from the public, and they tend to view it with pessimism and concern. Most of the infrastructure measures, such as the installation of photovoltaic systems or the construction of wind turbines off the German coast, are overwhelmingly approved by the population. However, when it comes to the construction of wind turbines near one's own home, approval is significantly lower. Generally, the population still has confidence that actors from science and research as well as environmental organisations will contribute to the successful implementation of the energy transition, but people's trust in the industry and political decision-makers is significantly lower (Arlt et al. 2022).[60] This general statement is confirmed by the level of engagement of German people in energy cooperatives. Germany has indeed a rather strong tradition of citizens' participation in community energy, with more than 800 existing RES cooperatives and 200,000 people involved in the energy cooperative movement (Figure 8.10). Recent Surveys also underline the German citizens' willingness to participate more actively in the energy transition, as underlined by Figure 8.10:

Figure 8.10: Willingness to actively participate collectively in energy transition[61]



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How the factor influences ENCI: A high degree of trust can positively influence ENCI for example in receiving and complying with information on energy saving and general types of ENCI that are aimed at incremental change. On the other hand, a lack of trust could be motivating citizens to participate in more transformative types of ENCI. Initiatives that are active on energy and sustainability related issues often report that they are not satisfied with the progress made by their government or the industry and therefore need to take the energy transition into their own hands and try to change as much as possible through individual or collective action.

Affected ENCI types: All of the ENCI types, because trust or a lack thereof in institutions or organisations influences engagement on the individual or collective level either way.

Local examples:

Lavidaverde sustainable housing community: In Germany, there is no problem with a lack of trust in regard to the concept of cooperatives or community energy (Kalkbrenner, Roosen 2016).[62] With the LaVidaVerde project, a diverse assembly group is realising a jointly developed idea of future-oriented living in Berlin's Weitlingkiez, thought to be an answer to current ecological and social challenges in the form of a residential project. LaVidaVerde is an energy-plus house for a diverse group of committed young and old people who have consciously decided on a project that enables communal living as well as resource-saving life and political work in and for the neighbourhood. The community is not limited to living together in the house but is also visible in the realisation of common goals. It is a case of ENCI since it consists in participative housing project towards the building of a *Plusenergie Haus*, and beyond energy aspects it is also promoting a sustainable community housing at the "*Kiez*" scale.

S7. Climate anxiety/depression (eco-anxiety)

How is this factor manifested in Germany: It is increasingly apparent that human health is impacted physically by climate change because of heat, draughts, floods and other environmental impacts but the link between mental health and climate change is less obvious (Clayton 2020).[63] This is often associated with the younger generations (see explanation below) (Hickman et al. 2021).[64] While there are reports on increased climate anxiety in other contexts, this cannot be stated for Germany, where people report low levels of climate anxiety. There is, however, reason to believe that greater anxiety about climate issues is more widespread among younger populations. Generally, climate anxiety seems to be connected with general anxiety and depressiveness, avoidance of climate change in everyday life, frustration of basic psychological needs, pro-environmental behavioural intentions, and policy support. People with higher climate anxiety expressed stronger pro-environmental intentions and supported climate-relevant policies more (Clayton 2020). There are also findings that people who are knowledgeable about climate change and interested in mitigating it might experience anxiety that does not paralyse them so that this anxiety might motivate the search for adequate actions against climate change (Helferich et al. 2020).[65]

How the factor influences ENCI: Climate anxiety does not seem to be widespread in Germany. There is no indication that climate anxiety works similarly as other types of anxieties, which can have a big impact on the individual/personal lives. It seems to be mainly connected to a strong concern for the environment which can lead to actions aimed at mitigating climate change. Climate anxiety is often linked to the younger generation and movements made up of young people such as Fridays for Future and interestingly,

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protest participants do report that they are motivated "by feelings, awareness of the issues and a willingness to engage in finding solutions" (de Moor et al. 2020).[66]

Affected ENCI types: Climate anxiety can be a motivating emotional factor in all ENCI types.

Local examples:

Ende Gelände: A movement that is made up of mainly younger people in Germany who are associated with concepts such as climate anxiety but are more radical than e.g. Fridays for Future is Ende Gelände. Ende Gelände is a broad alliance of people that emerged from the anti-nuclear and anti-coal movements, the Rhineland and Lausitz climate camps and the Hambacher Forest anti-coal campaign. They consist of leftist grassroots climate action groups, large environmental organisations, left political groups and other campaigns, groups and networks. The movement is using civil disobedience as a signal for action "to put our climate before profit". It is a case of energy citizenship because people from different activist groups and organisations take direct and often illegal action against particular ways of energy production, namely coal and gas for example with blockages.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, onshore and offshore wind, renewable hydrogen)

How is this factor manifested in Germany: Solar energy generates electricity that is then either used directly, stored or fed into the grid. Photovoltaic (PV) technology is established, cost-effective and flexible in combination with battery storage. By 2030, PV capacity is expected to increase from the current 59 GW to 215 GW through numerous measures – e.g., through more attractive conditions for the remuneration of photovoltaics on roofs, to create incentives to use all suitable roof surfaces.

Wind energy already covered around 24% of Germany's electricity demand in 2021 and represents the largest share of both total and renewable electricity generation. New areas must be developed for wind energy use and technological advances must be put into practice as quickly as possible. In addition, large, modern turbines are even better at harvesting strong winds at high altitudes. Numerous measures have already been taken in recent years – e.g., the participation of municipalities in the value creation. The RES 2023 intends to significantly accelerate the expansion of wind turbines notably through:

- Decentralised, flexible, oriented towards the common good citizen energy: i.e., the many small producers who operate local wind or solar farms for the common good. The German government has prepared a funding programme to develop and support citizens' energy companies.
- Improvements in the possibility of financial participation by municipalities which should become the norm in future to enhance acceptance.

The heat pump is the heating system of the future for new and old buildings. Today, there are already over one million heat pumps in use in Germany. In 2021, 154,000 new heat pumps were used in Germany, 28% more than in 2020r. The BMWK's "Energy Efficiency Work Plan" envisages promoting the replacement of oil/gas heating systems and supporting the heat pump ramp-up. The goal is to increase the number of newly installed heat pumps to over 500,000 units per year by 2024. And from 2024 onwards, if possible,

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every newly installed heating system should be 65% powered by renewable energies.

Hydrogen: The German government adopted the National Hydrogen Strategy[67] in June 2020. The goal is to reduce CO_2 emissions in the areas of industry, transport and energy on the basis of hydrogen technology and, at the same time, to promote the competitiveness of the German economy and open up new markets.

How the factor influences ENCI: This factor can be considered as an opportunity for the development of ENCI since the role of citizens in the energy transition has been given a greater attention by the German government in the Energy package introduced in 2022.

Affected ENCI types: Types 1, 2, 3, 4, 7, 8.

Local examples:

The hydrogen region Marburg-Biedenkopf: In 2019, the Marburg-Biedenkopf district was awarded the status of hydrogen region by the Federal Ministry of Transport. Marburg-Biedenkopf focuses on renewable technologies used in industry and commerce as well as in the mobility sector. Future investments are therefore being implemented here in large numbers: The new climate protection action programme with 30 measures is currently being adopted by the district council. New technologies, such as virtual power plants, which interconnect decentralised energy sources to meet the demand for electricity, are being jointly examined at the district level. In this way, the district of Marburg-Biedenkopf is taking the energy transition a step further – and shows how successful cooperation with many different actors can be.

Power purchase agreement (PPA) for photovoltaic façade system in Marburg: A photovoltaic system with 50 kilowatts of power has been built on the façade of a radiology centre near Marburg's main railway station in 2022. *Stadtwerke Marburg* and the *Sonneninitiative* association have concluded a PPA for the project, which ensures its long-term financing. Actually, a PPA evokes spontaneously large photovoltaic power plants. However, the model can also work on a small scale: The *Sonneninitiative* association and the Marburg municipal utility want to demonstrate this with an urban lighthouse project. The façade of the local radiology centre at Marburg's main railway station is to be equipped with a photovoltaic façade system with an output of 50 kW. This will be made possible by a long-term PPA signed between the *Sonneninitiative* association and the Marburg public utility company. However, the photovoltaic façade system is not only intended to supply electricity, but also to be architecturally attractive: the project is intended to show how all available space could be used for energy production in the city in the future thanks to innovative technologies and without disturbing the aesthetics of urban development (Dieckmann 2022).[68]

Before - After: The commercial building from the 1970s was almost completely covered with solar modules

Image © Solarradiology Marburg

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T2. Decentralised energy system and storage

How is this factor manifested in Germany: The character of the energy supply system is changing from conventional, centralised large-scale power plants to a more decentralised structure with numerous small generation plants. This requires an adaptation of the regional and municipal distribution grids to smart grids in which generators, consumers, storage facilities and grid operating equipment are interconnected. Research into the expansion of the electricity grid infrastructure and the feeding of high shares of renewable energies into the transmission and distribution grids is carried out within the framework of the funding initiative "Future-proof electricity grids."[69]

New storage concepts and intelligent power grids are central elements of a renewable energy-based energy system. Wind and solar power are not continuously available, implying that the supply of energy is less stable compared to large power stations. Therefore, storage solutions and smart power grids are under development to deal with excess energy produced during peaks in solar and wind power production. Accumulators are meant to bridge this gap between energy production and energy consumption. A particular attention is given to the concept of 'Power-to-Gas', in which excess electricity generated by wind and solar technologies will be used to split water molecules: the released hydrogen could then be converted back into electricity with fuel cells or fed into the natural gas grid. It is also conceivable that excess wind or solar power could be converted into heat (Power-to-Heat), into liquid fuels (Power-to-Fuel), or into basic chemicals (Power-to-Chemicals).

How the factor influences ENCI: This factor supports ENCI in a rather indirect way, through the decentralisation of the energy systems which enables citizens to get involved in the energy transition through a facilitated access to the grid. Individual storage is not that much considered in this factor, so it does not support direct forms of ENCI at the individual level. Yet, it might contribute to enhance collective forms of ENCI.

Affected ENCI types: Type 7, in case of regional and municipal networks in which citizens are entitled to participate; more indirectly type 8.

Local examples:

Federal Association of Citizens' Initiatives against SuedLink: The Federal Association of Citizens 'Initiatives against *SuedLink* is the transnational association of citizens' initiatives that was founded primarily in protest against the planned direct current lines in Germany. The primary goal of the federal association is the nationwide networking of citizens' initiatives with one another in order to give the protest against *SuedLink* a strong voice. They advocate decentralised and citizen-friendly energy planning and energy policy as a viable alternative to the planned electricity highways and call on politicians to rethink. The association fights against the building of North-south power lines presented as a requirement for the energy transition by claiming for another form of energy transition that would be more local and decentralised, and consequently in the local peoples´ hands. As such, they are contesting the mainstream views about the current grid development as a requirement for a further decentralised energy system.

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T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in Germany: Germany lags in infrastructure investment of mobile and fixed broadband connection speed which is crucial for the digital transformation, trailing behind leading countries due to few fibre connections and slow performance in small and rural municipalities. The digitalisation of the energy system will thus require a significant effort so that the demand for new technical systems will extend and make consumers play a more important role in the so called "smart markets" (as they will increasingly become electricity producers and in doing so will precipitate a greater demand for needs and consumption-based integration of generation and demand). Digitalisation of the energy system in Germany aims to enable this integration of generation and demand, yet without having defined a clear focus in terms of scale of action or technological pathways. This involves first installing intelligent measurement systems (smart meters) to replace current electricity meters installed in homes to turn the consumers into smart users, which is still an early-stage ongoing process in Germany.

Energy sharing among REC also plays a key role in the digitalisation of the energy system through the smart meter rollout, without raising major technical issues. The allocation of consumption and generation quantities among REC members and their plants can be carried out pseudonymously, securely and transparently via blockchain technology. RECs could use digital platforms for aggregating decentralised through neighbourhood power trading, energy sharing, participation in renewable energy plants, etc. However, such platforms do not yet exist for electricity procurement in Germany.

How the factor influences ENCI: The digitalisation of the energy system is often seen as a (rather lacking) opportunity for enhancing ENCI through digital technologies and the related emerging possibilities. Currently, energy sharing, especially in the RECs frames, is not available, due to the absence of technical and legal regulation for such emerging local markets. As such the current state of digitalisation of the energy system represents more a threat than an opportunity for the development of ENCI – except in the mobility sector, for which digital applications are way more developed. Balancing the raw material added consumption with regard to environmental sustainability and the added-value for a citizen energy transition remains a rather impossible challenge, which assign the digitalisation of the energy system on the transformative side of ENCI.

Affected ENCI types: Types 1 and 3 are affected at the individual level and type 7 at the collective level. Noticeable here is the fact that transformative types can hardly be considered for this factor since the digitalisation also induce massive sustainability issues with regard to the raw materials added consumption it might induce.

Local examples:

See previously **EWS Schönau pioneer virtual power plant (VPP).**

The virtual power plant of Stadtwerke Union Nordhessen (SUN): A sustainable energy supply and strengthening of regional value creation are central concerns for the Stadtwerke Union Nordhessen (SUN) and its project partners from the North Hessian economy and research. The further development of the energy system relies on the progressive use of flexibilities from decentralised energy producers on the one hand and on the control of the demand side on the other. The digitalisation of processes and tasks plays

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an essential role here. Digitalisation makes it possible to intelligently link producers, storage facilities and consumers to improve the integration of renewable energies and decentralised flexible capacities. As part of the “regio:VK” project, CUBE Engineering (Ramboll), Fraunhofer IEE and the SUN municipal utility partners from Kassel, Eschwege and Wolfhagen optimised deployment systems for virtual power plants and flexibly controllable biogas plants and biomethane CHPs and brought them to market maturity. The systems created and the know-how gained strengthen the transformation process at regional level and at the same time increase the share of ecologically produced electricity by local suppliers. As a conclusion, the citizens do not seem to be really considered in this VPP, which tends to confirm the indirect impact of the decentralisation and storage technological factor.

T4. Energy efficient buildings

How is this factor manifested in Germany: The Federal Funding for Efficient Buildings (BEG) reform in two steps adopted in 2022 aims at accelerating the achievement of climate targets in the building sector. It consists of:

- New bonus of 15 percentage points for serial renovation (for residential buildings)
- Extension and increase of the Worst performing building (WPB) bonus from 5 to 10 percentage points and also extended to refurbishments to an EH/EG 70 EE standard
- Bonus for heat pumps using a natural refrigerant
- Extension of the maximal approval period for complete renovations
- Increase in various efficiency requirements
- Fuel cell heating systems will only be funded as an individual measure in the BEG from 01.01.2023 if powered by green hydrogen or biogas.
- Changes for new building promotion from March 2023: The promotion of energy-efficient new buildings under the BEG is expected to be regulated in a separate funding guideline “Climate-friendly new construction” under the responsibility of the Federal Ministry of Housing, Urban Development and Construction as of 1 March 2023.

How the factor influences ENCI: Supporting measures, especially for energy-efficient renovation processes are in favour of further development of ENCI. Yet, except for individual housing, citizens are less targeted here. Increasing the energy efficiency within the building sector can thus induce rebound effects, particularly when citizens are not involved in the processes.

Affected ENCI types: Type 1, 2, 3, 4 are basically addressed here.

Local examples:

Network for Energy renovation of buildings in Wolfhagen: The use of qualified expert advice in the field of energy-efficient building refurbishment should be made easily available. This also includes encouraging sector craftsmen to cooperate with other traders and to provide them with differentiated qualifications. Educational and further training offers in cooperation with the district craftsmen's association are to promote the qualification of crafts enterprises in Wolfhagen and the surrounding area with regard to energy efficiency measures and innovative technologies. The aim is to establish a seal of quality for craftsmen. From this, a supra-regional network is to be formed, under which in turn smaller local activities

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can develop. In future, the Environmental Foundation Energy Offensive Wolfhagen could define a corresponding seal of quality for the executing companies and/or participation in a regional network as a prerequisite for funding.

Monitoring of the core city project-transfer to the districts in Wolfhagen: As part of increasing energy-efficiency of the joint project "Wolfhagen 100% EE", the town Wolfhagen worked on energetic refurbishment and development of the historic old town in a densely populated neighbourhood. The research project was seen as an opportunity to generate synergies with the existing commitment of the town of Wolfhagen in the *AG Historische Fachwerkstädte e.V.,* the participation in the funding programme "Active Core Areas" and to stimulate the participation of the citizens. The aim was to initiate the dynamics of a local energy turnaround, which is largely supported and implemented by the population and can be transferred to similarly structured municipalities. The linking of urban development and sustainable local energy policy through identification with the listed property has led to a visible increase in renovation activity in the old town. Through extensive networking with partners and institutions, suggestions could be passed on. Building on the experiences and results of the project "Energy-efficient city - energy-related building refurbishment in the neighbourhood" and the structures created, further advisory and support services in the field of action "energy-related building refurbishment" were developed for property owners. The aim is to take a comprehensive view in the sense of sustainable urban development and to transfer the successes of the core city project to the local districts as far as possible.

Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in Germany: The results of the Climate Impact and Risk Assessment 2021 (KWRA 2021) confirm that Germany will be affected by climate change throughout the country. As a result of climate change, a further increase in average temperature, in drought and heat, and in heavy rainfall events can be expected, among other things. These impacts vary spatially, as underlined in Figure 8.11.

There are also impacts, such as sea-level rise or increasing river floods that only occur in certain regions. If we look at the different climatic regions in Germany in Figure 8.11, we can see that a slight increase in mean temperatures and heat events is expected for the coastal regions and Northwest. The coast in particular may experience a sharp increase in heavy rainfall. In the driest regions of Germany, more heavy rainfall and more heat events may also occur. In the warmest regions of Germany, which already have the most hot-days and -nights, a further strong increase in heat stress can be expected. The southeast of Germany may also warm up significantly, with many more hot days and days without precipitation. More hot days and more days without precipitation are also expected for the areas of the cool-temperate low mountain ranges and the high mountains, and a significant increase in heavy rainfall for the low mountain ranges (Schauser 2022).[70]

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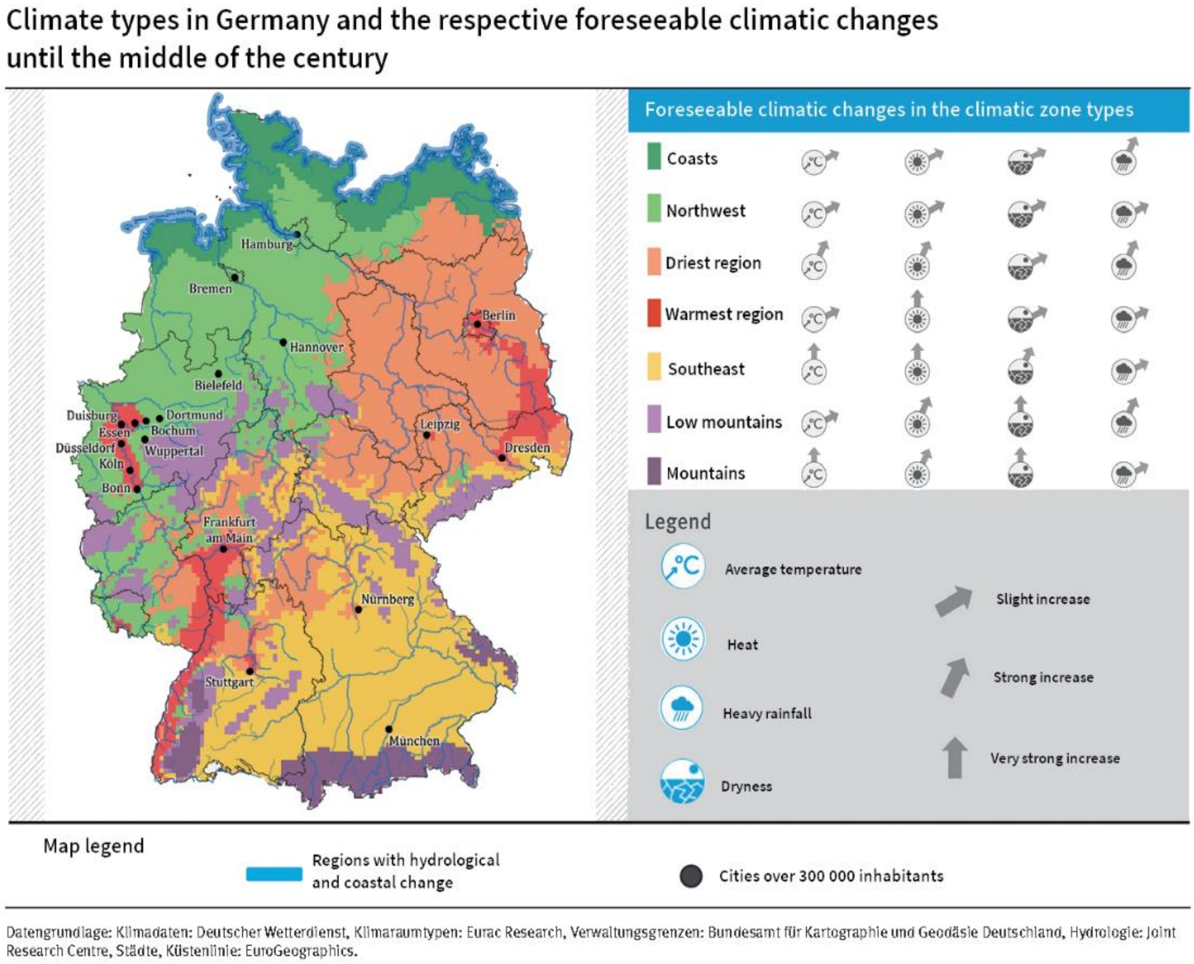
Figure 8.11: Foreseeable climatic changes according to climate types in Germany until the middle of the century



How the factor influences ENCI: Peoples' awareness and readiness to act as energy citizens is linked with the climate changes that might affect the climatic conditions of the regions they live in. Yet the causality between climate and climate change conditions and the engagement in ENCI practices and actions cannot be assessed in detail. For example, the heavy rainfall and the flood disaster resulted in more than 180 deaths in mid-July 2021 in Germany alone. The flood also caused billions in property damage. Experts anticipate an increase of extreme weather events due to climate change. The extreme flood that affected Rhineland-Palatinate and North Rhine-Westphalia in July 2021 did also contribute to enhance the awareness of the threats that climate change may induce. Therefore, climatic change, by raising awareness, can be conducive to ENCI. On the contrary, increasing heat in the summer might also lead to non-ENCI practices, such as a massive use of air conditioning systems.

Affected ENCI types: All (reformative and transformative) types of energy citizenship are likely affected thereby; however, it is likely that transformative energy citizenship will prove more viable and sustainable in the long term.

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Local examples:

After the flood – Renewable Energy Cooperative Altenburg eG: About a year after the devastating floods in the Ahr valley, the development of a sustainable heat and energy supply is taking concrete shape in a number of villages in the Ahrweiler district. The Rhineland-Palatinate Energy Agency is providing intensive support for local projects in the area of heating networks.

The renewable energy cooperative Altenburg eG was founded to operate the "cold" local heating. The state government will subsidise the project by 50%, it was announced at the founding meeting. The local heating network was initiated by the Altenahr municipality. Estimated costs: more than €3-million. Not only private households are to benefit from the geothermal project, but also large institutions, such as old people's homes and schools (Walden 2022).[71] This example underlines well how catastrophic climatic events might foster emerging ENCI.

EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

How is this factor manifested in Germany: Germany will require photovoltaics (PV) and wind energy as its electricity base in a climate-neutral world. By 2045, about 145 GW of electrical capacity must be provided by land-based wind turbines and 385 GW by PV systems. At present, however, the designation of suitable areas for the targeted expansion of PV and wind energy on land lags behind demand. Germany is a densely populated country with high energy demand, diverse land competition and an ambitious standard when it comes to protecting nature.

In principle, Germany has enough land to produce the open-space PV and onshore wind power needed for climate neutrality. It is easier to reconcile different interests on site if the use of forests and landscape conservation areas for the construction of wind turbines is not ruled out across the board and the minimum distance to settlements is made variable, and ground-mounted PV plants can also be built outside disadvantaged areas.

Germany can generate sufficient electricity from ground-mounted PV and wind energy (Saerbeck et al. 2021).[72] Even those federal states where supposedly little land is available have potential (Saerbeck et al. 2021). Land selection is about optimally balancing the interests of residents and the protection of landscape, nature and endangered species. The energy transition can be shaped locally by selecting partial areas from the fundamentally suitable areas. The Agora Energiewende calculator enables any citizen to simulate what decision-makers in the federal states and municipalities have to implement in reality as part of a fair balancing of interests when designating PV open spaces and wind areas.

How the factor influences ENCI: The RES potential is not a definitive output resulting from any mathematical calculation: it does also encompass legal frameworks, policy objectives, technic and economic feasibility. This is well shown by the following Figure 8.12 from Reiner Lemoine Institute (Saerbeck et al. 2021):

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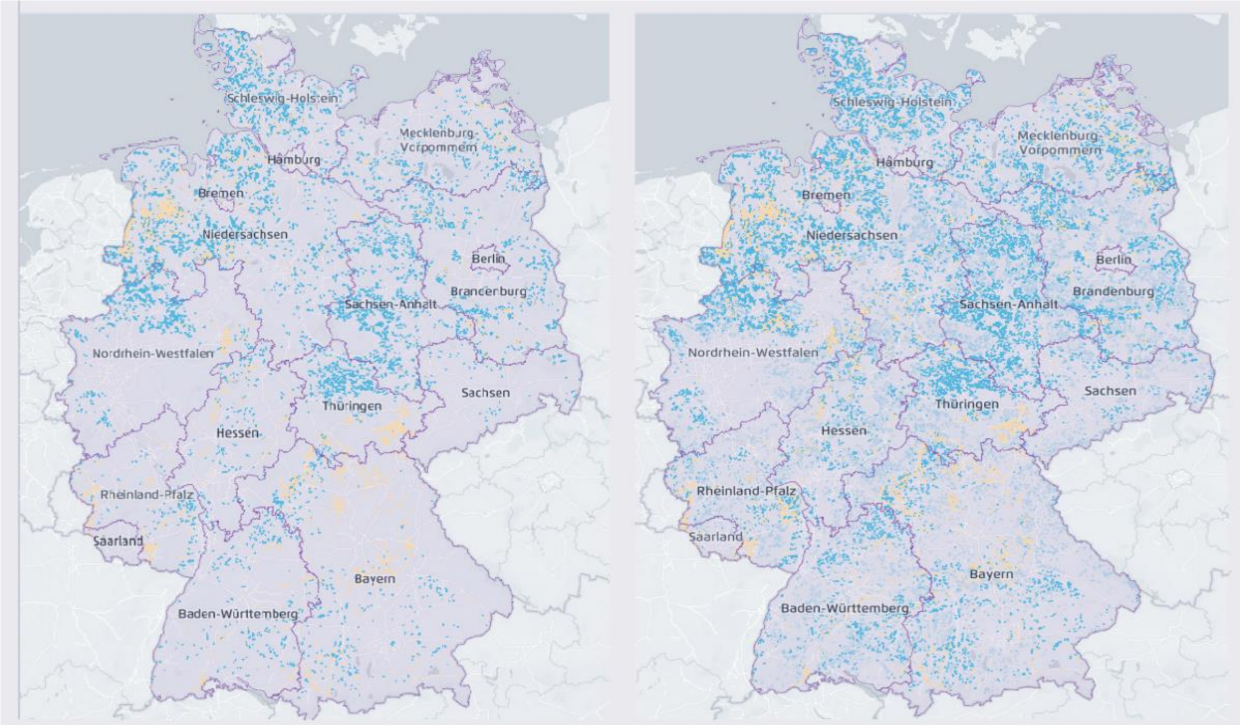
Figure 8.12: PV and wind area calculator



Agora Energiewende, Reiner Lemoine Institute (2021): PV and wind area calculator.
Left-hand page: setting "Designated wind areas (2019)", 136 TWh electricity generation from onshore wind turbines, settlement distance 1,000 m, exclusion of forest areas and landscape conservation areas, utilisation of potential area 17%.
Right-hand side: 299 TWh, settlement distance 800 , use of forest area 5% and use of landscape protection areas 2%, use of potential area 18%.

According to Saerbeck et al. (2021), what is currently lacking in Germany is not suitable areas, but the will of society as a whole to engage in the optimisation process of finding these areas. In that respect, the new RES Act 2023, by enunciating the principle that renewable energies are in the overriding public interest and serve public safety implies that renewable energies have priority in respective decisions, which might support ENCI.

The issue of the RES availability might thus be an unexpected factor for enhancing ENCI, provided it comes to a dialogue between the citizens and the RES projects developers, which is necessary to meet the required acceptance from citizens. Compromises have to be reached to push forward the energy transition while finding a balance between the optimisation of the production from RES (e.g., by putting wind turbines in the windiest areas) and the degree of acceptability that is expected from the citizens. This might also contribute to further participation in RES projects, as a way to overcome the oppositions.

Affected ENCI types: All types of ENCI are affected.

Local examples:

Citizens donate PV systems in Marburg-Biedenkopf district :[73] To be able to use hitherto unused public

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roof areas for electricity generation even without own financial resources, the district is currently carrying out a model project in cooperation with a kindergarten and to be financed by donors and donations: A PV system on the roof of the kindergarten building is to generate electricity mainly for the kindergarten's own use. Once the concept has been successfully tested, it is to be extended to other kindergartens, association buildings and public buildings. This local example underlines how possible resources (roofs for PV) can become available for the community and the citizens to engage, underlining that potential for RES is depending on many variables.

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Germany: Adopted for the first time in 1974, The German Federal Emission Control Act (BImSchG): "Act on the Protection against Harmful Effects on the Environment by Air Pollution, Noise, Vibrations and Similar Processes" belongs to the environmental law. Though the Act deals first with installations that require approval, it also serves the integrated avoidance and reduction of harmful environmental impacts through emissions into the air, water and soil, including waste management, in order to achieve a high level of protection for the environment as a whole, as well as protection and precaution against hazards, significant disadvantages and significant annoyances brought about in other ways.

This general framework has been completed by dedicated programmes: e.g., on air quality, Germany established the Immediate Action Programme for Clean Air which ran from 2017 to 2020. The government is providing around €2bn to towns and cities to combat air pollution by electrifying transportation and retrofitting diesel buses. Germany also passed the national air pollution control programme in May 2019 which introduces mandatory reductions in national emissions by 2030, including measures to reduce fine particulate matter and the short-lived climate pollutants (SLCPs) black carbon. Germany has also implemented 58 low-emission zones in over 70 cities, significantly reducing the number of older, polluting vehicles on roads.[74] Regarding the RES installations, for wind power, the BImSchG regulates the protection of residents from noise and shadows by setting limits: wind turbines are therefore not built directly next to a residential area, but must keep a sufficient distance anyway. Yet, according to associations like NABU additional distances such as the 1,000 m rule in North Rhine-Westphalia, do not offer residents any additional protection (NABU 2022).[75]

How the factor influences ENCI: Germany is characterised by a strongly anchored environmentalism and a rather high degree of ecological awareness within the population, which is still growing. As stated in the "Environmental awareness in Germany 2020" survey (Belz et al. 2022),"[76] awareness of the damaging influence of environmental pollution and pollutants on one's own person has grown over the last 20 years. No less than 38% feel "very strongly" or "strongly" affected by this. In contrast, 56% feel "rather little" and 7% "not at all" burdened by environmental pollution. In the 2000 survey, on the other hand, ¾ of the citizens felt that their health was affected "rather little" or "not at all" (Belz et al. 2022). Furthermore, climate change is perceived by a large majority as a threat. Nearly 80% of those surveyed see its consequences as a threat to the basis of life in Germany and over 90% say that "urgent measures must be taken to adapt to the consequences" – whilst only 11% see no reason to slow down climate change." If the Germans are highly supportive towards many related measures, 44% state that they "personally often lack

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the possibilities" to do something for climate action and almost 1/5 are convinced that they "cannot also take care of climate action". Beyond awareness, it is important for many citizens to receive supportive offers and to improve the social conditions for a climate- conscious change of life.

Affected ENCI types: All types of ENCI are impacted.

Local examples:

EWS Schönau a model founded by antinuclear rebels: After the nuclear disaster at Chernobyl in 1986, a parents' initiative against nuclear power was launched in the small town of Schönau in the German Black Forest region. Since the local grid operator had constantly obstructed related citizens' activities, local activists came up with the idea of acquiring the Schönau power grid to determine themselves the conditions for its operation. This anti-nuclear initiative stood firm and upheld its demand in two local referenda. A multi-million purchase price quoted by the incumbent prevent the activists from continuing their campaign. As a result, this civil-society initiative was the first in Germany, in 1997, to take over the grid as well as electricity supply to the local community. The press endearingly referred to them as the "Schönau electricity rebels" who "had won a David versus Goliath battle", and the victory of the Schönau people over nuclear lobbyists was met with much enthusiasm throughout the country. When the German electricity market was deregulated in 1998, EWS was quick to seize the opportunity to supply all its Schönau customers exclusively with electricity generated from renewable and cogeneration sources. As a result, Schönau completely freed itself of power supplied from nuclear and coal-fired plants.[77]

EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in Germany: Landscapes and habitats are affected in many ways when wind energy, photovoltaic, hydropower and other plants and structures are erected in large numbers, and agriculture grows more and more energy crops such as maize and rapeseed to produce biogas, for example. All of this represents an encroachment on mature landscapes and existing habitats. The amount of land required is already enormous, especially since the goal for the future must be an energy supply based on 100% renewable energies. For the Federal Agency for Nature Conservation (BfN), land should be used as efficiently as possible when expanding renewable energies: Given the limited availability of land, the implementation of the efficiency measures and energy savings envisaged in the Federal Government's energy concept are a mandatory prerequisite for shaping the energy transition in a way that is compatible with nature.

As of 2010 RES Act, ground-mounted photovoltaic systems could only be installed on already sealed areas, conversion areas from economic, military, transport or housing use, and on areas along motorways and railways (maximum distance of 110 m). The RES Act 2023 extends the area available for solar parks: Agri-PV is eligible on almost all agricultural land, with the exception of moorland and the maximum distance from motorways and highways is up to 500 m (Blessenohl 2022).[78]

How the factor influences ENCI: Numerous conflicts around RES, particularly wind power, are arising "from the relatively large land use and the associated interventions in plant and forest stocks as well as nature and animal protection" (Colell et al. 2022).[79] In addition to most frequent arguments of the nature protection, "the conflict about the integrity of the landscape in the sense of a cultural landscape and the

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associated cultural and recreational value is also repeatedly discussed" (Colell et al. 2022). Those conflicts around land use can be seen as some dissenting expressions of ENCI and the citizens participation often appears as a way to solve the issue through ENCI.

Affected ENCI types: All the types might in various ways be affected by this factor.

Local examples:

Wind turbine referendum in Inning in 2015: On 8. February 2015, Inning citizens had to vote this question per referendum: "Are you in favour of up to three wind turbines being erected in the municipal area of Inning north of the A 96 federal motorway and within the concentration area of the southern partial area use plan (wind power), provided that 1) it is economically viable and 2) the municipality of Inning operates the wind turbines with the possibility of financial participation by the citizens?" Led by the citizens' initiative for Inning's future (*Bürgerinitiative für Innings Zukunft - BIZ*), the opponents to the project won with 53.8%. To do so, BIZ had distributed flyers to all households, in which they questioned notably the profitability of wind turbines on the Martinsberg and claim that a large part of the examined area are "taboo areas" for wind turbines due to the proximity to the nesting sites and hunting grounds of red kites & Co.[80] As a result: the three windmills planned on the concentration area north of the innings will not be built (Setzwei 2015).[81]

EN5. Biodiversity protection

How is this factor manifested in Germany: With regard to the aspect of nature compatibility or the appropriate consideration of nature protection, the new Renewable Energy Sources Act 2022 falls short of its potential in many aspects. This appears clearly in the classification of the expansion of renewable energies as being in the overriding public interest. This designation gives the expansion of renewable energy a special weight that might overcome other protected interests. However, it is also overriding the conservation of natural resources and biodiversity which should also be seen as overriding public interest. Adopted in 2022 by the Federal Government, the new "go-to areas" from § 6 of the Wind Energy Area Requirements Act (WindBG) are meant to accelerate the expansion of onshore wind energy, with simplified approval procedures in these areas. For these, in the future, no environmental impact assessment and no species protection assessment for birds will be required. A counterpart was adopted later on, with amendments that include uniform legal standards for the assessment of collision risks as well as a nation-wide list of birds that are endangered by wind turbines and specific wind turbine "taboo areas" at precisely defined distances from breeding sites. Instead of the many different approaches currently used in the 16 German federal states, uniform rules will make planning procedures more straightforward and legally certain.

Hydropower and bioenergy also benefit from the privilege of outstanding public interest in the new RES Act 2023. Therefore, the promotion of small hydropower will continue, though the small hydropower plants, with a capacity of less than 1 MW, only contribute 0.5% to electricity production. At the same time, they cause disproportionately high damage to sensitive water ecosystems.

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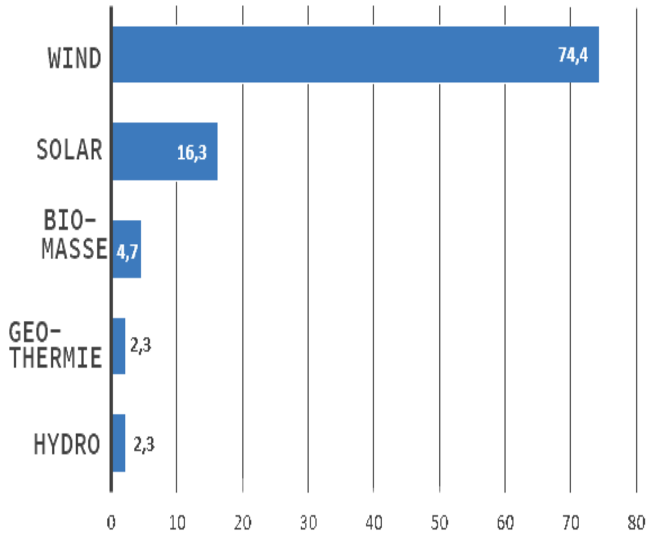
How the factor influences ENCI:

The protection of biodiversity and natural areas is one of the main sources of conflicts around the RES plants, and particularly the wind and solar ones, as underlines in Figure 8.13. The new definitions of "go-to-areas" and "taboo" areas that are meant to enhance the development of ENCI might result in an increasing number of conflicts for nature preservation, thus giving the environmental sustainability the priority over the energy transition when the choice of the land is seen as unsuitable. It might eventually appease the situation considering the new rules that are applicable nationwide. The influence of this factor is still uncertain.

Affected ENCI types: Types 5, 6, 7, 8, 9, 10 are the most affected by this factor.

Figure 8.13: Distribution of conflicts by energy type in percent



Source: Metaanalyse Konflikte um Erneuerbare Energien, TU Darmstadt 2021.

Local example:

Apfelstädt Habitat Citizens' Initiative in Thuringia: For two and a half years, citizens and state politicians have been arguing about the drying up of the Apfelstädt river. With part of the water from the dam system on the upper reaches of the Apfelstädt, electricity has been produced off the riverbed since summer 2020. For this purpose, the Thuringian long-distance water supply uses a pipe system called the "west ring cascade".

A citizens' initiative demanded the use of the reservoir water for two hydropower plants to be restricted. In 2021, they submitted a petition supported by 1,682 signatories to the Thuringian state parliament. Among other things, the petition called for electricity generation to be severely restricted or stopped. In 2022, the Petitions Committee of the Thuringian Parliament decided that a five-year monitoring programme for water management is the right way forward. A decision did not satisfy the citizens´ initiative, which is now looking into the possibility of filing a lawsuit against the operation of the hydropower plants. Since the citizens' initiative is not entitled to do so, they are now looking for allies among the recognised environmental associations.

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Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Germany: According to comparative tool developed by the European Federation of Citizen Energy Cooperatives REScoop,[82] "Germany has transposed the EU Renewable Energy Community (REC) definition, but not yet that of CEC (Citizen Energy Community) – of which transposition in German law remains uncertain. Specifically, the new REC definition results from some changes that have been made to the existing 'citizen energy company' under the RES Act 2023, so that the national rules that apply for cooperatives in general under the Cooperatives Act also still apply to REC. The new 'citizen energy company' definition also transposes the elements of the REC definition from the Renewable Energy Directive (RED II), and notably with regard to the ability to access support schemes under the RES Act 2023.

The new definition attempts to address shortcomings with the previous adopted definition, which allowed for the creation of fake or pretend-to-be energy communities to gain specific advantages in the tender process for onshore wind projects. The REC definition was also expanded to apply to both onshore wind and photovoltaic (PV) projects and entails the ability to receive market premiums, be exempted from participating in auctions and tenders, and receive investment support under a new grant-to-loan programme. Furthermore, support to REC under the RES Act 2023 is overseen by the National energy regulator, which has a supervising role in monitoring the implementation of the concept and its impact on competition and in enabling energy community projects.

How the factor influences ENCI: REScoop underlines that the new rules set up by the RES Act 2023 entail important aspects impacting the development of ENCI, particularly with regard to the eligibility to participate in a citizen energy company (…), i.e.: Natural persons (at least 50 as voting shareholders is required); micro, small or medium enterprises may hold voting rights; local authorities and associations that have legal capacity may hold voting rights; open and voluntary participation are elaborated in the Cooperatives Act; proximity and effective control – at least 75% of voting rights must be held by natural persons whose dwelling is registered in a postcode that is wholly or partly within a radius of 50 km of the planned installation; autonomy – no member or shareholder may hold more than 10% of the voting rights in the Citizen Energy Company. This provides a relevant framework to enhance the development of cooperatives and communities, and therefore, the various related forms of ENCI.

Affected ENCI types: Basically types 7 and 8, and by inference types 1, 2, 3, 4.

Local examples:

Insolvency from the Rhein-Rurg eG energy cooperative: The *Rhein-Ruhr eG* (EGRR) cooperative, based in Dinslaken (North Rhine-Westphalia), was founded in July 2007 and employed ten people as of 2016. At the same time, EGRR reported its customers to be around 20,000. The energy cooperative positioned itself as an "alternative company" that operates without the intention of making a profit. In 2019, EGRR had to file for insolvency with the Duisburg District Court. For about 4,000 remaining members of the cooperative, the insolvency does have financial consequences. Members do not have to make any additional contributions to the insolvency estate. However, EGRR no longer has access to its bank accounts and the shares of its members in the course of filing for insolvency. "EGRR will therefore not be able to satisfy your

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justified claims for payment of the share(s) for the foreseeable future," the cooperative said. Customers are now supplied with energy by their local basic supplier, at the substitute supply tariff. Though energy cooperatives in Germany are well-developed, some of them have to cease their activity for various reasons, thus putting their members in possible financial difficulties. In that respect, there is still a risk for citizens in becoming members of energy cooperative.

Böhmfeld FWR energy cooperative at the end in 2017: The Böhmfeld FWR energy cooperative was founded with a lot of euphoria and commitment in 2012 with the purpose of erecting two citizen-owned wind turbines. With the failure of all sensible projects, it is currently on the brink of extinction. Due to several obstacles, it had been clear for some time that there would be no wind turbine either in Böhmfeld or in Hofstetten. The wind turbine in Hofstetten was to be located in a protection zone around an earthquake measuring station. This is actually not allowed and the court has rejected a reversal of the extension of the protection zones for seismological installations in favour of wind farms.

1,200 cooperative shares of €100 each had been acquired. Due to costly expert opinion and operating expenses, only half of the money paid in by the investors is still available and since no other sensible project can be envisaged in the foreseeable future, the cooperative members voted to dissolve the cooperative. At the next general assembly, the cooperative members will find out what is left of their contributions and can be paid out to them on a pro rata basis.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in Germany: Till now, there is neither a fixed definition of energy poverty in Germany nor official statistics regarding energy poverty[83] as it is still encompassed in the social law approach of poverty reduction. Financial support to secure livelihoods is granted under the minimum income schemes according to the Basic Income Support for Job Seekers - SGB II and Social Assistance - SGB XII. This addresses the standard needs, including the costs for general household electricity and expenses for heating energy as well as loans for covering energy debts.

In the energy area, the concept of basic and substitute supply protects household customers by ensuring that every household customer has a legal right to be supplied with electricity or natural gas by the respective basic supplier – which are yet only compelled to do so within the "limits of economic reasonableness" (BNE 2020).[84] However, disconnections of electricity supply in Germany remain frequent for several groups of vulnerable people, an issue that the new Energy Economy Act (*EnWG)* adopted in 2022 does not really address (Verbraucherzentrale NRW 2021).[85] Indeed, if a customer is in arrears with at least €100, the basic supplier may stop supplying the customer with electricity (and/or gas) according to the legal regulations (§ 19 Absatz 2 *Strom-/ GasGVV*). To do so, the basic supplier only has to threaten the energy cut-off (electricity/gas) four weeks in advance. If the customer does not pay thereupon, the energy supplier is entitled to cut off the energy supply after four weeks.

The increasing energy poverty has been slightly considered in the new version of the RES Act adopted in 2022, which abolishes the renewables surcharge that consumers pay on the power price. Planned for 2023, the government moved the end of the surcharge forward to 1st of July 2022. While it was originally meant to lower electricity prices to incentivise consumers to switch to electric cars and heating systems, it is now

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mainly going to work as a relief measure for consumers suffering under high energy prices. However, this measure does not target vulnerable people specifically.

How the factor influences ENCI: The absence of inclusive and vulnerable people-dedicated legal framework can be considered as a threat, especially regarding the current energy crisis and the very high prices of energy. Though the EU has been calling for years on its member states to address the issue of energy poverty, the recent EnWG amendment does not support this demand, and could even conduce to an increasing number of disconnections of electricity supply.

Affected ENCI types: Basically types 1 and 2.

Local example:

NRW fights energy poverty: The North Rhine-Westphalia state project "NRW fights energy poverty" lasted from October 2012 to December 2021. In order to make the necessary energy transition also socially sustainable, the state government supports private households that are at risk of being affected by energy poverty. In 11 municipalities and districts, those affected can take advantage of the free budget and legal advice provided by the NRW consumer advice centre. Since the start of the project, more than 8,300 households (mainly recipients of social benefits, low-income earners and pensioners) with payment problems related to their energy bills have visited the Energy Poverty Budget and Legal Advice Service. Due to the holistic counselling approach and the complex problems of the consumers, more than 18,880 counselling appointments took place. In 90% of the cases, viable and sustainable solutions were worked out together with the people affected and the municipal network partners. As a result, 82% of the threatened disconnections were prevented and 64% of the already existing disconnections were lifted in a timely manner. This experience underlines that the prevention of energy poverty requires to bring all relevant actors together to solve the problem with intensive networking on site.

L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (incl. rights for active participation of customers in the electricity markets)

How is this factor manifested in Germany: The factor is currently highly dependent on the development of smart metering devices in Germany, which was given a legal framework in 2022. By 2032, all consumers are to be equipped with modern metering devices (§ 29 para. 3 p.1 MsbG). The new electricity meter replaces the previous analogue meter and has no communication unit. Other legal requirements are: Consumption values are stored for up to 24 months; better overview of electricity consumption, meter is not read remotely and does not transmit consumption values; for modern metering devices there is an €20 incl. VAT per year for installation, operation and reading for installation, operation and reading; metering point operator can be freely chosen; a smart meter gateway can be used so this metering device can be integrated into a communication network in the future. This legal requirement is meant to enable the consumers to become more active and flexible on the electricity markets and to monitor better their energy consumption while attempting to respect their freedom of choice as well as their privacy. Furthermore, a funding for Efficiency Smart Home applications that contribute to optimising energy operation and consumption has been created. The spectrum of eligible measures ranges from smart meters to measurement and control technology to regulation technology. Up to 15% of the costs are

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covered.

How the factor influences ENCI: This factor focuses basically on the “active consumer” form of ENCI. Currently, however, the price signal of the electricity market reaches some electricity producers and consumers in a partially distorted way due to various barriers in the energy market design; e.g., within the electricity sector due to the structure of the fixed components of electricity prices and at the interface to the heat and transport sector (Bundesnetzagentur 2017).[86] This factor does not represent a large opportunity for the development of ENCI though it can contribute to support certain forms of ENCI. Noticeable is that the legal framework does not impose a privacy damaging or highly constraining metering device.

Affected ENCI types: Mostly types 1 and 3, but also 3 and 4. Types 7 and 8 are also affected by the smart meter rollout, for which it can represent more an opportunity than a threat.

Local example:

Demand Side Management DSM in Wolfhagen: As a distribution system operator (DSO), the Stadtwerke Wolfhagen achieved a 100% RES energy consumption in 2015 and started then a pilot project in DSM. Within this project price signals are exchanged between participating residents and the DSO to encourage load shifting to times of high renewable generation. This project has been developed based on individual requirements. To be able to put their product to market in the long-term, it is necessary to ensure interoperability in the market structure and information technology that is developed around the globe. The traditional energy grid architecture has been established decades ago. As the industry faces the emerging fundamental changes towards a smarter infrastructure, Stadtwerke Wolfhagen has introduced its Demand Side Management pilot project to stay ahead of the competition while further benefitting from the high amount of renewable production. The project won the national ‚Energy Efficient City' competition, resulting in national funds which support the creation of the DSM pilot project including residential households and the development of an individual technological solution (Sondermann 2017).[87] However, the project apparently did not result in the implementation of a DSM at the local scale.

L4. Bureaucracy and red tape

How is this factor manifested in Germany: Germany is ranked 10/180 in the corruption perception index 2021 of Transparency international[88] with a stable score of 80/100. In that respect, it is perceived as a rather low corrupted country providing a stable legal and economic environment for renewable energy projects. However, this does not mean that there are no uncertainties and bureaucratic barriers to the development of RES. There are some bureaucratic hurdles, such as, time-consuming approval procedures and unreliable or uncertain framework conditions that throw a spanner in the development of RES (Bundesverband Neue Energiewirtschaft 2022).[89] “Anyone who invests in renewable energy projects for more than 20 years also needs certainties. That's why a small subsidy is still needed for most projects. For years, the government has been worsening the framework conditions for citizen energy projects, which have a high level of acceptance among the population. As a consequence, opposition to wind turbines and, more recently, large-scale solar plants increased continuously.”[90] As a result, the expansion of renewable energies in Germany slowed down recently, putting Germany on the path of being unable to meet climate

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protection targets. Clear guidelines and simplified procedures are still missing, for instance regarding the emergence of energy sharing communities. Bureaucratic hurdles are also hindering the development of energy cooperatives, resulting in few energy coops being currently truly profitable. Most cooperatives are facing high administrative costs, changing bureaucratic rules and fluctuation of energy prices (Haas 2022).[91] Some measures have been taken by the current federal government to reduce bureaucracy. For instance, early 2023, the request or registration of a planned solar power system with the grid operator will be simplified and a faster processing time will be specified.

How the factor influences ENCI: Fulfilling numerous bureaucratic obligations to be entitled to become active in the energy transition through electricity or heat production through RES represents a hurdle for the development of ENCI. Policy measures are thus expected (and intended) to simplify the processes in the near future, which would result in many more opportunities for citizen energy projects. Such a de-bureaucratisation requires also clear targets, and to address the needs of citizen energy initiatives. Indeed, for commercial developers and other profit-oriented projects, a reduction of the bureaucratic constraints could also mean a backlash for the citizens participation in local RES projects. For instance, one of the major obstacles to wind power development in recent years has been the drawn-out planning procedure (up to 5-8 years) that delayed the addition of new capacity and deterred investors. The reasons for this included the wide range of rules on species protection around new constructions (i.e. wind turbines), which the government removed for certain areas to reduce the time for the approval process. Such an example can hardly be seen as enhancing transformative ENCI forms when wind turbines are developed to the detriment of nature protection.

Affected ENCI types: Individual types 1, 2, 3 and 4 are affected by the bureaucratic hurdles. This is also critically worth at the collective level for types 7 and 8.

Local examples:

Balcony-PV plant funded by the State of Schleswig-Holstein: As part of the “Climate Protection for Citizens” funding programme, the state government has been promoting PV balcony systems and heating systems based on renewable energies since 16 January 2023. The purchase and installation of photovoltaic balcony systems is subsidised with a maximum of €200. The Consumer Advice Centre Schleswig-Holstein (VZSH) urgently recommends a prompt adoption of the proposal made by the German Association for Electrical, Electronic & Information Technologies (VDE) in laws, standards and subsidy programmes by the federal government or the state. The planned change in a VDE standard could soon remove formal obstacles, expensive prerequisites and limited feed-in possibilities that anyone who wants to install a balcony power plant at home has to face. However, the subsidy is still linked to the current VDE standard. This provides a rather good example of de-bureaucratisation: Balcony PV plant are still facing bureaucratic hurdles in most of the states, yet some improvement can emerge from new standards and innovative policies.

Some consequences of the “bureaucratic monster” on Berlin citizen energy cooperative (BEB): Katharina Habersbrunner, board member of BBE, calls the administrative obligations for RES projects a “monster” that was built up here by the old federal government, among others. BEB could for instance only implement one of five possible projects; the others were too complex due to the many regulations and thus sometimes became uneconomical.

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L6. Support schemes for further RES uses and models

How is this factor manifested in Germany: With the adoption of the "Act to Promote Tenants' Electricity and to Amend Other Provisions of the Renewable Energy Act"[92] in July 2017, Germany has given a legal framework to the tenants´ electricity (*Mieterstrom*) model. Tenant electricity is electricity generated in solar systems on the roof of a residential building and supplied to end consumers (especially tenants) in this building or in the same neighbourhood without being fed through the grid. The electricity not consumed by the tenants is fed into the general supply grid and remunerated. If the solar system generates too little or no solar electricity, the tenants are supplied from the public grid. The solar electricity and the grid electricity are bundled in a tenant electricity tariff. Unlike electricity from the grid, some cost components such as grid fees, grid surcharges, electricity tax and concession fees do not apply to electricity generated by solar systems. In addition, a subsidy is granted for each kilowatt hour of tenant electricity - the so-called tenant electricity surcharge. This is intended to create additional incentives for the expansion of solar installations on residential buildings, while also allowing the tenants - or more precisely, the residents of the building - to participate economically. With the amendments to the RES Act adopted in 2021/2022 (RES Act 2023), the support conditions were improved: the tenant electricity surcharge was increased and the regulation on the aggregation of installations was relaxed. This can further improve the economic efficiency of larger tenant electricity systems. In addition, so-called neighbourhood solutions became possible, i.e. under certain conditions, buildings in the vicinity can also be supplied with tenant electricity. The introduction of the "supply chain model" has simplified the claiming of the tenant electricity surcharge in those cases where the solar installations are operated by the landlord and a third party supplies the tenant electricity (BMWK 2017).[93]

How the factor influences ENCI: Since recently, it has mainly been homeowners who have had the opportunity to benefit from electricity from solar systems on the roof of their house. The tenant electricity regulation has made it also possible for tenants to benefit. If a landlord installs a solar system on the roof, he can supply the electricity generated to his tenants. This was already possible before the introduction of the tenant electricity surcharge, but in most cases, it did not pay off. In contrast to the purchase of electricity from the grid, there are no grid fees, grid surcharges, electricity tax or concession fees. However, tenant electricity models cause additional expenses for the provider in terms of sales, metering and billing. The promotion of solar tenant electricity closed the existing profitability gap. The subsidy is intended to make the offer of tenant electricity more economically attractive for landlords. As such, it contributes to enlarge the forms of energy citizenship, by allowing tenants to use electricity from the PV plant on their building roof (BMWK 2017).

The new neighbourhood approach has further enlarged the potential impact of the model in terms of ENCI enlargement: Since 01.01.2021, the electricity of tenant electricity systems that have gone into operation since then no longer has to be consumed "in direct connection". Instead, it is sufficient that the tenant electricity is supplied to users (tenants) who live in the same neighbourhood.

Affected ENCI types: Individual types that are focused on the household or organisations are basically affected by this factor i.e., the reformative types 1 and 3 and, secondarily the types 2 and 4 – though the tenant model is more reformative than transformative.

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Local examples:

Berlin citizens energy (Bürgerenergie Berlin – BEB) tenants electricity offer: With their tenant electricity offer, BEB contributes to generating electricity where it is also consumed: directly on the roofs of Berlin's apartment buildings. In this way, BEB brings climate protection to the city, while at the same time enabling citizen participation in eco-power plants via the cooperative and offering tenants their own solar power at a favourable price. Tenant power projects have three different actors:

- The homeowner provides the roof on which the photovoltaic system is installed. Ideally, it is a flat roof, hardly shaded and offers enough space.
- BEB invests in the construction of the PV system and sells this electricity directly to the tenants in the house. If the sun does not shine, certified green electricity is automatically supplied from the grid by *Elektrizitätswerke Schönau* (EWS), with whom BEB cooperates. The electricity supply is thus secure as usual.

The residents can use the tenant electricity to obtain solar power from their own roof. This is particularly cheap because price advantages are passed on for direct consumption to the residents. Thanks to the BEB offer, tenants not only benefit from low electricity prices and secure green supply, they can become active energy citizens: by actively contributing to climate protection directly on site through an environmentally friendly energy supply; by becoming a co-owner of the plant as a member of BEB cooperative.

Summary table

Factors		High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition					x	
	Multi-level energy governance structure of a country					x	
	Political support for ENCI (mechanisms, networks, etc.)					x	
	Political/democratic culture and traditions						x
	Inclusion and empowerment policies	x					
	Geo-political challenges (war in Ukraine, energy supply…)		x				
ECONOMIC	General economic situation / Inflation rate & purchasing power					x	
	Energy prices			x			
	Energy market					x	
	Energy taxation, state aid, fuel subsidies					x	

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	Financing and investment opportunities						X
	Sub-national innovation systems: energy sharing						X
SOCIAL	Level of income / wealth disparity and energy poverty		X			X	
	Energy literacy, awareness and skills			X	X		
	Citizen engagement and passivity in society						X
	Trust in institutions and collective endeavours				X		
	Climate anxiety/depression (eco-anxiety)						X
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES				X		
	Decentralised energy system and storage				X		
	Digitalisation of the energy system			X			
	Energy efficient buildings				X		
	No added factor						
ENVIRONMENTAL	Climate vulnerability					X	
	Availability of resources					X	
	Pollution					X	
	Conflicts and opportunities about land use for renewable energy					X	
	Biodiversity protection		X				
LEGAL	Legal framings of ENCI forms						X
	Legal measures dedicated to vulnerable consumers, energy poverty, inclusion	X					
	Rights and duties of consumers, prosumers on the energy market				X		
	Bureaucracy and red tape			X			
	Support schemes for further RES uses and models						X
	Total factors per level of barrier/support	**2**	**3**	**4**	**6**	**11**	**7**

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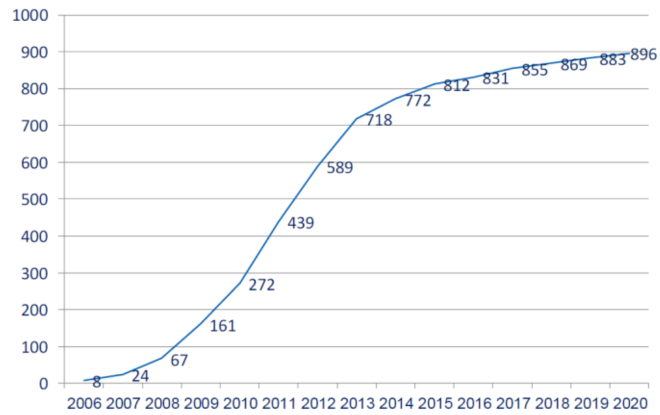
Conclusion

Figure 8.14: Foundation of energy cooperatives since 2006 – cumulated

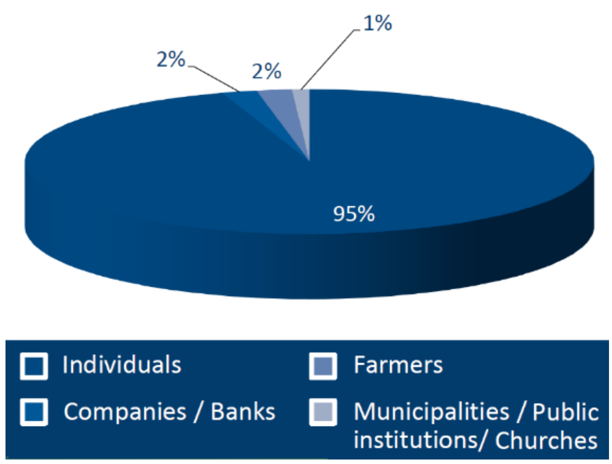


Source: DGRV, 2021.

Both renewable energy transition and energy citizenship had to face a clear slowdown in the recent years (Figure 8.14). In 2021, according to the yearly survey led by the German Cooperatives Confederation (DGRV 2021),[94] 34% of the 835 energy cooperatives in Germany were not planning any new projects and the lack of perspective was particularly evident in the main field of activity, solar power generation. In 2018, 72% were still planning projects in this area, and only 38% in 2021. The main reason for the negative development and for the decrease of the share of citizen energy in the RES production was the changed framework conditions for photovoltaics (since about 80% of energy cooperatives operate solar power plants). In recent years, the expansion of tenders to promote renewable energies had pushed back the commitment. Selling solar power directly on the electricity market was also not an option due to the low market prices.

Following the Federal Constitutional Court obligation made to the federal government to set up CO_2 emissions goals aimed at meeting the Paris Agreement objectives (Bundesverfassungsgericht 2021),[95] the new RES Act 2023 has been adopted with the purpose of pushing forward the energy transition to meet the climate goals 2030 and 2050 and of reactivating citizen energy. The new framework for RES and RECs intends to address most of the existing barriers to the development of citizen energy, i.e. simplifications of procedures, easier grid connection, new remuneration rates, subsidy for individual photovoltaics, tenant electricity, etc. The renewed policy and legal framework combined with a rather good economic situation and adapted support schemes and subsidies in Germany are thus major opportunities to foster further developments of citizen energy and, beyond, of ENCI. Specific measures are also supporting individual private ENCI development, through e-mobility incentives and financial support for energy-efficient renovation of housing conditions. The large set of new measures that have been adopted in 2021 and 2022 provides a panel of opportunities for further development of both individual and collective forms of ENCI. From a governance point of view, the potential role and involvement of the municipalities in the energy transition has been noticeably increased with the RES Act 2023 – though municipalities´ membership in energy cooperative was still very low in 2021 (Figure 8.15)

Figure 8.15: Membership structure of energy cooperatives in Germany in 2021



Source: DGRV.

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Some major barriers are still remaining, especially in terms of vulnerability and inclusiveness of the German energy system. Energy vulnerability and poverty are rather little addressed in federal government policies. In particular, the massive increase of energy prices induced by the Ukrainian war has resulted in some emergency measures to support the most vulnerable citizens. However, energy poverty and inclusiveness tend to remain out of the scope of the energy policies, which might result in a two-speed energy transition partitioned between the citizens that have difficulties in affording basic energy needs and the citizens that are wealthy enough to become active energy citizens – whether at home or through participation in RECs.

This development entails the risk that the relatively high awareness for the necessity of energy transition and of climate change issues in the German society does not translate in a strong development of ENCI.

The main barriers for the development of ENCI are mostly linked to the accessibility of some forms of ENCI that require financial means and/or adapted frameworks. In that respect, some socio-technical innovations are still lacking and adequate framings, such as the energy sharing that many civil stakeholders are claiming for. The digitalisation of the energy system is still lacking behind, which could also be a barrier for the development of such innovations, yet it is also raising some key issues in terms of ecological sustainability with regard to the massive deployment of highly technological devices it requires. Another ecological concern is also emerging due to the recent de-bureaucratisation of the procedures for RES plants, especially for wind power, which could result in a backlash in nature and biodiversity protection – as underlined by many associations such as NABU.

In summary, the overall ENCI context in the country has to be re-assessed after a short period of doubt with regard to the German pioneer status for the development of RES. The planed phase-out of nuclear power and exit of coal are still an ongoing challenge and the recent policy and economic framework shows that the German Government intends to take back control over the energy transition towards a renewable and decentralised energy system. The national ENCI ecosystem appears currently favourable for the development of a highly diversified ENCI. This requires also that the willingness to get involved within the German population turns into a more active and just involvement, a process that is still dependent on the adoption of further facilitating frameworks – such as balcony solar plant or energy sharing.

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Acronyms German/English

Acronym	*German wording*	English translation
ALG	*Arbeitslosengeld*	Unemployment Benefit
BAFA	*Bundesamt für Wirtschaft und Ausfuhrkontrolle*	Federal Office for Economic Affairs and Export Control
BEG	*Bundesförderung für effiziente Gebäude*	Federal funding for efficient buildings
BEG EM	*Einzelmaßnahmen der Bundesförderung für effiziente Gebäude*	Federal Support for Efficient Buildings Individual Measures
BEK 2030	*Berliner Energie- und Klimaschutzprogramm*	Berlin Energy and Climate Protection Programme 2030
BfN	*Bundesamt für Naturschutz*	Federal Agency for Nature Conservation
BKartA	*Bundeskartellamt*	Federal Cartel Office
BImSchG	*BundesImmissionsschutzgesetz*	German Federal Emission Control Act
BMUV	*Bundesumweltministerium*	- Federal Ministry for the Environment
BMWK	*Bundesministerium für Wirtschaft und Klimaschutz*	Federal Minister for Economic Affairs and Climate Action
BNetzA	*Bundesnetzagentur*	Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway
BUND	*Bund für Umwelt und Naturschutz Deutschland*	German Federation for the Environment and Nature Conservation
BVerfG	*Bundesverfassungsgericht*	Federal Constitutional Court
DIW	*Deutsche Institut für Wirtschaftsforschung*	German Institute for Economic Research
DRGV	*Deutscher Genossenschafts- und Raiffeisenverband*	German Cooperatives Confederation
EEG	*Erneuerbare Energie Gesetz*	Renewable Energy Sources Act
EnWG	*Energiewirtschaftsgesetz*	Energy Economy Act
EWG Bln	*Energiewendegesetz Berlin*	Berlin Climate Protection and Energy Transition Act
KfW	*Kreditanstalt für Wiederaufbau*	Credit Institute for Reconstruction
KVG	*Kasseler Verkehrs-Gesellschaft*	Kassel Transport Company
KWRA	*Klimawirkungs- und Risikoanalyse*	Climate Impact and Risk Assessment
MsbG	*Messstellenbetriebsgesetz*	Metering Point Operation Act
NABU	*Naturschutzbund Deutschland e. V.*	Nature and Biodiversity Conservation Union
ProgRess	*Deutsche Ressourceneffizienzprogramm*	Resource Efficiency Programme
Strom-/GasGVV	*Strom-/Gasgrundversorgungsverordnung*	Basic Electricity Supply Ordinance
WindBG	*Windenergieflächenbedarfsgesetz*	Wind Energy Area Requirements Act
	Wind-an-Land-Gesetz	Onshore Wind Energy Act
WindSeeG	*Offshore Wind Energy Act*	Offshore Wind Energy Act
WoFG	*Wohnraumförderungsgesetz*	Housing Support Act

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[82] In this subsection, we are mostly relying on the EU tracker developped by REScoop, available for Germany here: https://www.rescoop.eu/policy/germany-rec-cec-definitions

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[95] Bundesverfassungsgericht 2021. Verfassungsbeschwerden gegen das Klimaschutzgesetz teilweise erfolgreich. *Op. Cit*. Noticeable is also the fact that the Federal Constitutional Court rejected in 2022 eleven complaints, of which some were directed against already existing state climate protection laws and some against the failure of some state legislatures to standardise a reduction path for greenhouse gases by law. See: Bundesverfassungsgericht. 2022. Erfolglose Verfassungsbeschwerden zur gesetzlichen Normierung eines Reduktionspfades für Treibhausgase durch Landesgesetzgeber. Pressemitteilung Nr. 7/2022: https://www.bundesverfassungsgericht.de/SharedDocs/Pressemitteilungen/DE/2022/bvg22-007.html

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9. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN HUNGARY

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Introduction

The National Energy and Climate Plan (NECP, 2020c) and the National Clean Development Strategy (NCDS, 2021) are the two core documents which determine the country's medium- and long-term energy and climate policies.

90% of the country's total primary energy supply comes from fossil fuel and nuclear sources (ITM 2020b). It means that Hungary is highly dependent on external fossil fuel and non-renewable resources.

"Hungarian energy governance conveys a unique disposition, filled with contradictions and lacking clarity. Much like many of its CEE neighbours, it is still entrenched in pre-existing producer-consumer relations that shape its amicable relations with Russia. This, like most of the country's energy policy, is shaped at the highest political level. Multilevel governance is subordinated to anticipate or execute the objectives dictated by policymakers in the highest echelons of government. Other actors have very limited powers to question, contradict, or substantially shape the government objectives" (Szabó et al., 2021. p26).

According to the NECP's WAM scenario[10], the share of energy from renewable sources used for transport could increase to 16.9% in 2030 and 28.8% in 2040 (ITM 2020a), compared to the minimum binding target of 14% in 2030 (European Parliament and Council 2018a). In order to achieve at least the latter goal, the government plans to raise the proportion of first-generation biofuels to nearly 7%, while the share of second generation biofuels and biogas should be raised to 3.5%. The remainder will hinge on transportation's electrification (Szabó et al., 2021, p.20).

The energy system is highly centralised with little intention of decentralisation. Renewable energy utilisation and community energy are not in the forefront either since it would require a more flexible and less centralised system (Vadovics, 2017).

Due to the rather centralised nature of the Hungarian systems (energy, governance, education, etc.) citizens have limited space to be active citizens, especially if they wish to be prosumers. Specific legal barriers also hinder the development of energy citizenship and the wider distribution of renewable energy. This situation has slightly changed due to the energy crises started in 2021-22.

In the National Energy Strategy (ITM, 2020b), there are goals, which would loosen the centralisation and put the citizens in the focus:

- **Putting the Hungarian consumer into the centre** (by supporting decentralised energy production; widening their freedom of choice in certain areas; and developing programmes for improving

[10] Projections scenario 'with additional measures' (WAM) means projections of anthropogenic GHG or air pollutant emissions by sources that encompass the effects of policies and measures which have been adopted and implemented, as well as planned policies that are judged to have a realistic chance to be adopted and implemented in the future *(EEA Technical report No 4/2015. Projections in hindsight).*

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vulnerable users' situation).

- **Strengthening the energy security** (with reducing the energy import-dependency by gradually utilising the renewable and hydrocarbon resources; by strengthening the country's energy- and gas market integration; by continuing the diversification policy in the gas market and by guaranteeing the availability of the national energy production capacities).
- **Executing the restructuring of the energy sector to make it more climate-friendly** (by reducing the pollution of the electricity sector; by helping the energy-reduction efforts with innovative solutions and by greening the district heating).
- **Using the economic possibilities of energy innovation** (by mapping and supporting the innovation possibilities; executing the Second National Climate Strategy; by executing the transport-greening and industry-greening programmes and by using the possibilities in economic development).

In the current report, two separate examples were chosen to be examined in detail. The 19th District of Budapest was selected because they have a very active community in Wekerle in terms of energy citizenship (Wekerle is one part of the district, built in 1908). As the design of the estate was influenced by the British garden city movement of the late 19th century, Wekerle offers the environment of a small town in the metropolis; a friendly, green area that offers a basis for thriving community life (Vadovics et al., 2012). The other Hungarian local example is Budaörs, which is in the agglomeration of Budapest. It was selected for their active role as well in several domains of the present PESTEL analysis. Their leadership is consciously working on making the town sustainable in different ways, and Budaörs is also referred to as the "Innovacity".

Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)

How is this factor manifested in Hungary: Hungary as a member of the European Union has accepted the general climate and energy policy targets and has created its National Energy and Climate Plan, National Clean Development Strategy, National Energy Strategy 2030 and other relevant strategy documents detailing the commonly agreed upon objectives. However, the content of these strategies have not been fully transplanted into laws and regulations and current circumstances (such as "cheap fossil fuel prices", Covid-19 pandemic, war in Ukraine, etc.) override these long-term strategies and blocking the energy transition processes.

Regarding energy efficiency, keeping both electricity and gas prices for households and small businesses artificially low by capping them for almost a decade has been counterproductive: first, it does not differentiate between households with low income and higher income (i.e. not paying attention to social equity); second, consumers are limited in their choices, and lastly, it hinders decarbonisation. The above policy was revised and abolished in July 2022, and households above the average consumption level are paying close to market prices (IEA, 2022). This means a huge and sudden increase of costs for many households, and it is not necessarily addressing those who cannot actually afford it.

The importance of renewable energy – thanks to the urging of the EU – had been growing till 2013 but then

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it halted in Hungary due to central policy shift (Szabó et al., 2021). Its ratio in the gross final energy consumption exceeded the 13% target of 2020 but it is below the 2030 ambitions of 21% (IEA, 2022). *"Biofuels and electric vehicles have been playing an increasing but still moderate role in the transportation sector, leaving their diffusion to be a task of the future"* (Szabó et al., 2021, p.26). Paks Nuclear Power Plant and Paks II still play major roles in the government's vision on energy.

How the factor influences ENCI: Despite the ambitious goals and policies, the situation is more shaded in reality. For example, the national funding scheme for solar panels for individuals was successful – the allocated funding amount was booked within days for each funding rounds, but there were considerable delays in the administration from the government's side, and it caused inconveniences to such levels that it might not be worth investing in it after all, as additional cost and prices have grown significantly in the meanwhile (24.hu). The second funding scheme for solar panels will not be announced on time because the budget would come from the EU and due to the rule of law conditionality mechanism against Hungary the fund is held back temporarily. Furthermore, according to a new decree (26 October 2022), feeding the solar panels generated electricity into the grid will be suspended which makes it impossible for households to install them (Energiaklub, 28 October 2022). All these affects negatively individuals and SMEs to become energy citizens.

Additionally, the existing policies do not help community energy programmes either (Energiaklub, 28 October 2022). There were some programmes in the early 2010s, which aimed at helping the households to change their electric devices or doing insulation, but the government stopped them claiming running out of funding amounts. These programmes were supposed to help citizens to become active.

Affected ENCI types: Type 1, 2, 3, 4, 7 and 8

Local examples: Both Budaörs and the 19th District of Budapest have climate strategies – as a way of showing their commitment. Budaörs also has SECAP and introduced an ISO 5001 energy management system in order to reduce the city's energy consumption by 10% annually.

Furthermore, Budaörs – by winning at the European City Facility (EUCF) – will create a Positive Energy District with the help of experts and stakeholders.

P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)

How is this factor manifested in Hungary: The direction of the energy governance is unclear: while there are signs that it is moving towards a more decentralised energy system, there can be also grasped a regression in this matter. This is because "its policy objectives frequently contradict one another" (Szabó et al., 2021, p.25).

For example, the government has been gradually centralising the energy system rather than decentralising it: it works via top-down approach excluding in many cases experts, let alone the NGOs, whose voices are curtailed by the Orbán regime (Szabó et al., 2021).

However, in the documents, such as the National Energy Strategy 2030, it is explicitly written that the goal is "to put the consumer in the centre", which is elaborated on: "low utility costs, increasing energy

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independence and bigger freedom of choice" (NES 2030, p.15). Two important elements are emphasised in the document: to make consumers prosumers by producing renewable energy for themselves; and to support the spread of smart meters, which also contribute to putting the citizens in the centre. This change occurred due to some external pressure (EU) and to the rising level of competitiveness of solar panels, which would help decentralisation (Szabó et al., 2021). Nevertheless, since the installation of solar panels was made unrealistic in late 2022 with the new regulations (Mester, 8 December 2022), their future is unclear as of now, which would be very important for the further democratisation of the energy system. It is safe to say that *"a portion of the populace may be developing into prosumers over the past few years, but this has only had a minor impact on the overall landscape of energy governance"* (Szabó et al., 2021, p.24). Furthermore, as the evaluation report (written by three reliable civil organisations) pointed out, the renewable energy communities are not explicitly mentioned – as opposed to other countries' NECPs (National Energy and Climate Plans) (MTVSZ, SZGK and ELMA, 2021, p. 43).

A supporting measure for ENCI was the creation of the Hungarian Energy Community and Adaptability Providers' Association (MERSZ) in July 2022. The goal of the Association is to help the creation of energy communities and adaptability providers and by this, to make them a feasible option for both consumers and producers (portfolio, 8 August, 2022).

How the factor influences ENCI: Since the energy governance is not following a clear path, the influences on ENCI are also ambiguous. While the measure supporting decentralisation helps the emergence of ENCI, the recent suspension of the feeding of electricity generated by new solar panels into the national grid and the general nuclear energy preference of the government rather hinder the development of certain ENCI types. In more details, the individual energy citizenship (for example installing solar panels to become (partially) independent from the energy system) is hindered, but if the government takes the NES seriously and implements measures following its objective of "putting the consumer in the centre", it can support individual actions. According to a poll, the population is less willing to invest in energy efficiency measures than they were before (Mester, N., 8 December 2022).

The creation of MERSZ is viewed differently by experts, some are more optimistic than others (Sarkadi, 25 July 2022). If it works well, the energy communities could thrive, which would partially solve some of the problems related to renewables, namely that creating separate local grid would ease the national grid too.

As it is usually the case, bans and restrictions on environmentally conscious solutions could always lead to social movements by (environmental) activists or others.

Affected ENCI types: Type 1, 2, 3, 4, 7, 8, 9 and 10

P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in Hungary: According to the National Energy and Climate Plan, the involvement of stakeholders in the preparation of the NECP was extensive. The government consulted with experts, the civil society, industrial experts, the association of local authorities, universities etc. (see NECP, 2022). However, based on the evaluation of the process by Energiaklub, it seems that the consultation (a survey) addressing the general public, which is a mandatory part of the preparation, was only available for one week; combined with the survey asking about the National Clean Development Strategy, and not

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properly advertised (Energiabox, 26 November 2019). Furthermore, the NECP is not meeting its own expectations set by the government and others (Munkácsy et al., 2020). Therefore, it has to be viewed with criticism.

According to The Environmental Implementation Review (2019),

> *"In Hungary, the governing principles for public participation are laid down in the Environmental Protection Act (EPA) that gives everyone the right to participate in environment-related procedures. This right can be exercised: (i) in person or through a representative; (ii) through social organisations; or (iii) through municipal local governments. The EPA is complemented by specific decrees and acts in different sectors. However, sector-specific legislation tends to follow different approaches when it comes to public participation (e.g. whether or not legal standing is required to comment). Two factors are known to limit public participation: (i) a tendency to exclude participation by multiple individuals or groups (overlooking the fact that projects develop within a tiered planning and permitting procedure); and (ii) the fact that administration procedures are streamlined and accelerated"* (p.32).

How the factor influences ENCI: The general ignorance of the government toward the democratisation of the energy system and the low encouragement of citizens to act about energy efficiency, decarbonisation etc. are hindering the development of ENCI.

Affected ENCI types: All types.

Local examples: The 19th District of Budapest and Budaörs (among others) took part in the Save@Work project and/or the Compete4SECAP project, which aimed at including employees in an energy-saving competition.

There are many other good initiatives in certain cities, but the general involvement of citizens is still in its infancy compared to Western Europe, it usually does not exceed the level of communication and awareness raising campaigns.

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in Hungary: As a post-socialist country, Hungary has a rather passive society (see S3 and S4 in Social factors), and non-governmental organisations hardly ever take political stands (because partially they are afraid of losing their supporters).

Furthermore, the paternalist inheritance (namely that people are waiting for the state to act/help) leads to the fact that energy democracy does not work well either. There are only a very few examples when citizens take the initiative, such as the Pedibus was in Gödöllő (when kids are going to kindergarten or school on foot in a group accompanied by adult volunteers).

There are a few cases where NGOs and companies cooperate (like in Tiszabő) or when local governments work together with NGOs (e.g. working actively on the realisation of local policies and SECAPs), but these are in minority, and they are facing difficulties in many cases.

The EU-funded SUNRISE project (which had several Hungarian partners) is a good example for participatory planning where all sides were involved (local government, experts, citizens etc.), but most of

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these cooperation and initiations by NGOs stem from EU funded projects as Hungarian NGOs are not strong enough in general to start and carry out such activities.

How the factor influences ENCI: The paternalistic society and the low level of participation or activism leads to less ENCIs on the collective level and hinders the emergence of ENCI in general.

Affected ENCI types: Type (5, 6,) 7, 8, 9 and 10.

Local examples: Budaörs – within an URBACT project – is implementing the CITIES4CSR project where companies are taking social responsibility, i.e. which are beneficial for the city's population/inhabitants.

In Wekerle, there are citizen-initiated projects, such as the Wekerle Energy Brigade, which is a DIY group aiming at insulating doors and windows.

P5. Inclusion and empowerment policies

How is this factor manifested in Hungary: The National Energy Strategy includes 35 plans and measures, which have to be implemented until 2050. It includes the support of regions and territories, which are heavily dependent on fossil fuel industries to become more reliant on renewables and by developing district heating. The Strategy also pays special attention to the vulnerable ones with special financing schemes. However, it needs additional policies from other fields (segregation, health, pollution etc.) because energy poverty cannot be separated from those issues. Presently, no official definition of energy poverty is present in the national legislation, it is yet to be determined.

All in all, "disconnection protection – from the electrical and gas supply – is the main policy of social protection for low income and disabled households" (Streimikiene, D., 2022, p.23). On the national level, there is no financial support for combating energy poverty based on social status, which is a big deficiency. Empowerment and energy literacy trainings are also lacking on the national level, they rather exist on the local levels or organised by NGOs. Continuous monitoring of energy poverty is also a missing point.

How the factor influences ENCI: Low energy literacy combined with lack of empowerment programmes hinder the development of ENCIs. Although the national strategies do include plans and measures, they only focus on 2050 and presently no real supporting measures enable ENCIs in Hungary.

Affected ENCI types: Type 1, 2, 5 and 6.

Local examples: In Budaörs there were trainings specifically for pensioners and the "poor" within a local government project in 2021-2022 which helped preparing and popularising the climate strategy.

In Budaörs as well as in Kispest (18th District of Budapest) several training programmes have been organised by the local authorities for the local municipal employees to empower them to be more active citizens and energy conscious employees.

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P7. Political vision on the future of the national energy system

How is this factor manifested in Hungary: In his speech, Prime Minister Orbán said in the spring of 2022 that the goal is not to cut the Russian import completely, but to increase the country's energy independence, *"not to be dependent on Russia, there should always be something else as well, not to be exposed to them"* (portfolio, 2 April 2022). Based on his speech and the government's energy strategy, in 2030 the dependence on fossil fuel is going to remain high.

The importance of the role of renewable energy has grown in the past years: the Minister of Energy, Csaba Lantos said that if the EU-funds arrive to Hungary, they would utilise solar – and to some extent – wind energy (Sarkadi, 8 January 2023). Presently, within renewable energy, 65 percent comes from solar, 22 percent from biomass and only 6 percent from wind energy (pénzcentrum, 9 June 2022). However, countries with high Russian nuclear dependence tend to decline wind energy because wind cannot be as well controlled as nuclear power, and the countries would need to heavily invest in transforming the national grid towards Smart Grid solutions (VIP, 16 January 2023).

"Besides low utility prices for households, the Paks II project constitutes the other fixed point of any governmental thinking on the future energy landscape" (Szabó et al., 2021, p.12). This was confirmed in the speech of the Minister of Energy in January 2023, namely that nuclear option is definitely needed, that is why the investment in Paks II is so important (Sarkadi, 8 January 2023).

How the factor influences ENCI: If investments in renewable energy happen in the coming years, it could also support the creation of ENCIs. However, the heavy reliance on nuclear energy and fossil fuels are not giving a supporting background for the development of ENCI.

Affected ENCI types: All types.

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Hungary: Hungary had the highest inflation rate in the European Union – over 22.5% – in November 2022 (portfolio, 16 December 2022). This is not only due to the global economic and energy crisis, but it can be partially explained by the political measures as well, such as keeping the price caps for several products for months (including the petrol) (Pálos, 28 October 2022), the high dependency on Russian gas etc. Furthermore, according to Transparency International, Hungary has relatively high corruption level (see the Corruption Perceptions Index): this was emphasised in a joint analysis, which was trying to draw the European Commission's attention to it as well. On the top of these, the relatively low median income (atlatszo.hu, 29 September 2022) and Hungary being the laggard in terms of purchasing power in Europe (only countries in the West Balkan have lower PPS), make the economic situation dire for many. This is combined with the partial cancellation of the price cap on utility prices, which also hit those harder who live in a bigger and/or a less energy-efficient building. Moreover, since the inflation hits those more who earn less (Stubnya, 1 November 2022), inequalities keep growing.

The GDP grew relatively well, which led to investments and energetic renovations at households, many

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families from the middle classes could afford to implement solar panels. However, due to the crises, according to a survey, 40% of Hungarians cannot keep the same standard of living they had two years ago (hvg.hu, 12 December 2022).

How the factor influences ENCI: Increasing prices – hence the decreasing value of the purchasing power – means that people are more forced than before to save on their expenses and investments are less of an option for many. While energy citizenship does not necessarily require an investment, saving money through energy consumption can be both good and bad for the environment. One can decide on introducing simple energy-saving habits to use less energy or deciding on sharing tools with neighbours, which can both be counted as energy citizen behaviours, but being an energy citizen can also mean using inorganic products (e.g. tyres, plastics) for heating rather than bio-waste due to lack of money.

In general, despite the relative fast increase of the country's GDP, due to numerous reasons (taxation system, inequality in available subsidies and proper education, etc.) many people live in poverty and have very limited time and energy to deal with ENCI in their everyday lives.

Affected ENCI types: Type 1, 3, 10.

EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in Hungary: Hungary introduced regulated retail prices for electricity, gas and district heating for households and small businesses in three phases starting in 2013. This so-called Universal Service Scheme covers 5.3 million consumers, of which 5.1 million are households and 0.2 million small businesses (IEA, 2022 p. 100). Instead of this general price cap, from which – regardless of social and financial background – everyone benefits, the NES 2030 proposes a review and if necessary revision of the scheme for electricity. The price cap has a counter effect: people use more *because* it is cheaper (Jandó, 2 May 2018).

With the advancement of the global energy and economic crisis, in the summer of 2022 the government – referring to it as the "energy emergency" – decided to lift the price cap for those who consume "above the average". This radical measure – again disregarding those in need socially and financially[11] – not only made it worse for households, but several businesses had to close as well (including ones embracing energy citizenship). Those who consume above the average have to pay two times higher for electricity and seven times higher for gas.

Looking at the prices from the international arena, *"average industry and household retail electricity prices in Hungary are significantly lower than in neighbouring EU countries"* (IEA, 2022, p. 101). Furthermore, since Hungary is highly dependent on energy import, *"domestic energy prices are to a large extent reliant on factors determined outside the Hungarian borders"* (Weiner & Szép, 2019, p. 2).

At the beginning of 2023, the energy minister emphasised that despite the energy crisis, the Hungarian government will still keep the prices lower for the population during this heating season (up to the average consumption level, but even above that people have to pay a price which is much lower than the market

[11] The so-called "big families" (with at least three children) are excluded.

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price) (Sarkadi, 8 January 2023).

According to one of the car-sharing companies, after the government suddenly lifted the price cap from petrol, the usage of their cars (which are exclusively electric) has significantly increased (hvg.hu, 9 December 2022).

About the country's energy security, see P1 or P7. (Political factors).

How the factor influences ENCI: The recent partial lifting of the price cap for electricity and gas induced citizens and businesses to shift to renewables (Bene, 19 August 2022). However, the decree on solar solutions makes the installations of solar panels almost unrealistic due to the fact, that new installations cannot be connected to the national grid for an undefined period, thus the population are left with fewer choices.

As the costs of fossil fuels are artificially kept low and their environmental externalised cost are not included in them, it is not always worth investing in renewables in Hungary because the rate of return is relatively slow for households.

Affected ENCI types: Type 1, 2, 3, 4.

Local examples: Local governments do not have a say in centralised prices. They can only offer – to a very limited extent – financial support to their inhabitants/local citizens for energy expenses in the form of social aid to buy wood or smaller amounts as compensation for the energy costs.

EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in Hungary: The centralised nature of the Hungarian energy market was elaborated elsewhere (see EC2). The most important point is that it is not the intention of the government to decentralise the market (or – as a matter of fact – governance in general): this is the core of the government's economic philosophy, i.e. to keep the citizens dependent on them rather than being able to decide according to their own interest. Most of the energy utility companies have been bought up by state owned companies thus further centralising the energy system of Hungary.

How the factor influences ENCI: The centralised energy market makes the development of ENCI very hard in many cases (e.g. installing solar panels or creating energy communities). It might help the development of social movements if enough people realise that this governance is not a good direction towards tackling climate crisis.

Affected ENCI types: All types.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in Hungary: Unfortunately, the majority of the policy instruments do not support a green transition (or at least not consequently). One of the main measures is the utility price reduction (see EC1, EC2), which – according to the IEA (2022) – is *"not the most economic and*

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environmentally suitable measure, as it may risk increasing Hungary's energy import dependency, notably on Russian natural gas" (p.28). Furthermore, as was already emphasised elsewhere, it does not differentiate between the well-off people and those in need. Therefore, everyone has benefited from it equally until 2022 when the government made some changes, but it still does not serve social equity (see more at EC2).

Another recent measure (2022) – which also does not serve the sustainable goals – was the ease of logging rules in Hungary. The quick adoption of this rather controversial decree was a response to the energy crisis (Szőke, 9 August 2022).

Regarding mobility, there are tax exemptions for environmentally friendly (electric, hybrid, plug-in or zero emission) cars, and workplace mobility regulations have recently changed from heavily supporting cars to supporting zero or low emission solutions as well (micromobility, public transport, bike or walking). However, the newest plans for the recovery funds (RRF) excluded the building of bike infrastructure even though it was in the previous version (which had been consulted with experts from the civil sphere whereas the final version was not). The price cap put on petrol (between 15 November 2021 and 6 December 2022) had also a rebound effect on sustainability as well. The earlier introduced tax exemptions for using electric cars in cities are being slowly withdrawn.

"The Hungarian energy sector is subject to various taxes, including the energy tax, value-added tax (VAT) and excise duty. A range of exemptions and tax breaks reduce the effectiveness of the tax rates (OECD, 2021) in terms of environmental steering. The final consumption of electricity, natural gas and coal is subject to an energy tax (their intermediate consumption is exempted from the tax). Renewable energy is not subject to the energy tax to encourage its growth in the Hungarian energy mix. Residential energy consumption is also exempted from the energy tax" (IEA, 2022 p.27). The government has recently casted out an extra tax on renewables.

How the factor influences ENCI: As Antal (2019) wrote, "the direct reason for which the breakthrough of wind and solar energy has not yet happened in Hungary is more or less clear: the government blocked niche development by policy means. Except for a short period after 2006, it was not legally permitted to develop wind energy, and when solar energy matured around the end of the studied period, its development was delayed by uncertainty created by the government around regulations, subsidies and taxes" (p. 176). These – together with the abovementioned regulations – highly hinder the development of energy citizenship cases, especially the individual ones, but other types as well.

More and more cities cancel the allowances for electric cars (such as free parking, local tax reductions). In many cases, the cities are trying to make public transport more attractive by not raising the prices for tickets and passes and by making it more difficult/expensive for car usage (e.g. increasing the parking fees).

Affected ENCI types: Type 1, 2, 3, 4, 7 and 8.

Local examples: Local governments have rather limited voice in the subsidies. The very few areas where they can act independently from the government are the taxation of individual motorised transport, public transport and in the area of housing to some extent (e.g. maintaining social houses).

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EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Hungary: An important grant was the support of solar power panels, which is held back for now but there were many applicants who – especially due to the energy crisis – applied for it. (This recent suspension goes against what is written in the NECP (2019), namely that *"we wish to continue encouraging energy production for private purposes, based on renewable resources, strengthening the energy independence of consumers and consumer communities",* p. 48.) Another one is the support of energy communities in different ways. The importance of energy communities and their support is emphasised in both the NECP and NES 2030. However, the financial supports do not show this in numbers: *"from 2014 to 2020, Hungary allocated around €160 million of EU funding to renewable energy investments under EU sectoral and territorial operational programmes. Until 2027, Hungary will provide further investment aid to renewable energy and other types of energy projects from the national budget using carbon credit revenues and potential EU funds"* (IEA, 2022, p. 72).

Another area of subsidies or grants helping indirectly ENCIs and make the energy system more just is addressing energy poverty. The utility cost reduction programme is being claimed as an action fighting energy poverty, but the main beneficiaries are not the most vulnerable ones. "Warmth of the Home" programme was targeting vulnerable families, which was a state funding scheme for energetic renovations of buildings. However, the amount was not sufficient and it was sourced out within days (HBS–FoE Hungary, 2018).

As for mobility, there was also a financial support scheme for people or small companies to buy e-bikes or electric cargo bikes.

How the factor influences ENCI: Not having sufficient amount of grants and support hinders the development of ENCI in all its forms.

Affected ENCI types: All types.

Local examples: Since the government does not offer sufficient amount of support (not enough national funding schemes open for local governments, the larger investment measures require government approval, great part of the former municipal income was taken away (centralised), thus local authorities are now trying to win direct EC funds (ELENA, UIA, EUCF, Horizon, EIB, etc.).

EC8. Green industry development and green job creation

How is this factor manifested in Hungary: According to the OECD Third Environmental Performance Report, "Hungary has made progress in greening its economy and cutting emissions, but it needs to speed up efforts to replace fossil fuels with renewable energy sources, improve energy efficiency in buildings and promote sustainable transport" (OECD, 28 June 2018). The same report says that while the country has strengthened its environmental laws, their implementations are hindered.

The building of the South Korean battery factory in Nyíregyháza, the Chinese battery factory and the BMW's newest factory in Debrecen are signs for the opposite direction to green industry. These factories do not represent the green industry even if they are serving electric cars.

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In the EU, Hungary belongs to the “Eco-Innovation Catching-up Group”, which is the laggard in the area of ecological innovations (Gulyás, 2022). Furthermore, as it is written in another EU report, *“Hungarian SMEs continue to be below the EU-28 average in the environmental dimension of the small business act. The proportion of Hungarian SMEs that take resource-efficiency measures is still below the EU average, as is the proportion of SMEs that offer green products and services. Moreover, the share of SMEs that have benefited from public support measures for the production of their green products fell from 15% in 2015 to 0% in 2017”* (Environmental Implementation Review, 2019).

How the factor influences ENCI: Not being a frontrunner in greening the industry can have a hindering effect mostly on organisations and individuals who have fewer opportunities to join such projects.

Affected ENCI types: Type 3, 4, 7 and 8.

Local examples: Budaörs is taking part in an URBACT project called CITIES4CSR: Budaörs is cooperating with local companies who do CSR (corporate social responsibility). Both the local inhabitants and the environment benefit from these local actions.

https://www.budaors.hu/?module=news&action=list&fname=cities4csr2#MIDDLE

https://www.budaorsiinfo.hu/blog/2022/07/09/budaors-is-csatlakozott-egy-a-legszennyezettseg-csokkenteset-celzo-nemzetkozi-kampanyhoz/

Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Hungary: The average income in Hungary is the third lowest in the European Union according to Eurostat (Hungary Today, 20 April 2022) and the wealth disparity has been increasing for the last two decades (Jelinek and Virág, 2020). The situation has worsened due to the pandemic: in Hungary, the first wave of the COVID-19 crisis affected the vulnerable social groups stronger than the EU average, and the disposable income inequality also increased (Medgyesi and Tóth, 2022).

Furthermore, the lower the household’s income, the more money they have to spend on energy-related expenses on average (it is not true for everyone though because some households cannot even afford to spend money on that) (Habitat for Humanity, 2020).

The ratio of households who suffer from energy poverty is estimated between 10 (Habitat, 2020) and 20 percent (Energiabox, 2020) – depending on the definitions and indicators taken into account.

How the factor influences ENCI: In some cases, in order to become an energy citizen, one has to invest in long-term solutions, the payback period of which is financially not really rewarding. Therefore, low income may hinder certain types of ENCIs because it does not allow individuals to invest in long-term solutions. (However, this is also connected to the factor called “the society’s willingness to invest”.) On the other hand, if someone does not have enough money to afford sufficient energy might start saving on energy in innovative ways (without investments), which are also some types of ENCI (for example, sharing electric devices, creating a community where they share tools etc.).

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Thus energy poverty can also be an opportunity and an obstacle too in relation to ENCI.

Another way to tackle energy poverty in a sustainable way is the creation of renewable energy communities. However, the National Energy and Climate Plan – as opposed to that of other countries – does not include specificities regarding this issue (MTVSZ, SZGK and EMLA, 2021).

Affected ENCI types: Type 1, 2, 3, 4, 9, 10.

Local examples: Budaörs offers financial support based on the residents' social and financial status at least to partially compensate the increased energy prices. Kispest, 18th District of Budapest – as it is part of the capital – cannot offer the same: residents can apply for financial support for their increased energy prices directly from municipality of Budapest.

S2. Energy literacy, awareness and skills

How is this factor manifested in Hungary: Energy saving is not in the mainstream thinking in Hungary (MTVSZ, 2022) just like there is lack of knowledge about community energy and the operation of the energy market, which makes it harder for both individuals and local authorities to create energy communities (MTVSZ, SZGK and ELMA, 2021).

The usage of smart meters and monitoring one's consumption in general are not in the mainstream thinking in Hungary (Fodor, 2016). While the ratio of smart devices measuring electricity in the EU was 34%, it was 1% in Hungary (Tounquet & Alaton, 2020). However, because of the energy crisis people started to be more conscious about their consumption. (This process was helped by the media where more and more articles appeared about how to save energy at home.)

Hungary does not have a separate ministry dedicated to environmental issues (see in L1). The government has not been allocating money for awareness raising campaigns since 2013, which has a negative effect.

How the factor influences ENCI: Since there was not much focus on energy efficiency and sustainability in Hungary in the past decade (mainly because of the relative low energy prices), and also because of the incredibly difficult stigmatising situation of NGOs – see Lex NGO – working in the field (Tamás Székely, 2017), there are only a few ENCIs in the county. This trend has somewhat changed due to the energy crisis and people in general are suddenly more aware of their energy consumption, and some stated actively looking for renewable solutions.

Affected ENCI types: All types.

Local examples: Both Budaörs and Kispest have joined the Covenant of Mayors, which is a network of European cities in order to boost local energy and climate initiatives. They have their own SECAPs and climate strategies. The latter were prepared with participatory planning (i.e. involving stakeholders, including their citizens). Several smaller projects and information, training campaigns have been conducted, as well as addressing their citizens to become more energy-conscious focusing e.g. on mobility (bike to work) and gardening.

https://klima.kispest.hu/, https://www.budaors.hu/?module=news&action=list&fname=klima

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S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in Hungary: Regarding the general civil activity in the country, civic participation in public affairs is low and there is a general ignorance of political news (Bernát et al., 2015). Furthermore, solidarity is low as well as the tendency of being a member of organisations (Tóth, 2009).

Accordingly, based on the results of the ISSP Environment module (2020), the citizen engagement in environmental issues is rather low in the country. Altogether 10 percent of the respondents took part in at least one of the political activities in the field of saving the environment during the previous five years: signing a petition (6%), donating money to an environmental group (5%), demonstrating (2%), being a member of an environmental group (2%). Compared to the previous results from 1993, there has been no shift in this regard. Looking at the financial sacrifices, the population is less willing to pay more (taxes or in other way) for the sake of the environment than 15 years before (Schneider and Medgyesi, 2020).

In 2014, the ISSP's topic was citizenship. Only 36 percent of the Hungarian respondents answered that in order to be a good citizen, one should participate in a social or political organisation and only 35 percent thought that one should help those in need (in other parts of the world) (Szeitl, 12 November 2014).

However, when there was an opportunity to take part in the consultation about the National Energy and Climate Plan and the National Clean Development Strategy, over 200,000 people filled in the survey within just a few days (Energiabox, 26 November 2019).

Regarding the NGO sector, the Hungarian government has been persecuting NGOs, which are receiving funds from abroad. They passed a controversial law ("Lex NGO") in 2017, which was revoked four years later by the European Court, but there are still concerns about the financial surveillance of NGOs (Hungary Today, 22 April 2021).

In the broader field, ever since the outbreak of the global crisis, the teacher demonstrations grew rapidly in size and depth as well, becoming a social movement. Even though it is very loosely related to the energy system, the demonstrators do not only fight for a salary raise, but also for a more equal, better education system, which is interrelated to all spheres of life.

How the factor influences ENCI: The general low level of citizen engagement is hindering the development of ENCIs. It affects both the individual and collective types. For example, at the latest demonstration for climate change (organised by the Hungarian branch of Friday for Future), there were only a few hundred people (Mérce, 23 September 2022). It affects the individual types because the lack of civil activity refers to a general ignorance of the society.

The Lex NGO directly affects the operation of several NGOs receiving funding from the Open Society Foundation (which moved out from the country in 2018). Among them there are organisations dealing with active citizen engagement and empowerment towards energy transition, as well as with disadvantaged people and areas in the country, which affects ENCIs too.

Affected ENCI types: All types.

Local examples: Wekerle Energy Brigade is a citizen-initiated project in Kispest (19th District of Budapest): a DIY group aiming at insulating doors and windows. Transition Wekerle is a key member of the Hungarian

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Transition initiatives. It relies heavily on the cooperation of individuals, local NGOs and local institutions. It focuses on local food, local energy and local economy in order to lighten the eco-footprint of residents, promote active citizenship, new ways of cooperation and solidarity.

S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Hungary: Both institutional and interpersonal trust is low in Hungary (like in other Central and Eastern European countries) because of the institutions' politicised nature (Boda and Medve-Bálint, 2012) and corruption.

In many countries, energy communities work in the form of associations/corporations or at least acknowledges those principles. In Hungary – like other post socialist countries – associations have negative connotations. That is also why cooperation is difficult/burdened for energy communities or other initiatives. However, the strengthening of energy communities could have a positive effect on social self-organisation and trust (MTVSZ, SZGK and Elma, 2021, p.45).

How the factor influences ENCI: The country's past is burdened and therefore hinders the development of ENCIs from the self-organisational point of view.

Affected ENCI types: Type 3, 4, 7 and 8.

S8. Social norms, attitudes and perceptions towards energy-efficient products, services, technologies and appliances, and towards social innovation

How is this factor manifested in Hungary: Lacking data on social norms towards energy-efficient products and services, here we share some examples for social attitude towards environmental lifestyle and behaviour, which is strongly related to the topic in question. Based on the ISSP Environment Module (2020), 60 percent of the respondents in Hungary said that they reduced their energy consumption due to environmental considerations during the past month. Environmentally conscious behaviour strongly correlated with the level of one's education: while only 20 percent of the people with eight grades lead an environmentally conscious lifestyle, the same is true for 50 percent among those with a university degree. The same goes for subjective social status: environmentally conscious behaviour positively correlates with it. Reducing car usage is also becoming more popular: 24 percent said that they often or always decide to use the car less due to environmental considerations. All these ratios are higher than 15 years before when they asked the same questions (Schneider et al., 2020).

Another survey (Eurobarometer) was conducted at the same time and "Environment, climate and energy issues" were only the ninth concern of the population – making Hungary one of the laggards on this question (Kollár, 2019).

However, in 2022 – based on a representative survey – 95 percent of the respondents said that they want to become more environmentally conscious in the coming year. Energy efficiency was the most popular area – 67 percent chose this option; repairing one's devices was the third with 54 percent and mobility was the fifth with only 32 percent. The respondents found hard to change one's mobility habits – which is due to the lack of soft infrastructure (for walking and biking). Energy efficiency – on the other hand – was found

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the easiest to be changed (Varga, 17 January 2023).

How the factor influences ENCI: On the one hand, a positive side effect of the recent and sudden very high energy prices is the general elevation of awareness in connection to energy efficiency, thus a relatively larger part or the population is open to ENCI initiatives. On the other hand, for citizens to be able to act there has to be supporting legislation and infrastructure, which is not yet present due to the government's exposure to Russian fossil fuel and the lack of willingness to support renewable energy resources on a larger scale. This indeed hinders almost all types of ENCI in Hungary.

Affected ENCI types: Mainly type 1-6.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)

How is this factor manifested in Hungary: Solar energy is currently the most available renewable energy source in Hungary. It accounts for the largest share of electricity generated from renewable sources, 44% in 2020. The installation is currently mainly a matter of money because both the specialists and the solar panels are available. (Hungarian Central Statistical Office and ITM, 2021)Even the regulatory and support system for small household power plants was beneficial, but it has recently changed in a not so favourable direction. The former annual basis accounting system is being changed. Thus, there will be no possibility of balancing the energy production in the planned short-term accounting at the level of small household power plants.

There is currently no possibility to build a wind power plant in the country. A current theme in the Hungarian public debate is whether or not renewable energy production can be easily integrated into the Hungarian energy system. Opinions are divided, but those of the current decision-makers tend to be that the current technological level of the system would not be able to cope with flexible production.

Hungary also plans to rely more on hydrogen in the long term; it even has a hydrogen strategy since 2021. The strategy indicate that it could play a role mainly in the industrial sector and transport as a replacement for natural gas (Hungary's National Hydrogen Strategy).

How the factor influences ENCI: In Hungary solar power is the renewable source that has the greatest potential and is readily available in terms of expertise and technology. However, due to legal barriers, it is currently an option only for individual ENCIs to make progress, because for legal reasons, community energy cannot easily be developed.

Although the development of hydrogen is expected to have an impact mainly in industry, it will play a major role in transport. This could have an impact on individual ENCIs as an option on the consumer side (e.g.: buying a hydrogen car, choosing less polluting transport).

Affected ENCI types: Type 1, 2.

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Local examples: The Municipality of Kispest is considering solar and geothermal developments. It plans to build a solar farm with a capacity of about 500 kW on municipal land. In the longer term, it plans to build a geothermal power plant with a capacity of 20 MW, which would provide a major part of the district's heating (SECAP of Kispest, 2018).

District heating in Budaörs is provided by the Budaörs Settlement Management Nonprofit Ltd. Improvements to the heating plant and the network are ongoing, and the energy consumption of it has been significantly reduced (about 40 percent in 10 years). The municipality has so far installed solar panels on seven buildings, and the settlement has more than 250 small scale electricity generating plants (SECAP of Budaörs, 2020).

T2. Decentralised energy system and storage

How is this factor manifested in Hungary: The Hungarian energy system is highly centralised. In 2021, almost 45 percent of the gross electricity production was nuclear, 27 percent was natural gas, and another 9 percent was coal and lignite. This composition shows the large power plant structure. Natural gas is responsible for 70 percent of heat generation (mekh.hu).

MVM Group – a state owned company – is one of the largest companies in the country, with the group's generation units accounting for 59.4% of the country's total electricity generation in 2021. The MVM group also supplies heating energy. In 2020, the Miskolc Combined Cycle Power Plant was restarted and is now up to new standards after modernisation (mvm.hu) (more details about centralisation see P2).

The high level of centralisation creates a number of risks to energy security, as does the low controllability of power plants, which results in a high inflexibility of the system and therefore creates a further barrier to the integration of renewables (Sáfián-Munkácsy, 2015).

Closely related to this topic is community energy, which is currently at an early stage of development in Hungary, both from legal and other perspectives (e.g. limited visibility in society, limited financial support). Although the problem is not primarily technological, it can be connected to it. For instance, the network is inflexible, thus making it difficult for flexibility aggregators to integrate. Furthermore, for now, energy community accounting is only possible where a group can connect to the system through a common meter. Within the community, smart meters can allocate production and monitor consumption. The technological conditions to do so are still limited (MTVSZ, 2022. május 31).

How the factor influences ENCI: The centralised nature of the energy system makes it inflexible. The development of ENCIs would clearly benefit from a flexible system, so centralisation and inflexibility are the main barriers in the country (see more about it in P2).

For example, for multi household buildings to become an energy community, it would currently require each household to be equipped with a smart meter and then connected to the grid through a joint device. This complex system is a major obstacle to the development of ENCIs for now.

The remaining centralisation in Hungary also hinders the reduction of energy poverty, as these groups are even more vulnerable to changes in energy prices.

Affected ENCI types: Type 5, 6, 7, 8.

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Local examples: The municipality-level developments mentioned in the previous chapter (T1) support decentralisation.

Decentralisation in Kispest is supported by the active grassroots Energy Efficient Wekerle initiative, whose members can support the work of the municipality with expertise, experience, local knowledge and a well-developed community network (Climate strategy of Kispest, 2020).

T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in Hungary: According to the National Clean Development Strategy, significant progress has been made at the transmission and distribution network level, as well as at the end-user level (e.g. digitalisation is spreading in the energy sector and artificial intelligence has already appeared), further efforts will be needed both in terms of innovative system integration and end-user developments (ITM, 2021). Among other things, smart inverters, compressed air energy storage solutions and fast-charging technologies are at the demonstration stage. Their success depends on further innovation efforts (ITM, 2021).

The strategy highlights the need for digitalisation in both industrial and agricultural technologies and also in transportation and mobility (about the last ones, see more on T5.) (ITM, 2021).

How the factor influences ENCI: In Hungary, digitalisation is not yet at the leading level, and our experience in GDI shows that even simple tools such as a meter to monitor the consumption of appliances are not well known by the general population.

Although digitalisation is in the plans, it is not yet very much in practice. However, energy communities in condominiums could currently only be implemented through one main meter and several smart meters, but this is not yet very feasible in practice.

What is encouraging is that the billing system is relatively easy to access online after registration, so it can help individual consumers to self-monitor.

Affected ENCI types:

- Hindering: Type 5, 6, 7, 8
- Enabling: Type 1, 2

Local examples: In Kispest, the proposed household energy investments include the installation of smart meters as an effective incentive to further reduce energy consumption. The strategy suggests that this will allow, in the long term, differential energy tariffs to be paid, in addition to providing feedback to consumers and raising awareness of consumption (SECAP of Kispest, 2018). In addition, the Energy Efficient Wekerle initiative also offers the possibility to rent smart meters and thermal imaging cameras to residents.

In the framework of the COMPETE4SECAP project, an Energy Management System (ISO 50001) was developed and certified in Budaörs (https://compete4secap.eu/magyarorszag).

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T4. Energy efficient buildings

How is this factor manifested in Hungary: With the household sector taking up the largest share of final energy use (31%), building energy efficiency is an important factor in energy and climate policy. This is especially so given the fact that Hungary's building stock is technically obsolete, with a large proportion of buildings lacking adequate insulation and/or energy-efficient heating systems. According to Eurostat, about 92% of homes are owned privately, and the share of the population living in detached houses is relatively high, 72% (Vadovics, 2019).

Greenhouse gas emissions from housing are much higher than in Europe. According to 2020 figures, the EU average per capita CO_2 emissions were 700 kg, compared to around 830 kg in Hungary (Eurostat).

As for the use of energy, the level of consciousness is low. The majority of the households do not follow their energy consumption data and the household appliances stock is inefficient on a large scale (Vadovics, 2019).

Energy prices in Hungary, which have been artificially low for many years, have risen significantly due to the current crisis (war in Ukraine), causing serious problems for more and more families, especially when it comes to heating their poorly renovated houses (Feldmár, 2022).

Since 2013, energy certificates for properties have been uploaded to the Lechner Knowledge Centre's e-certification platform by authorised experts, and since then more than 1.2 million homes have been entered into the system (Lechner Tudásközpont).

Similar to residential property, the municipal offices and other buildings (e.g. kindergartens, nursing homes, cultural centres) in Hungary were inefficient. However, many buildings have been successfully renewed under the Operational Programme for Spatial and Urban Development (the strategic objective of which is to encourage the transition to a low-carbon economy), which has been running for several years (palyazz.hu). However, as a result of the current energy crisis, municipalities that have not yet been able to upgrade their properties could face serious debt.

In Hungary, buildings with various green certifications (LEED, BREEAM, DGNB, and WELL) are becoming increasingly important in the corporate sector. The HuGBC (Hungary Green Building Council) is at the forefront of this, providing a knowledge platform, awareness-raising and educational activities based on international practices and its members' knowledge, experience and innovative solutions.

How the factor influences ENCI: The large number of buildings in inadequate condition is currently making it difficult for both individual and community building ENCIs to get started. They often require costly investments (insulation, replacement of windows and doors, heating system improvements) to bring them up to an adequate level, so until than they cannot start meaningful work in a community space.

Housing in poor condition particularly affects those who live in energy poverty. Many households choose to heat with wood because of their poor financial situation, as it gives them more flexibility. In recent years the cost of firewood has also become an increasing burden on households, forcing many to use lower quality and more polluting fuels (e.g. lignite, flammable waste, rubbish) (Feldmár, 2022). (More on this in EN3)

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As the energy certification system becomes more common, it could be a catalyst for the development of ENCIs. The system itself can have an awareness-raising effect on individuals, which can set them on the path to consciousness. Possible support to achieve standardised conditions and minimum requirements could help ENCIs to start.

The modernisation of municipal buildings and the spread of green certification in the corporate sector are also major contributors to raising the awareness of the professionals. The growing knowledge can help to promote ENCIs that require greater expertise.

Affected ENCI types: Type 1, 2, 7, 8, and Type 3, 4.

Local examples: Every year the Municipality of Kispest pays special attention to the modernisation and renovation of the buildings under its control. In recent years, the budget allocated to education institutions has been used to renovate several kindergartens and nurseries. The main investments in these facilities have been in heating and lighting modernisation, insulation and replacement of windows and doors. In addition, the municipality is launching tenders for the renovation of blocks of flats and housing associations, and is supporting the renovation of religious buildings and properties (Climate strategy of Kispest, 2020). The local NGO, Energy Efficient Wekerle, as a grassroots organisation promotes energy efficiency, especially in the district of Wekerletelep. Among other things, it is possible to ask for professional advice on technical building energetics and to rent a thermal camera. (See also EN4)

In Budaörs, the municipality has supported the renovation of panel buildings, other apartment buildings and detached houses. In the past 10 years, despite the increase in population and housing stock, the energy consumption of the buildings has not increased (SECAP of Budaörs, 2020).

T5. Smart mobility and green mobility

How is this factor manifested in Hungary: Hungary's Clean Development Strategy puts a strong emphasis on green mobility. The plans include a more sustainable, greener, safer and better-connected transport, supported by high-tech infrastructure and based on the right balance between public and private transport, recognising everyone's right to make their own travel choices, while encouraging CO_2-emission friendly travel modes and serving the interests of all for cleaner and healthier air, less noise pollution and safer living spaces (ITM, 2021).

Electrification is an increasingly important part of the development. More and more electric buses are being added to the Budapest Transport Centre's fleet. In addition, the development of an interconnected tram network has made fixed-track transport even more accessible (humda.hu).

Since 2019, the government has also launched the Green Bus programme in Hungary, which specifically aims at greening mobility, for example by supporting major cities with electric bus tenders (humda.hu).

The role of electric scooters and bike-sharing systems in transport is growing, making it easier for consumers to access and use them. Car-sharing schemes are also growing in popularity (especially in the capital), with a large proportion of electric cars in their fleet.

Smart mobility is mainly supported by apps, which can help either in car transport (e.g.: avoiding traffic jams) or in community transport (transfer from bus to electric scooter).

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How the factor influences ENCI: Individual consumers are increasingly able to choose greener, alternative modes of transport. This can help individual ENCIs make a complete lifestyle change.

In this sector, it is particularly important that we can talk about multi-directional development, so that everyone can find the right tool for their needs, even with a combination of longer-term and micro mobility solutions (e.g. in Budapest, the car-sharing service pass includes a free bike-sharing service pass) (https://www.facebook.com/mollimobudapest/posts/978692159422037).

Affected ENCI types: Type 1, 2.

Local examples: The possibilities of the municipality of Kispest to reduce emissions from transport are limited, as most of the emission sources in the district are not the responsibility of the district, but of the capital. By encouraging residents to use public transport, promoting cycling and reducing emissions from the municipal fleet, the district's management can have a direct impact on transport emissions (SECAP of Kispest, 2018). In terms of sustainable transport, Kispest has made significant progress in increasing the share of cycling. Following the Cycling Kispest project in 2010, a larger project has been launched which looks at cycling as part of climate awareness and as a more sustainable form of public transport (Climate strategy of Kispest, 2020).

The difficulty for Budaörs is that, although it has a suburban rail link, a railway station is too far from residential areas to be more widely used. Cycling in the settlement is primarily a recreational activity, but the city has had a cycle path concept for quite some time (SECAP of Budaörs, 2020).

Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in Hungary: Hungary (and the wider Carpathian Basin) is one of the regions with above-average warming. The national increase of 1.23°C since the beginning of the last century is higher than the estimated global change of 0.9°C (ITM, 2020).

The frequency and intensity of extreme weather events caused by climate change are already increasing significantly and are projected to increase further. (The wettest year recorded by the Hungarian Meteorological Service since measurements began was 2010, which was also associated with huge floods, but extreme climate change is reflected in the fact that the driest year immediately followed in 2011, which resulted in a very severe drought) (ITM 2020a).

This is supported by calculations in the IPCC report published in August 2021. According to these projections, flash floods will increase in Hungary and surrounding areas (in Western and Central Europe), while drought damage and forest fires will also cause more and more destruction (Kiss, 2021).

How the factor influences ENCI: Both the current case analysis and GDI's previous work show that those proactive on environmental issues who are aware of the impacts of climate change are personally affected. From this perspective, the increasing impact of climate change is an opportunity for bottom-up ENCIs, as it is inspiring more and more local heroes in Hungary to engage in sustainable, community-building

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activities.

The social dimension of climate issues is closely linked. Sociological studies show that in Hungary, post-materialist values (including environmentalism) are generally less prevalent among the population than among citizens of Western European countries. However, research shows that this has changed in many respects since the system change, and that individual responsibility for the environment and belief in individual actions, which are essential for the development of ENCIs, have increased in Hungarian society (Schneider-Medgyesi, 2020). (For more details, see S3)

Affected ENCI types: As mentioned in the description, this factor acts as a basic, horizontal motivation and can facilitate the formation of **any type of ENCI**. In GDI, we are familiar with a number of different types of projects motivated by the recognition of the seriousness of climate change.

Local examples: The Municipality of Kispest is committed to tackling climate change, including by preparing SECAP and being a member of the Covenant of Mayors. Based on climate models, Kispest is likely to be most affected by heat waves, precipitation scarcity and extreme rainfall patterns. Due to sudden rainfall, protected buildings in the district (e.g. Wekerletelep) and other more sensitive areas could be damaged if the district does not provide drainage and seepage (Climate Strategy of Kispest, 2020).

Budaörs also joined the Covenant of Mayors, as a long-term commitment to climate protection and rational energy management. The city has also prepared its SECAP and climate strategy, which already addresses the issue of adaptation to climate change. The municipality is already facing many of the challenges of climate change, which are expected to worsen in the coming decades. These include flash floods resulting from heavy rainfall, summer heat waves, and storm damage (Climate Strategy of Budaörs, 2021).

EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

How is this factor manifested in Hungary: The share of renewable energy in Hungary has been increasing in recent years, but it is still lagging behind other EU countries. In 2020, the share of electricity generated from renewable sources was only 12 percent, about half of it solar and almost a third biomass-based. Although the country is not the most advantaged in terms of wind potential, there is still significant opportunity to develop it further. Hungary has good geothermal capabilities, but despite the potential availability, the use of geothermal energy is still limited (Hungarian Central Statistical Office).

In the long term, the country expects to make significant progress in the use of solar energy, based on the more suitable conditions in Hungary. This is also justified by the fact that in the neighbouring countries (Poland, Romania and the Balkans) wind and water power generation is the main focus, in line with local conditions, so in theory the expansion of solar power generation in Hungary could help to balance out energy production in the region (ITM 2020b).

The current energy crisis is an extreme illustration of how unused renewable resources are missing from the Hungarian energy system.

How the factor influences ENCI: Both the unrealised renewable potential and the centralised and

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inflexible structure of the current energy system are barriers to the formation and development of ENCIs, as there are fewer options. (For more details, see P1, P2, P7, and L1)

Nevertheless, this can also be seen as an opportunity, as there is plenty of potential (as a source) and relevance for the expansion of renewables. Now in Hungary, the main way forward would be to promote wind energy. Until then, solar, biomass and geothermal energy can be an option at both individual and collective level. Solar can be used to generate electricity and heat on an individual level and hopefully soon on a collective basis. Biomass heating can also be a solution at community level besides at individual level, as it can be fired more efficiently and in a cleaner way in a community heating plant, (there are already best practices that could be followed). Geothermal energy can be used mainly as heat in the Hungarian context, for example to support community agriculture.

The concept of energy communities has only just been integrated into national law, so small-scale community power plants have not been an alternative until now. These are currently not functioning due to a lack of legal regulation (see L1, L4, L6 for more details).

Choosing green electricity would be a good example of at least promoting reformative energy citizenship, but now consumers do not really have the option due to legal obstacles.

Affected ENCI types:

Hindering:

- Missing and gaps: type 1, 2, 5, 6, 7, 8.
- Missing green electricity: type 1, 3, 5

Supporting:

- Realising opportunities type 5, 6, 7, 8

Local examples: In Kispest, solar and geothermal energy offer a large amount of potential resources. The dense built-up areas and the fact that the district is bordered by other districts, significantly limits the scope for renewable energy investments. The potential can be realised through smart planning, with rooftop solar and geothermal wells could significantly increase the volume of local, environmentally friendly energy production by 2030 (SECAP of Kispest, 2018).

Budaörs has a number of locally available renewable energy resources, with solar systems already installed on the public buildings of the municipality. The settlement also has excellent geothermal potential, which has not yet been used, but will provide a potential source of renewable energy for local residents in the future (Climate Strategy of Budaörs, 2021).

The installation of solar panels on public buildings and other visible infrastructure elements in public spaces has an importance beyond themselves. As a visual element, they are an important awareness-raising and communication tool, enabling local authorities to communicate their commitment to innovation and sustainable, climate-conscious development at the same time (SECAP of Budaörs, 2020).

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EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Hungary: In Hungary, a specific issue related to pollution is visual pollution, which is a major obstacle to the deployment of wind energy.

Nuclear power generation now accounts for 15 per cent of primary energy use (2021) and the current trends in development continue to point towards the expansion of the Paks nuclear power plant. Both the waste fuel and the release of the warm cooling water back into the Danube are environmentally problematic. Moreover, the development would be supported by Russia, which is becoming an increasingly sensitive issue in the current political climate (Hungarian Central Statistical Office).

Around 40% of the Hungarian population use wood for heating, mainly in rural areas. Biomass is highly promoted in the current energy crisis, and although the country currently has enough, the heating value of freshly chopped trees is poor and promoting it is more environmentally damaging. Rural families with low incomes not only lack heating equipment that can provide proper heating, but the fuel used is typically not properly dried wood with a good calorific value. This leads to inefficient, poorly heated homes, which in turn raises a number of health issues locally (cold living quarters, mould). In addition, the particles emitted with smoke due to imperfect combustion also cause significant air pollution in the surrounding area (Feldmár, 2022).

How the factor influences ENCI: Wind energy related communication on visual pollution is further hindering the development of renewable energy communities (although regulatory barriers remain the main problem since 2014).

There is still strong support for nuclear power in the country, which is holding back the emergence of ENCIs as it centralises. However, it also contributes to the existence and development of movement-type ENCIs that are against nuclear energy (e.g. Greenpeace movements). (For more details see P1, P7.)

Insufficient heating is particularly present in rural areas and among families living in energy poverty. The current situation is an issue and motivation for several ENCIs. As the problem remains unresolved by regulation or other supportive measures, it promotes the creation of ENCIs, both in the local awareness-raising and lobbying directions.

Affected ENCI types:

Supporting:

- Nuclear plans and pollution – Type 9, 10
- Insufficient heating and local air pollution – Type 7, 8

Hindering:

- Wind energy and visual pollution – Type 5, 6, 7, 8

Local examples: Based on Kispest's greenhouse gas inventory, energy consumption and transport are the main sources of greenhouse gas emissions at the local level (similar to Budapest) (Climate Strategy of Kispest, 2020).

The geographic location, significant transport links, economic and regional centre character of Budaörs combine with a high degree of mobility. This increases the energy consumption, but also causes significant

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air and noise pollution. For households, the traditional practice of burning leaf litter should be mentioned, although it is difficult to quantify and is not included in the GHG inventory according to the SECAP methodology but it is a significant source of CO2 emissions and air pollution (SECAP of Budaörs, 2020).

EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in Hungary: Since Hungary is less well supplied with renewable energy sources and large-scale investments are rare, this conflict in its classic form as described here is less visible for now.

However, what may be related to this topic in Hungary is the large number of buildings with monument protection (or under other types of protection, e.g. urban design protection, architectural design protection), where the placement of solar panels and insulation are problematic. Solar panel installation is not impossible, but it is difficult and requires a unique approval process, which is not always granted. These buildings can only be insulated from the inside, per apartment, and windows can only be replaced with a custom-made version (Gajdics 2021 and ujhaz.hu, 22 august 2018.).

It is also worth mentioning that it is currently impossible to install a wind farm in Hungary, due to legal regulations. Among the reasons for this is the fact that no turbines can be built within 12 km of a municipal boundary, which makes the issue a kind of territorial conflict (*277/2016. (IX. 15.)*).

How the factor influences ENCI: Historic buildings typically cannot be fitted with solar panels and often cannot be insulated from outside. This is a clear barrier to the development of community-based ENCIs and may make it more difficult to create renewable energy communities. Making it impossible to install wind farms has the same hindering effect.

Affected ENCI types: Mostly 5 and 6 (municipality buildings) and 7 and 8 (e.g. community of condominiums)

Local examples: Wekerletelep is a neighbourhood of Kispest with a particularly high number of protected buildings, which are currently subject to legal restrictions on insulation. With this regulation, the current savings potential is small, does not bring significant reductions in consumption and in most cases does not meet the efficiency improvement levels required in the tenders. This is particularly important because the old buildings in Wekerle have the most significant heat loss in the whole district (SECAP of Kispest, 2018).

EN6. The impact of water resources in energy production and the increasing scarcity of drinking water

How is this factor manifested in Hungary: Although it may seem outdated, it is important to mention the 1988 protest against the hydroelectric power plant at Bős-Nagymaros on the Danube, Hungary. This event was one of the exemplary demonstrations of the time of the political transition and one of the origins of the Hungarian green NGO movement (tuntetes-archivum.hu).

One of the reasons behind anti-nuclear protests, already mentioned in the context of pollution, is that the

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cooling of the nuclear power plant is causing the warming of the Danube, which also creates a number of biodiversity risks.

Hungary has very good hydrological conditions. The domestic water supply per capita in our country is nearly 12,000 m^3/person/year, one of the highest in Europe. However, based on domestic run-off, the average is only 600 m^3/person/year. 95% of our water outflows come from abroad, so the vulnerability of our sub-watersheds is very high, in terms of both quantity and quality (Reich, 2019).

The protection of our waters is a shared responsibility, and in recent years, a number of initiatives have been built around this goal (e.g. CWC - City Water Circles project, LIFE in RUNOFF, LIFE MICACC).

How the factor influences ENCI: In Hungary, water has become a particularly important and symbolic issue, and both occasional pollution and other water-related events are receiving more attention. These issues typically stimulate social mobilisation and thus the organisation of ENCIs.

Initiatives organised to protect waters can make a major contribution to strengthening local communities, which is beneficial for the development of ENCIs. The preservation of water quality and quantity is also closely linked to more sustainable energy production and agriculture, and thus becomes an extra motivation for local communities.

Affected ENCI types: Type 9, 10 and also Type1, 2, 5, 6, 7, 8.

Local examples: In Kispest, the strategy mentions a number of water-related programmes and plans, such as the creation of rainwater collecting areas, the development of residential rainwater collection system and awareness raising on the topic. As an urban area, water management is also a priority here to reduce the heat island effect (Climate Strategy of Kispest, 2020).

Some water-related adaptation measures have already been implemented in Budaörs. The most significant is the construction of a retention basin, which is also important for flood protection and stormwater management in the Hosszúréti stream. (Climate Strategy of Budaörs, 2021).

Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Hungary: Hungary was among the first countries globally to turn its net zero emissions target into a legal commitment with the adoption of the Climate Protection Law in 2020. The Hungarian government has adopted seven strategies to guide Hungary's medium- and long-term energy and climate policy, most important being the National Energy and Climate Plan of 2020 and the National Clean Development Strategy of 2021 (IEA_Hungary, 2022).

Despite the many policies (strategies) adopted, only a few measures have been initiated. The above mentioned strategies have also received heavy criticism from independent experts (Energiaklub NETK véleményezés, 2020). Although the political will towards climate protection is seemingly present, there has been no separate responsible ministry for the environment or climate since 2010. The related issues are dispersed among several ministries managed by under-secretaries of state. A new ministry for energy was created in December 2022, but its focus is mainly on the provision of energy security.

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In Hungary mostly reformative types of ENCI are supported in the legal documents. Most of the EU regulations have been transposed into the Hungarian legislation, but in many cases these have been diluted or postponed several times (e.g. energy communities – see P2), or even a counter measure has been initiated – e.g. ban on installing wind power farms since 2014; making the excess solar panel produced electricity intake financially non-appealing to citizens or companies since 2022).

The Act on Electricity Supply was modified in 2021 to give green light to renewable energy communities either in the form of cooperative or non-for-profit company, but no real follow up activity could be seen apart from a funding scheme for a few experimental projects.

How the factor influences ENCI: The legal measures in general have an enabling effect on ENCI, but as explained above, in numerous cases the regulations are formulated in a way that it rather hinders the emergence of ENCI types. Most of the measures enable reformative type ENCIs in the form of providing funds to replace appliances by energy saving ones, installing solar panels, etc.

An additional hindrance towards ENCI is the fact that the wording of energy communities in the Hungarian legislation is not fully compatible with the EU requirements. RED II establishes energy communities not only to electricity – as is in the Hungarian version – but to all energy types (e.g. heat, bio fuel). Furthermore, in Hungary large companies are not excluded from the membership of energy communities, whereas the EU regulations suggest otherwise (EMLA, budapest.hu).

Affected ENCI types: Types 1, 3, 5, 6, 7 and 8.

Local examples: Although only a minority of the local authorities focus on ENCI related issues apart from the nationally compulsory minimum level – less than 200 municipalities have joined the Covenant of Mayors and a few hundred have other Climate Change and energy efficiency related strategies out of 3200 –, there are some very progressive ones supporting and enabling the evolution of ENCIs locally. In several cases (e.g. Budaörs and districts of Budapest) the local citizens, experts, NGOs and other stakeholders are involved in the strategy building processes as well as in the realisation of local projects.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in Hungary: "In many EU countries, including Hungary, there is a lack of political will towards an extensive mitigation of energy poverty, e.g. providing funding for the insulation of houses and installation of clean heating systems for the poor, who cannot do it on their own or cannot take on loans. Despite the regulations, there are no objectives to manage energy poverty in the national energy and climate plans, especially, when Hungary – with numerous other EU member states – struggle to reach its own national energy efficiency goals of 2020, and even more with the EU level objectives set for 2030." BW-MTVSZ-HU-Energypoverty-study_Energiaszegenyseg_2022marc_Life.

The relevant policies in connection to energy poverty have not yet been published in Hungary (Fit for 55 és az energiaszegénység, MEHI, 2023,).

For more reference on energy poverty related policies, please see sections P1 and P2.

Present legislative processes favour centralisation thus people living in energy poverty are even more vulnerable as the means the local authorities used to have to aid them diminish.

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An energy price cap was introduced to aid Hungarian households in 2013 (a 20% universal energy utility costs reduction for everyone, wealthy and vulnerable consumers alike), which did help the poor too, but it did not intend to solve the problem of energy poverty in general (Habitat, 2020).

Although there were some measures and funds for energy efficiency developments, the real vulnerable consumers were unable to receive such support, as the recipients had to have own contribution too.

There are some regulations to support families in 'Protected' status, e.g. disconnection moratorium for energy service companies towards families in social crisis during the COVID-19 period, but this did not apply for households with prepaid utility services (e.g. electricity), although the poorest families belong here.

There is no real focus on social inclusion presently, great amount of the work with vulnerable consumers in energy poverty has been left to religious organisations (Catholic Karitász, Hungarian Charity Service of the Order of Malta, Baptist AID, etc.) and NGOs, in many cases receiving considerably low funding from the central government.

How the factor influences ENCI: Most of the regulations hinder the emergence of ENCI as they do not enable social inclusion and the abolishment of energy poverty, as most of the measures are not available or appropriate for families in the greatest need. Furthermore, the legal framework, definition, and indicators for energy poverty are non-existent in Hungary, which gravely hinders any attempt to solve it.

Affected ENCI types: Types 1, 2, 7 and 8.

L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (inlc. rights for active participation of customers in the electricity markets)

How is this factor manifested in Hungary: Most of the rights relating to transparent information of users and rights for active participation of customers in the electricity markets (through guaranteed grid access, remuneration for energy fed into the grid, and demand response) are regulated in the updated and modified Electricity Act of 2007, which is based on RED (Renewable Energy Directive) and IEMD (Internal market in electricity). An additional specialty of the Hungarian legislation is that it only allows forms of cooperatives or non-profit companies in connection to Energy Communities.

An important step was the introduction of the Energy Efficiency Commitment Scheme in 2021 (Law no. CLX/2020) according to which energy suppliers are obligated to initiate energy efficiency measures based on the amount of energy they sell, and the investments must be realised at the end users (Felsmann, 2020 & Németh, 2021).

How the factor influences ENCI: As discussed in T1, the wording of energy communities in the Hungarian legislation as well as the limitations on membership in them are not fully compatible with the EU requirements. These discrepancies gravely hinder the development of ENCI as seemingly new energy communities could be set up any time, in practice none can be initiated.

Affected ENCI types: Types 1, 2, 3, 4, 7 and 8.

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L4. Bureaucracy and red tape

How is this factor manifested in Hungary: The formation of Energy Communities and acquiring the necessary permits – according to the Electricity Law of 2007 – require the involvement of an extensive number of authorities and administrative agencies. Furthermore, selling excess electricity back to the grid provides less amount of money per unit than buying extra from the grid, if needed, in the form of energy and grid use cost.

When applying for inverter capacity above 2.5 kW the possibilities are limited, and for capacity between 2.5 and 5 kW the option was even more difficult before April 2021. As 2.5 kW capacity is seldom enough for a household, the extra costs and administration puts extra burden on the applicants (EMLA, budapest.hu).

Another bureaucratic obstacle for energy communities is that they cannot derogate the rights of consumers, but at the same time all justifiable costs must be covered towards the energy suppliers, thus even if the members of an energy community do not use the grid, they still have to pay a relatively high grid usage cost. The legal term “justifiable cost” is not properly described in the relevant laws.

Due to the centralisation processes since 2010, a vast amount of authority was taken away from the municipalities, including building regulation and issuing local building permits, thus it is not always clear what requirements future renewable energy projects (e.g. energy communities) need to meet.

How the factor influences ENCI: The above-mentioned administrative burdens and uncertainty due to the not straightforward legislation hinder the emergence of some types of ENCI, and additionally some local building regulations create extra obstacles for individuals and communities wanting to be active and self-sufficient in relation to energy.

Affected ENCI types: Types 1, 2, 7 and 8.

L6. Support schemes for renewable energy sources

How is this factor manifested in Hungary: Energy and climate related strategies indicate funding as an important measure, but limited amount of funds is opened by the Hungarian government compared to other EU countries. Due to strong centralisation and continuous decrease in the available annual budget, local authorities experience increasing difficulty providing local support and funding to compensate the lack of central funds.

As mentioned in other sections, a central ban on initiating new wind energy projects was introduced in 2014, and although there have been several calls for solar energy funding, the recently introduced new takeover pricing of excess electrical power generated by household level solar panels does not favourably influence new installations.

As a motivating tool, if someone cannot apply for funding to install solar panels or other household energy efficiency related projects – e.g. due to exhausted funds – a 0% interest rate loan scheme was initiated in 2017.

In many cases – where national funding is unavailable – Hungarian municipalities can turn to the EU Commission’s direct funding schemes, such as ELENA, EIB, Urban Innovative Action (UIA), European City

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Facility (EUCF).

How the factor influences ENCI: The available funding opportunities in general support the emergence of ENCI, however, in many cases, the funding amount is too small or obtaining funding requires special skills that the average households do not possess.

Affected ENCI types: Types 1, 3 and 7.

Local examples: Due to the rather potent centralisation process by the central government, the budgets of the local governments are drastically cut, thus they do not have the means to launch local funding schemes to foster renewable energy.

Summary table

	Factors	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition	X			X		
	Multi-level energy governance structure of a country		X		X		
	Political support for ENCI (mechanisms, networks, etc.)	X					
	Political/democratic culture and traditions	X					
	Inclusion and empowerment policies	X					
	Political vision on the future of the national energy system	X			X		
ECONOMIC	General economic situation / Inflation rate & purchasing power		X				
	Energy prices	X					
	Energy market		X				
	Energy taxation, state aid, fuel subsidies				X		
	Financing and investment opportunities	X					
	Green industry development and green job creation		X				

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SOCIAL	Level of income / wealth disparity and energy poverty		X			X	
	Energy literacy, awareness and skills	X					
	Citizen engagement and passivity in society	X					
	Trust in institutions and collective endeavours	X					
	Social norms, attitudes and perceptions towards energy-efficient products, services, technologies and appliances, and towards social innovation		X				
TECHNOLOGICAL	Availability of technologies for the decarbonisation of the energy sector and renewable energy				X		
	Decentralised energy system and storage	X					
	Digitalisation of the energy system		X		X		
	Energy efficient buildings		X		X		
	Smart mobility and green mobility					X	
ENVIRONMENTAL	Climate vulnerability						X
	Availability of resources	X			X		
	Pollution			X	X		
	Conflicts and opportunities about land use for renewable energy		X				
	The impact of water resources in energy production and the increasing scarcity of drinking water					X	
LEGAL	Legal framings of ENCI forms	X					
	Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion	X					
	Rights and duties of consumers, prosumers and new producers in interaction with energy market		X				
	Bureaucracy and red tape		X				
	Support schemes for renewable energy sources				X		
	Total factors per level of barrier/support	**14**	**11**	**1**	**10**	**3**	**1**

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Conclusion

To summarise the results, the biggest barriers to the development of ENCI in Hungary originate from the realm of political decision-making and legal regulations. Although various national strategic documents (for example, the National Energy and Climate Plan and the National Clean Development Strategy) clearly follow the principles expressed by the European Union, in some instances, some of these national documents lack the very same ambition, and are not transported with enough details into practice in the Hungarian legislation and policy. In addition, the political communication is also often inconsistent.

One of the main specific barriers is the fact that although the RED II Directive has been transposed into Hungarian law, the lack of detailed regulation currently makes it impossible to establish an energy community in the country. Providers are unable to account for the collective consumption of a community through a single meter, and the desirable legal form of energy cooperative itself has not been developed.

Another very important overall obstacle is that the central government continues to favour centralisation processes rather than the desirable decentralisation, which would be crucial for ENCI. This is reflected, among other things, in the continuous degradation of the meaning of municipal autonomy, the authority of municipalities has been continuously narrowed in the past decade. According to the government's energy policy, the further development of the Paks nuclear power plant is viewed as the main solution to national energy security, while the installation of new wind power generators is legally impossible and solar panels are almost discouraged financially.

In addition to all this, a very important factor is general uncertainty, as the government with a two-thirds majority in parliament can, and does, change even constitutional regulations overnight. An example of this was when the government implemented a multiple increase in utility bills for municipalities in a short period without consultations in the middle of the energy crisis. This uncertain environment hinders business investment and long-term planning, which are essential for ENCIs.

One of the opportunities is that knowledge about climate change is becoming more widespread in Hungary as well. The country is currently among the more fortunate in terms of climate change impacts, but storm damages and heat island effects are being felt more and more. Personal involvement can also create a stimulating environment for ENCIs. The current energy crisis has also raised the level of energy awareness among the population, as rising utility prices have forced many people to pay more attention to these issues and to save.

There are perhaps three areas where progress can be highlighted. The first is the development of energy efficiency in buildings, where progress has been made both in the municipal sector (in the form of funding for energy projects) and in the business sector (green certified buildings).

The other is green and smart mobility, where there are ongoing developments at national level (development of suburban railways, spread of electric car chargers, construction of hydrogen truck park, and increase in the popularity of shared micro mobility devices). This is a fortunate area because it involves few sacrifices in terms of convenience.

The third is related to water management. Residential and small-scale public tenders and investments in rainwater retention are becoming increasingly common and several awareness-raising projects on water have been started in recent years. This knowledge can also contribute to the development of a conscious

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citizens and a holistic approach.

ENCI initiatives in Hungary are not in an easy position, and can often feel that they are going against the flow. However, as in other parts of the world, awareness raising, lifestyle greening and community building are becoming more and more relevant. Some kinds of systems are also becoming more and more accepted in Hungary, for example, in the field of mobility.

Perhaps, precisely due to the fact that ENCI initiatives in Hungary are often started from the direction of energy, they tend to take a holistic approach, addressing multiple aspects of sustainable lifestyles or somehow dealing with carbon-footprint. There is a stronger sense of community, where initiatives are successful, tightly knit communities are formed, typically with one or two leading characters.

It is also important that top-down initiatives can often succeed because of the low level of proactivity in post-socialist society. These top-down initiatives are essential, because they can often provide the missing initial push that is natural in Western societies, which can start a resident on the path of becoming an active citizen.

The current energy crisis certainly shows that the largely import-based and centralised Hungarian energy system is risky from an energy security perspective. This will fortunately translate into a move towards decentralisation and the strengthening of local community organisations.

Although the institutional building structure is already on the path to renewal, residential buildings are much more energy inefficient and community energy initiatives are not yet able to develop due to legislative gaps. Significant support for household energy improvements would be needed to reduce emissions from buildings nationwide. If this is complemented by the decentralisation of the energy system, ENCI cases could start on the right path forward.

The most important transformation to support progress would be the detailed preparation of legislation related to Community Energy Initiatives.

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10. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN IRELAND

Authors: Dean Phelan, Benjamin Schmid, Frances Fahy, Rebecca Corless (University of Galway)

Introduction

In Ireland, citizen and community engagement in climate action and the decarbonising of the energy sector is a cornerstone of the national Climate Action Plan (2021). Energy communities play a central role in realising this. These energy communities are closely linked to their conceptualisation in Irish energy policy. This conceptualisation was defined in the Irish Government's (2015) "Energy White Paper on Ireland's Transition to a Low Carbon Energy Future 2015-2030", where they were identified as one of the country's key pillars to achieve its climate targets. In order to support the emerging Sustainable Energy Communities (SEC) movement, the Sustainable Energy Authority Ireland (SEAI) created the Sustainable Energy Communities Network. These SECs play a key role in promoting energy citizens within a community framework.

According to the Environmental Protection Agency (EPA), since 2011 Ireland's Greenhouse Gas (GHG) emissions have trended upwards, peaking in 2018. The largest source of emissions is agriculture, which accounts for 37.1% of total national emissions in 2020. After this, the transportation sector represents 17.9% of total 2020 GHG emissions, with energy accounting for 15% of emissions. The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to reach a legally binding cut in emissions of 51% by 2030 compared to 2018 levels, with a target of net-zero emissions by no later than 2050. Ireland's national climate objective requires the government to pursue and achieve the transition to a climate-resilient, biodiversity rich, environmentally sustainable and climate-neutral economy by the end of 2050. These targets and objective are aligned with Ireland's obligation under the Paris Agreement and with the European Union's objective to reduce GHG emissions by at least 55% by 2030, compared to 1990 levels and to achieve climate neutrality in the European Union by 2050 (Climate Action Plan, 2021: 21).

In recent years, citizens have gained a prominent legislative role in relation to energy use. Of particular importance to this shifting role was the Clean Energy for all Europeans Package, which set out to empower consumers through enabling and facilitating individual consumer engagement in energy activities and in the development of energy communities. From this package, two directives are being transposed into Irish law, the Electricity Market Directive (IEMD) and the EU-Renewable Energy Directive (REDII), both of which lay out a variety of rights, entitlements and obligations for consumer participation in the energy sector.

In Ireland, decision-making power on energy policy is strongly centralised with the national level holding key competencies. Nevertheless, subnational governments, especially the 26 counties, still play an important role in energy governance through their functions in spatial planning, community development and in implementing national policies. The counties are the main subnational administrative units and governed by elected county councils. Therefore, this report covers two counties in addition to the national level, as "local/regional" examples, namely Tipperary County and Galway City County. Selection of these two counties was based on i) ensuring that both a rural (Tipperary) and urban (Galway City) county was covered and ii) synchronising these examples with case studies of energy citizenship conducted as part of

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the Horizon 2020 EnergyPROSPECTS project. Two of the case studies, Energy Communities Tipperary Cooperative and Galway Energy Cooperative are located in the two included counties.

Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)

How is this factor manifested in Ireland: In line with the EU's objectives for reducing GHG emissions and achieving carbon neutrality, Ireland's national climate objective requires the State to pursue and achieve the transition to a climate-resilient, biodiversity rich, environmentally sustainable and climate-neutral economy by no later than the end of the year 2050. The Climate Action and Low Carbon Development (Amendment) Act 2021 commits Ireland to reaching a legally binding target of net-zero emissions no later than 2050, and a cut of 51% by 2030 as compared to 2018 levels (House of the Oireachtas, 2021). In the past 4 years, the Irish Government has increased the country's ambition in relation to emission reductions, renewable energy and energy efficiency. In line with these ambitions, there have been significant changes to Irish climate and energy policy. The Climate Action Plan 2021 sets out the actions needed to deliver Ireland's climate targets, with indicative ranges of emissions reductions for each sector of the economy. The plan sets to reduce CO2eq. emissions from the electricity sector to a range of 2 to 4 MtCO2eq. by 2030 through targets that include: increasing the share of electricity demand generated from renewable sources to 80% by 2030; generating at least 500 MW of these renewables through local community-based projects; expanding and reinforcing the grid; delivering three new transmission grid connections or interconnectors to Northern Ireland, Great Britain, and the EU; and ensuring that 20-30% of system demand is flexible by 2030.

How the factor influences ENCI: Central to the Irish Government's plans to reach their climate targets is to foster collaboration between government, businesses, communities and individuals to implement policies, infrastructures, systems and technological innovations (House of the Oireachtas, 2021). Through the National Dialogue for Climate Action (NDCA), the Irish Government hopes to empower everyone in society to help reduce Ireland's carbon emissions by: improving climate literacy; funding, supporting and enabling active climate action at local and national level while promoting self-efficacy (empowering the public to adopt more sustainable behaviours); and conducting social and behaviour research to capture insights.

Affected ENCI types: The increased importance given to citizen engagement within climate and energy policy in Ireland holds the potential to boost multiple ENCI types, including: type 1, 2, 3, 7, 8 and type 9.

Local examples:

Galway City: Galway City Council (GCC) relies on two key planning strategies in setting its energy policy, i) the Climate Adaptation Strategy 2019-2024 and ii) the Galway City Council Development Plan 2017-2023. A new Development Plan (Galway City Development Plan 2023-2029) was recently adopted and came into effect in early 2023.

The Climate Adaptation Strategy (2019-2024) does not include any quantitative targets related to energy-

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related measures but formulates the procedural goals to "integrate climate change and the 'Climate Adaptation Strategy' (and mitigation) into the 'City Development Plan'" (p. 78). Furthermore, one of the four main goals of the strategy is to "increase the resilience of community services to climate change by planning and implementing appropriate adaptation measure". This translates to the targeted action to "identify funding streams for local climate action projects and support communities and voluntary sector in developing and implementing climate adaptation projects at local level." (p. 91).

The Galway City Council Development Plan 2017-2023 included the policy aims to "promote and facilitate the development of renewable sources of energy within the city, and support national initiatives, in conjunction with Galway Energy Agency (GEA) and other agencies, which offer sustainable alternatives to dependency on fossil fuels and a means of reducing greenhouse gas emissions, subject to the avoidance of unduly negative visual and environmental impacts, or impacts on residential amenity." (p. 134) and to "increase the energy performance of future buildings in the city by encouraging energy efficiency and energy conservation in the design and construction of development" (ibid).

The new Galway City Development Plan (2023-2029) dedicates an entire chapter to climate action (p. 42-60) and formulates a wide set of objectives ranging from "support[ing] a successful transition to a circular economy" to "support[ing] […] the national objective of the legally binding path to net-zero emissions no later than 2050, and to a 51% reduction in emissions by the end of 2030" to the "development of renewable energy infrastructure". Of particular note are the objectives of "support[ing] the designated decarbonisation zone (DZ)" and "support[ing] energy master plans produced by sustainable energy communities in Galway City" (p. 51). According to the National Government Climate Action Plan, each local authority has to identify a DZ, i.e., a spatial area where a set of climate action measures are identified to address low-carbon energy, GHG emissions and climate needs and reduce GHG emissions by (at least) 7% per year from 2021 to 2030 (a 51% reduction in this decade) (p. 51)

Tipperary County: Tipperary County Council's (TCC) Climate Adaptation Strategy (2019) states their aim of making the county more resilient in the face of Climate Change while empowering communities through increased climate awareness via the Tipperary Public Participation Network (TPPN). A PPN is a network that allows local authorities to connect with community groups around the country. The Public Participation Network is the 'go to' for all local authorities who wish to benefit from community and voluntary expertise in their area. Accordingly, the Tipperary PPN is a collective of all the community, voluntary, social inclusion and environmental groups in Tipperary.

TCC's Tipperary County Development Plan 2022- 2028 dedicates an entire chapter to "Low-Carbon Society & Climate Action", in which a set of 11 planning objectives are formulated (p. 46f.). They include to "[s]upport and facilitate the implementation of European and National objectives for climate adaptation and mitigation" and "to encourage and support community energy schemes, and ways to incorporate energy efficiency and renewable energy development at the community level, though micro-generation, auto-production and investment in commercial energy production".

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P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy and the commitment to the involvement of local government)

How is this factor manifested in Ireland: The Irish Government's plan to achieve carbon neutrality involves a collaborative effort between many different stakeholders, including both national and local government, businesses, communities, and individuals. Generally, local governments in Ireland have little autonomy when compared with most other European countries (Ladner et al. 2021). Accordingly, climate and energy policy are set at the national level. Nevertheless, local government have decision-making powers in relation to certain functions, namely: land use, planning and development; and housing. As such, local authorities have a role to play in increasing energy efficiency, specifically in relation to the National Retrofit Plan, in which the Irish Government has committed to retrofit 500,000 homes by 2023 and install 680,000 renewable energy heat sources in both new and existing residential buildings. The Irish Government's current Energy White Paper on Ireland's Transition to a Low Carbon Energy Future 2015-2030 (Department of Communications, Energy and Natural Resources, 2015), lays out their vision for the Irish energy system to become increasingly decentralised while shifting traditional assumptions about energy supply. Such a shift will necessitate a change in the mindsets of individual consumers, businesses, agencies and utility companies. This Energy White Paper explicitly highlights the role of all citizens as "energy citizens", and the active role that they will play in increasing energy efficiency and renewable energy projects. It also aims to allow communities opportunities to work with local government and energy agencies to develop community renewable energy and energy efficiency projects.

How the factor influences ENCI: The Irish Government's commitment to decentralising the energy system in Ireland through enabling and supporting citizen-led renewable energy production, along with their commitment to enhance citizens' capacities to achieve energy efficiency through climate literacy programmes and the National Retrofit Plan, both provide opportunities to support the development of ENCI.

Affected ENCI types: The multi-level energy governance structure of Ireland affects all 10 types of ENCI, particularly types 2 and 7, as it enables the development and support of ENCI through allowing citizen-led renewable energy production and the enhancement of energy efficiency.

Local examples:

Galway City: As part of GCC's action plan as set out in their Climate Adaptation Strategy, it will identify funding streams for local climate action projects, and support communities and the voluntary sector in developing and implementing climate adaptation projects at local level.

Tipperary County: In TCC's Climate Adaptation Strategy, it commits to ensuring that all TCC social housing stock is equipped for current and future climate impacts, and that TCC will update the information given to tenants, including how to minimise climate emissions.

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P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in Ireland: Despite lacking a political culture that strongly supports citizen-led energy efficiency or generation and ENCI more broadly, the Irish Government has been increasingly recognisant of the importance of citizen participation and energy citizenship in recent years. Following the publishing of the Energy White Paper on Ireland's Transition to a Low Carbon Energy Future 2015-2030 (Department of Communications, Energy and Natural Resources, 2015), in which commitments were made to support community engagements with national and local government, the SEAI launched the Sustainable Energy Communities (SEC) Network to support the nationwide movement of Sustainable Energy Communities (SECs). According to a 2020 report by the Irish Environmental Protection Agency (EPA) (Watson et al., 2020), this recent interest from policymakers in the role of citizens in the energy transition is viewed in two main ways: a way to speed up project development through enhanced citizen understanding and acceptance; and "a basic right that leads to collective action, inclusion, empowerment, transparency, and accountability" (Oxenaar, 2021: 6).

How the factor influences ENCI: Until recently, ENCI has received very little political support in Ireland with only limited development occurring for community-generated energy, and a dominance within the renewable energy sector by large-scale commercial providers focusing on wind energy. However, the increasing political support and recognition of ENCI through a string of recent policies and legislation, as well as governmental mechanisms to enhance and propagate citizen participation in the energy transition, offer opportunities for individual and community ENCI to benefit from additional support being made available at national and local level.

Affected ENCI types: ENCI is supported in relation to types 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples:

Galway City: GCC are developing a Climate Change awareness campaign through a Public Participation Network (PPN) and collaboration with schools and relevant agencies. The aim of this campaign is to not only inform the public of the impacts of Climate Change locally, but to help identify adaptation and mitigation priorities through stakeholder consultation processes.

Tipperary County: The Tipperary Energy Agency (TEA) was established in 1998 by TCC and Limerick Institute of Technology. TEA enables communities, businesses, and local government to deliver and achieve renewable energy projects such as the Templederry Community Wind Farm and the Cloughjordan Ecovillage. The TEA demonstrates how local leadership can engage ENCI to deliver long-term benefits for communities.

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in Ireland: Energy communities form one of the main pillars of the Irish Government's plan to achieve their Climate Change targets as outlined in the 2015 Energy White Paper. Within Ireland, the central manifestation of energy communities are the SECs which are understood as partnerships between public, private and community sectors whose goal is centred on renewable energy or energy efficiency. To support these, the SEAI created the SEC Network to address and promote energy

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citizens within a community framework. Alongside governmental measures to develop energy communities, other intermediary organisations have also worked towards the development of energy communities in Ireland, such as Energy Co-Operatives Ireland who aim to build networks for renewable energy cooperatives as part of a Europe-wide movement. In addition to cross-sectoral energy communities, the National Retrofit Plan has also opened space for participatory and deliberative practice through policy through citizen-led renovation initiatives.

When it comes to political/democratic culture overall, 45% of Irish citizens state that they are confident that they have a say in government decision-making, representing an average value among the Organisation for Economic Cooperation and Development (OECD) countries (OECD, 2023).

How the factor influences ENCI: Although the Irish community energy movement is relatively small, the Irish Governments political commitments to energy democracy is increasing and with it, so too are the number of communities and cooperatives being set up and the number of citizens that are able to engage with them. These energy transition initiatives stemming from the hybrid institutional sphere offer beneficial opportunities for the development and emergence of ENCI through information sharing, support in the assessing and planning of projects, accessing financial support, and in building collaborative networks which enable growth.

Affected ENCI types: All of the ten ENCI types are affected by energy democracy, with eight of the types being affected in terms of citizens' agencies and capabilities to engage with the Government's transition to carbon-neutrality, while the remaining two are impacted through the development of a previously limited democratic culture in relation to energy. This is something that citizens may be able to continue to expand in future in relation to types 6 and 10.

Local examples:

Galway City: Galway Energy Co-Operative is a participating SEC with the SEAI in Galway City that offers a consultancy service to local communities in relation to retrofitting and heating systems, as well as engaging in collaborative renewable energy projects.

Tipperary County: The Energy Communities Tipperary Cooperative (ECTC) is a citizen-led home insulation upgrade and retrofitting organisation that is a designated SEC by the SEAI. The ECTC leverages funding from the SEAI to provide a service to assist local communities in getting grant aid, sourcing suitable contractors, and overseeing projects for homeowners, while working with local Credit Unions as their financing partners.

P5. Inclusion and empowerment policies

How is this factor manifested in Ireland: In addition to the goal of transforming Irish citizens from "passive consumers" to "energy citizens", the Irish Government also set out to ensure that the transition to carbon-neutrality is fair, just, and that the costs are shared equitably, with policies aiming to protect the most vulnerable communities in Irish society. Such a just transition has been defined by the National Economic and Social Council (NESC) as "*one which seeks to ensure transition is fair, equitable, and inclusive in terms of processes and outcomes"* (2020: 77). This committal to ensuring a just transition is

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written into several key climate and energy policies and measures, such as: the Climate Action Plan 2021; the appointment of a Just Transition Commissioner; the Climate Action and Low Carbon Development (Amendment) Act 2021; and the establishment of a range of financial supports for the Midlands region in its transition away from peat harvesting for power generation. The Midlands region in Ireland is given particular consideration in climate and energy policy as it is the first region to have been directly impacted by the energy transition due to the cessation of peat extraction for power generation, a practice that is highly concentrated in this region. Significant resources have been committed to a programme of investment and support in the Midlands region, including a Just Transition Fund to assist local communities and businesses, the Midlands Retrofit Programme to retrofit social housing, a Midlands retrofitting one-stop-shop service, investment in reskilling and training across the region, and investment in renewable energy infrastructure and community participation by the SEAI, Bord na Móna and the Electricity Supply Board (ESB).

How the factor influences ENCI: The commitment to delivering a just transition holds the potential to engage vulnerable communities in ENCI through offering additional financial, educational, and technological supports to communities that have previously been passive in relation to the transition. The governmental objective to support ENCI will help to expand the extent of ENCI in Ireland through measures aimed at enhancing energy literacy, reducing energy poverty through grants and investments, and boost citizens' political participation in the energy transition through initiatives like the National Dialogue on Climate Action and online platforms such as the Climate Conversation portal.

Affected ENCI types: The ENCI types affected by Ireland's inclusion and empowerment policies are: types 1, 2 , 3, 4, 5, 7, 8 and 9.

Local examples:

Galway City Council: GCC commit to assessing the vulnerability of GCC's social housing stock to climate related events, and review their maintenance and repair standards, procedures and frequency for their housing stock. Through upgrading and retrofitting its social housing stock, the Galway Co-Op Housing Development Society aims to increase energy efficiency among its tenants while increasing its use of sustainable energy within its co-op. The Galway Co-Op Housing Development Society is supported as a SEC by the SEAI.

Tipperary County: In January 2023, the Community Climate Action Programme: Climate Education, Capacity Building and Learning by Doing initiative was launched which aims to build the capacity of trainers from Tipperary's five municipal districts to better engage with communities to take meaningful action on climate to support a just transition through community-led local development.

P8. Geo-political challenges (COVID, war in Ukraine, gas and oil supply)

How is this factor manifested in Ireland: Following Russia's invasion of Ukraine, energy costs in Ireland have risen significantly with 29% of Irish people now living in energy poverty, the highest percentage ever recorded in Ireland (Economic and Social Research Institute, 2022a). In a time of increasing inflation and a worsening cost of living crisis, many Irish people are concerned that they are unable to afford their energy bills. Of the 1,017 people interviewed in Ireland for the Summer Eurobarometer 2022, 33% of interviewees

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listed “inflation/ rising prices” as one of their 2 most feared consequences of the war in Ukraine. Further, 91% of Irish interviewees agreed that the war in Ukraine has had serious economic consequences for Ireland, with 68% believing that it has had serious financial impacts for them personally. In response to the rising cost of energy, the Irish Government announced a series of measures under Budget 2023 to assist Irish households and businesses in meeting the rising cost of energy, including a €4.1 billion package of one-off measures. Under this package, 2.2 million households will receive a €600 electricity credit payment (Department of Environment, Climate and Communications, 2022a).

How the factor influences ENCI: There are potential opportunities for ENCI to be further developed following the war in Ukraine as a way to increase energy security by lessening Ireland’s dependency on imported non-renewable energy supplies. The heightened public consciousness of rising energy prices globally may also offer an opportunity to build on this momentum to further raise awareness on energy efficiency and sufficiency, as well as to better encourage people to participate in the National Retrofit Plan and the SEC networks, and to avail of the Clean Export Guarantee through micro- and small-scale energy generation (as discussed above in P1 and P2). However, the war in Ukraine also presents immediate threats to ENCI through reducing the economic means that people have to participate in ENCI.

Affected ENCI types: The ENCI types affected by geo-political concerns are: types 1, 2, 3, 4, 7, 8 and 9.

Local examples:

Galway City: GCC provide information about the SEAI’s SECs, on how to apply for the scheme and on why SECs are important for Galway City, including stating that these community energy projects mean warmer, healthier homes and community buildings. They also explain that they improve quality of life, especially for the vulnerable in the community.

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Ireland: Despite significant wage growth amidst tight labour market conditions and a projected growth in GDP to above 10% in 2022 after full relaxation of pandemic-related restrictions, real incomes will be significantly impacted due to high inflation. Increased energy prices and serious supply chain constraints resulted in inflation reaching a record high of 9.6% in June 2022 (OECD, 2022). Yet, despite the rising inflation nationally, the Summer Eurobarometer 2022 showed that Irish interviewees held a more positive outlook in relation to their national economy than the EU average; with 47% of people in Ireland judging the national economy as “good”, compared to the EU27 average of 34%; and 51% judging it as “bad” compared to the EU27 average of 64%. Further, 81% of Irish interviewees judged their household’s financial situation as “good” compared to the EU27 average of 70% (European Commission, 2022).

How the factor influences ENCI: The general economic situation in Ireland holds both potential opportunities and threats to the development of ENCI. Firstly, continued high inflation rates, affecting real incomes nationally, the government’s Clean Export Guarantee and retrofitting grants, and a growing

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public awareness of the insecurity and unsustainability of non-renewable energy sources could allow for opportune conditions to successfully promote ENCI via state-supported retrofitting and literacy projects. However, diminishing (median) real incomes and the additional financial burden placed on low-income households by growing inflation rates will further weaken consumer spending meaning that many people will be unable to afford the upfront costs associated with installing solar panels or retrofitting their homes.

Affected ENCI types: ENCI is affected in relation to types 1, 2, 3, 4, 7, 8 and 9.

Local examples:

Galway City: In January 2023, Galway County was experiencing the highest inflation rates in Ireland, largely due to the cost of housing. The increased inflation rate of 22% across the county, combined with Galway City's status as the most expensive area in the country for accommodation and nationally shrinking (median) real incomes mean that inhabitants of Galway City are increasingly likely to be faced with energy poverty.

EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in Ireland: As of 2018, Ireland has become increasingly import dependent for energy as the Corrib gas field continues to reduce in size faster than Ireland is developing new renewable energy sources. In 2021, Ireland's dependency on imports for energy was 80%, ranking Ireland as the 8th most import dependent country of the EU's 27 member states. Ireland's dependency on imports for energy, combined with its high dependence on fossil fuels for electricity generation and the fuel mix used for its electricity generation, contribute to the steep rise in electricity prices in Ireland, particularly since the beginning of 2021 (Sustainable Energy Authority of Ireland, 2022). The most recent figures by the SEAI (2023a) show that electricity is significantly more expensive than other fuels at €26.45 per kWh for households compared to €12.58 for oil (kerosene), €8.51 for gas, and €11.78 for wood pellets. Throughout 2022 inflation levels continued to rise in Ireland, with energy and consumer price inflation at 48% and 9.6% respectively in October of that year. The escalating price of energy and other essentials has had a disproportionate impact on poorer households; specifically youths, elderly and lone parents (OECD, 2022). Despite offering long term savings, home retrofitting does not offer immediate financial relief, with REScoop.eu (Oxenaar, 2021) estimating the average home retrofit at costing between €25,000 and €75,000.

How the factor influences ENCI: Although the rising cost of non-renewable energy might act as an incentive for some people to begin micro-generating renewable energies or completing other retrofitting work in their homes, many Irish homeowners are unwilling to invest in sustainable renovation measures due to the high cost of retrofitting work (Oxenaar, 2021). The drastic increase in energy poverty in Ireland is likely to further worsen this threat to ENCI, although as was discussed above in EN1 there is also an opportunity for ECNI to be promoted and further developed through financial supports for retrofitting and climate literacy programmes.

Affected ENCI types: ENCI is affected by energy prices in relation to types 1, 2, 3, 4, 7, 8 and 9.

Local examples: According to the most recently available Central Statistics Office (CSO) data (2016), the primary fuel used for domestic heating in both Galway and Tipperary is oil, at 58.6% and 60.3%

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respectively. Given that oil is the second most expensive energy source in Ireland and that its cost is rising as a result of government carbon taxes and the shortages in supply due to the war in Ukraine, citizens of both locations are likely to experience additional financial burden.

EC3 Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in Ireland: In order to help meet Ireland's climate target of generating 2.5GW of solar renewables as set out in the Climate Action Plan, the Irish Government launched the Micro-generation Support Scheme in January 2021. This scheme has seen the (supply-side) liberalisation of the energy market through offering support to homeowners and businesses to generate their own renewable energy. In addition to offering grants for Solar PV installation to both domestic and non-domestic applicants, the Irish Government also signed legislation giving effect to the Clean Export Guarantee (CEG). Prior to this tariff, homeowners and businesses were not remunerated by energy providers for any excess energy that they fed back into the grid. In 2023, the SEAI will assess extending grant supports to other eligible technologies such as micro-hydro, micro-wind and micro-renewable CHP (Department of Environment, Climate and Communications, 2021).

How the factor influences ENCI: The (supply-side) liberalisation of the energy market in Ireland via frameworks such as the Micro-generation Support Scheme offers great opportunity to develop ENCI while simultaneously assisting the Irish Government in achieving their climate targets. Through offering financial support in the form of grants to Irish households and businesses for Solar PV installation, and by forcing Irish energy suppliers to pay households and businesses for the energy that they are feeding into the grid, the Irish Government are better enabling ENCI through financial empowerment.

Affected ENCI types: ENCI is affected by the liberalisation of the energy market in relation to types 1, 2, 3, 4, 7 and 9.

Local examples:

Tipperary County: Community Power is Ireland's first community owned renewable electricity utility company. Community Power is a partnership of community energy groups that developed out of Ireland's first community owned windfarm; Templederry Wind Farm in County Tipperary.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in Ireland: In 2010, Ireland introduced the carbon tax which is applied to carbon-emitting fuels such as peat, coal, oil and natural gas. This carbon tax is intended to reduce Ireland's carbon dioxide emissions and is considered to be an important tool in combatting Climate Change (Economic and Social Research Institute, 2022b). Beginning at €15 per tonne of carbon dioxide emissions from gaseous and liquid fuels in 2010, the tax was then applied to solid fuels at a lower rate in 2013. The Irish Government has committed to progressively raising the carbon tax year-on-year to a goal of €100 per tonne in 2030, while using the revenue to finance climate-related investment, prevent energy poverty and

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ensure a just transition (OECD, 2021). In Budget 2023, there was an increase in the rate from €41 per tonne of CO_2 to €48.50 per tonne of CO_2 emitted by fuel. Carbon taxation brings about long-term benefits by reducing the impacts of Climate Change and its associated costs through reducing demand for energy-intensive goods.

How the factor influences ENCI: Through progressively raising the cost of the carbon tax year-on-year, the emergence of ENCI is supported by fiscal measures. However, the impacts of this raising tax rate are disproportionately felt by households, with the added expense increasingly pushing economically disadvantages communities and individuals further into energy poverty (ERCI, 2022). Although Budget 2023 announced a €600 electricity credit payment to ease the financial strain on households and businesses, the overall increase in energy prices has further disempowered disadvantaged individuals and communities who are not yet able to avail of the government's other supports for transitioning to carbon-neutrality. Yet, the raising costs from the carbon tax are likely to enhance ENCI through encouraging energy efficient practices, and providing additional financial incentives to those who can afford to transition to greener energies.

Affected ENCI types: The ENCI types affected by Ireland's economic policies are: types 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples: Neither Galway City Council nor Tipperary County Council provide grants or any other economic policy instruments for energy related improvements.

EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Ireland: In Ireland, there has been an increase in recent years of funding programmes becoming available with the potential to support ENCI in different ways. Specifically, many of the national funding programmes centre around grant schemes for household retrofitting, with information campaigns generally focused on encouraging householders to avail of grants for renewable energy and energy efficiency improvements. In recent years, this grant aid has been offered through a number of SEAI schemes to encourage households to engage in energy efficiency upgrades such as Solar PV systems, captivity insulation, heat pumps, etc. Grant aid may be applied for by either individuals or as part of community schemes, and the grant rate awarded depends on a number of pre-defined criteria such as socio-economic factors and the age of the dwelling. Between 2000 and 2016, more than 370,000 homes received such grants for energy efficiency improvements (Goggins et al., 2019).

How the factor influences ENCI: The provision of funding programmes and grant aid undeniably offers tremendous opportunity to support the development of ENCI in Ireland through empowering households and communities to actively engage in the energy transition and to better improve their dwellings' energy efficiency. By providing grant aid for energy efficiency and renewable energy improvements, the financial burden of home retrofitting is lessened, thus making ENCI a more feasible goal for many people.

Affected ENCI types: Financial and investment opportunities affect ENCI types in Ireland such as 1, 2, 3, 4, 5, 7, 8 and 9.

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Local examples: As the Irish government make more financing programmes available to citizens to support ENCI, local authority and community organisations in both in Galway City and Tipperary County are informing and advising citizens on how to avail of funding supports. These organisations include Galway City Council, Tipperary County Council, Energy Communities Tipperary Cooperative, Tipperary Energy Agency, and Galway Energy Co-Operative Limited.

EC9. Raw material and resource prices

How is this factor manifested in Ireland: Ireland's housing stock is considered to be highly carbon intensive, emitting nearly 60% more CO2 than other countries due to a number of influencing factors such as: the high number of people per dwelling, with Ireland ranked as 5th highest in Europe in 2021 for persons per dwelling (Eurostat, 2023a); Irish homes are among the largest in Europe in terms of number of rooms per dwelling; detached and rural dwellings are common in Ireland (Ahern et al., 2013; SEAI, 2018); approximately 50% of Irish housing stock was built prior to 1979, thus they were built prior to the implementation of minimum insulation standard (Ahern et al., 2013); and oil, gas and solid fuels are extensively used for heating in the Irish building stock (Kerr et al., 2017). Given this, the cost of retrofitting the Irish built environment for renewable energy installations or energy efficiency upgrades is significant. According to RESCoop.eu (Oxenaar, 2021), the average home retrofit costs between €25,000 and €75,000. In 2017, the SEAI launched their "Deep Retrofit Pilot", with the average cost for a home renovation from F to A3 Building Energy Rating (BER) rating costing an average €54,000 based on a total of 325 renovations. Given the expense involved, the SEAI estimated that €35 billion will be required over the next 35 years in order to make Ireland's existing housing stock low carbon.

How the factor influences ENCI: Given the high carbon intensity of Ireland's housing stock, the significant costs of retrofitting Ireland's dwellings, the increasingly high rates of energy and consumer inflation in Ireland, and the lessening real incomes nationally, it is likely that without access to grant aid, the cost of retrofitting upgrades will prevent or deter Irish homeowners from engaging in ENCI through investing in sustainable renovation measures.

Affected ENCI types: As with the other economic factors, the ENCI types affected by raw materials and resources prices in Ireland are 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples: The Energy Communities Tipperary Cooperative CLG offers a one-stop-shop service for retrofitting to ease the difficulty in receiving grant aid, sourcing contractors and materials, and overseeing projects.

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Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Ireland: As the cost-of-living crisis in Ireland worsens and (median) real incomes fall, levels of energy poverty are reaching record highs. Working with a definition of energy poverty as a household spending more than one-tenth of their net income on energy, a recent ECRI (2022) report shows that 29% of households in Ireland now qualify as experiencing energy poverty; exceeding the 1994/1995 record high of 23%. Energy poverty is considered "the most significant negative social impact resulting from the inefficiency of the domestic sector", with the impacts of energy poverty affecting the physical and mental health of those experiencing it (Desmaris et al., 2019: 46). Energy poverty is worsened by the financial difficulties experienced by people due to the ongoing housing crisis in Ireland and the low energy efficiency of rental properties nationally. In Ireland, 17.2% of people live in rented accommodation (Eurostat, 2023b). According to the Central Statistics Office (2021), only 4.8% of rental properties in Ireland have a Building Energy Rating (BER) of A, with 12.6% rated as B, 31.8% rated as C, 35.6% rated as D-E, and 8.9% rated as F-G. The difficulties faced by people in relation to the cost-of-living crisis, the housing crisis, and access to energy supply were reflected in the Eurobarometer. When asked what they felt were the two most important issues facing Ireland, 65% of 1,017 interviews chose "rising prices/inflation/cost of living" (versus an EU27 average of 54%), 48% chose "Housing" (versus a 6% EU27 average), and 15% chose "energy supply" (versus 22% EU27 average) (European Commission, 2022).

How the factor influences ENCI: The worsening economic situation for residents in Ireland and the growing levels of energy poverty pose a serious threat to the successful development of ENCI. Diminishing real incomes, growing inflation rates, a worsening housing crisis, and record levels of energy poverty are likely to disempower citizens to engage in ENCI through lessening their capacity to invest in ENCI actions.

Affected ENCI types: Levels of income/wealth disparity and energy poverty affect the following ENCI types in Ireland: types 1, 2, 3, 4, 5, 7, 8 and 9.

S2. Energy literacy, awareness and skills

How is this factor manifested in Ireland: Following a successful piloting period between 2017 and 2019, a new structure was established for the National Dialogue for Climate Action (NDCA). Led by the Department of the Environment, Climate and Communications, the NDCA operates as an interdepartmental working group on citizen engagement and dialogue involving various governmental agencies and departments, with a secretariat appointed by the Environmental Protection Agency. The NDCA's purpose is "to create a comprehensive structure to support widespread public and stakeholder engagement on climate change, empower people across all of society to adopt more sustainable behaviours, and be a vehicle to facilitate public participation in the Climate Action Plan" (Government of Ireland, 2021: 60). In order to achieve this purpose, one of the NDCA's three key objectives is to improve climate literacy through creating awareness about Climate Change and to enhance public understanding of it. In line with this, action number 36 of the Climate Action Plan is to "build climate literacy through primary and secondary curriculum".

How the factor influences ENCI: As stated in the Climate Action Plan (2021: 62), "climate literacy involves

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empowering people to understand sometimes complex information about the climate. Improvements in climate literacy can best be achieved through the promotion of evidence-based communications and through the national education system. Improving climate literacy will enhance our capacity to make small changes in our daily lives, to engage with climate action at a local level, and to participate at national level in the co-design of policy". Therefore, through improving climate literacy there is great potential to support the development of ENCI among the public.

Affected ENCI types: All ten of the ENCI types are affected by energy literacy, awareness and skills. Eight of the types are affected in terms of citizens' agencies and capabilities to engage with the Government's transition to carbon-neutrality: types 1, 2, 3, 4, 5, 7, 8, and 9. The two remaining types, 6 and 10, are affected as enhanced climate and energy literacy, awareness and skills may help to develop a democratic culture in relation to energy.

Local examples:

Galway City Council: GCC aim to increase citizen awareness of the potential impacts from Climate Change events and how best to avoid or reduce damage to their homes.

Tipperary County: In TCC's Climate Adaptation Strategy, it commits to updating the information given to tenants, including how to minimise climate emissions.

S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in Ireland: This factor is manifested in Ireland in very similar ways to energy literacy, awareness and skills discussed in Section S2. Similar to the central role that climate literacy plays to the vision of the NDCA as one of its three key objectives, so too does citizen engagement. The second and third key objectives of the NDCA are:

- "Funding, supporting, and enabling active engagement in climate action at a local and national level, conducting public consultations, and promoting self-efficacy by empowering the public to adopt more sustainable behaviours.
- Capturing insights from engagement activities and conducting social and behavioural research to measure behavioural change and provide an evidence base to inform the Climate Action Plan and sectoral climate policies" (Government of Ireland, 2021: 60).

Central to most of the NDCA's work programme are activities to support people and stakeholders in taking an active role in delivering on climate action, including empowering people to make changes in their lives, providing funding for projects, running events, and promoting network and capacity building, with these activities happening at both local and national levels. At a national level, the NDCA is supporting, facilitating and coordinating a series of climate conversations, a youth climate assembly, an open public consultation, a national stakeholder forum, and plan to host a series of conferences and lectures. At the local level, the NDCA commits to allow local actors to share their ideas through participating in climate conversations hosted by the NDCA, provide financial support for local innovations, host annual local climate action conferences, and support networking and capacity building (Government of Ireland, 2021).

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How the factor influences ENCI: Through developing frameworks for active and meaningful citizen engagement in the energy transition process, both at national and local levels, Ireland is taking steps to support the emergence of ENCI despite a tradition of passive energy citizenship. The national level dialogues facilitated by the NDCA should allow for a diverse range of stakeholders and the public to communicate with each other and with policymakers, while the supports offered at local level should empower individuals and communities to take climate action.

Affected ENCI types: As with Section S2, all ten of the ENCI types are affected by citizen engagement. Eight of the types are affected in terms of citizens' agencies and capabilities to engage with the Government's transition to carbon-neutrality: types 1, 2, 3, 4, 5, 7, 8, and 9. The two remaining types, 6 and 10, are affected as enhanced climate and energy literacy, awareness and skills may help to develop a democratic culture in relation to energy.

Local examples: In 2022, Galway City Council (GCC) launched an application to the European Commission to become a 'Net Zero Pilot City', a move which would bring €1.5 million funding to implement innovative approaches to carbon reduction over a two-year pilot programme. With the main goal to increase the number of retrofitted buildings, the pilot proses a "Retrofit Accelerator Programme", which would seek to "upskill contractors, incorporate learnings from post-retrofit performance management, and support behavioural change to increase people's engagement around retrofitting".

In this endeavour, GCC collaborates with a number of academic, civil-society and governmental partners, including the Westside Sustainable Energy Community and the Galway Energy Co-operative.

S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Ireland: While Irish Government's Energy White Paper (2015) recognises that Ireland has well established processes for community engagement and consultation on infrastructure planning, it acknowledges that the approach used by certain public authorities and industry in the past has resulted in a lack of public trust in political institutions. In light of this lack of trust, the government has taken significant steps to ensure that large projects demonstrate in-depth community consultation, public engagement and that project planners demonstrate a thorough understanding of the affected communities' concerns. Yet, when interviewees were asked if they trust the Irish national government and the Irish national parliament, more Irish interviewees in the Eurobarometer reported lacking trust in both the national government and parliament than those who trusted them. In total, 46% of Irish interviewees trusted the national government, with 49% not trusting it, while only 44% of interviewees trusting the national parliament and 49% lacking any trust in them (European Commission, 2022).

How the factor influences ENCI: In order for Ireland to meet its climate goals and for citizens to be able to meaningfully engage with ENCI and benefit from the government's programmes and measures, citizen engagement is essential. However, as with many European countries, there is a lack of trust for political institutions in Ireland which poses a threat to the willingness of citizens to engage in the required processes. Consequently, the lack of trust in Ireland for political institutions may hinder the development of ENCI.

Affected ENCI types: All ten types are affected by trust and lack of trust in institutions. The lack of trust in

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political institutions in Ireland may impede the extent to which citizens and organisations engage in ENCI, while also potentially creating a public desire for political change.

S8. Social norms, attitudes and perceptions towards energy-efficient products, services, technologies and appliances, and towards social innovation

How is this factor manifested in Ireland: Within Ireland, the national energy policy is dominantly centred on technological innovation and change, with consumer participation traditionally assuming a passive role. The dominance of this traditional techno-centric problem framing is evident in a review of recent Irish Sustainable Energy Consumption Initiatives (SECIs) done by Goggins et al., (2019), which showed the number of SECIs according to their problem framing. Of the four framings identified, 25 national SECIs used a problem framing that focused on changes in technology, 15 SECIs focused on changes in individual behaviour, 9 SECIs focused on changes in complex interactions, and only 6 focused on changes in everyday life situations. This techno-centric approach echoes Irish government policy more generally, whereby technological solutions are sought for issues despite recent trends suggesting that such approaches alone are insufficient to deliver the needed reductions in residential carbon emissions.

How the factor influences ENCI: The over reliance, emphasise and expectation on technological innovation alone as offering solutions to energy-related issues is potentially damaging for the development of ENCI. Although some citizens may use such a problem framing as a pathway to achieve greater ENCI, for the most part such a narrow hyperfocus may hinder the development of widespread ENCI as the inaccessibility of such an approach and its rhetorical dominance may discourage individual and community engagement while encouraging passivity and inaction.

Affected ENCI types: This factor affects ENCI types in Ireland by impacting on the capacity for individual and collective action. As such, ENCI is affected in relation to types 1, 2, 3, 4, 5, 7, 8 and 9.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and off-shore wind, renewable hydrogen)

How is this factor manifested in Ireland: Ireland has committed to various goals as part of its transition to carbon neutrality, including the expansion of renewable energies. The expansion of renewable energy generation in Ireland has traditionally been dominated by wind power – a form of renewable energy generation that has largely excluded citizens due to the costs involved and the complexity of the planning process - while solar power accounted for only 0.01% of Ireland's total electricity generation in 2015. A key reason for the lack of electricity generation from Solar PV has been due to the technological issues of accessing the national electricity grid, something that is both time consuming and costly. Since the implementation of a new regulation in 2020, community projects such as the SEAI's designated SECs can now have grid connection for their community energy projects, with members of the SECs needing to be located near the projects (Frieden et al., 2020). In addition to offering grant aid to citizens and communities

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for Solar PV installation, the SEAI are expected to assess the viability of extending grant supports other suitable technologies in 2023, including micro-hydro, micro-wind and micro-renewable CHP (Department of Environment, Climate and Communications, 2021).

How the factor influences ENCI: Without access to the necessary technologies, citizens will be unable to generate their own renewable energy, nor will they be able to actively participate in the decarbonising of the energy sector more broadly. As the necessary technologies for the generation of renewable energies become more readily available, technologically possible, and financially viable with grant aid, this factor will play an increasingly important role in supporting the development of ENCI. A major obstacle to the realisation of citizen-owned wind energy are the risks associated with the planning and authorisation process, as this process involves high upfront costs, e.g. for environmental impact assessments, which are also associated with uncertain outcomes and little support if an approval is not granted.

Affected ENCI types: The ENCI types affected by this factor are types 1, 2, 3, 4, 5, 7, 8 and 9.

T2. Decentralised energy system and storage

How is this factor manifested in Ireland: Ireland's extensive electricity transmission network is operated by EirGrid, who are responsible for the planning and operating of the electricity transmission network. ESB Networks is licensed to build, maintain, operate and develop the electricity distribution network in Ireland. Both of these organisations have distinctive roles in relation to distribution networks and electricity transmission: "ESB Networks builds and maintains the transmission system while EirGrid manages the power flows and ensures that the transmission system can meet increases in electricity demand e.g., by facilitating more energy from renewable sources" (Department of Environment, Climate and Communications, 2022b: 14). Renewable energy sources predominant in Ireland (wind, PV) are irregular and intermittent, and as such they require complementary flexible sources of power to ensure that the electricity system remains stable and operational. When generating renewable energy via micro- and small-scale energy generation, citizens and communities are now able to sell their excess energy back to the grid. Utility companies have been given the power to set their own rates of payment for excess energy as long as their rate passes the "at the market rate".

How the factor influences ENCI: The decentralisation of Ireland's distribution network offers an opportunity to support the emergence of ENCI through increased micro- and small-scale energy generation. In this regard, ENCI is further supported by the Clean Export Guarantee, which requires utility companies to pay for energy that is fed back into the grid. As these companies are permitted to set their own rates for this excess renewable energy, ENCI may be further enhanced for citizens as a result of their capacity to switch between utility companies depending on which one is most financially rewarding.

Affected ENCI types: The ENCI types affected by this factor are types 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples: n/a: distribution grids are operated at national level

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T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in Ireland: As part of the Irish Government's National Climate Action Plan, 2.4 million electricity meters are being upgraded to smart meters across the country by ESB Networks. The purpose of this upgrade from traditional meters to digital electricity meters is to allow for more exact and transparent tracking of households' electricity usage in the hopes that it will promote better energy efficiency. A key function of these smart meters is that they will allow households to measure the amount of solar panel generated electricity that they export to the grid. These exports to the grid will play an essential role in supporting Ireland in reaching its 80% electricity consumption from renewable energy sources target by 2030. However, the increase of renewable energy being used by Ireland's electricity grid is putting the grid under pressure due to the unpredictable and intermittent nature of renewable energy and the lack of connections between the Irish power system and other countries' systems. The independent, industry-led, networking cluster Smart Grid Ireland aims to assist with the upgrading of the electricity grid through informing government and regulation, promoting good corporate citizenship, and actively driving technology solutions needed to achieve a digitalised, decentralised and decarbonised electricity network (Sustainable Energy Authority of Ireland, 2019).

How the factor influences ENCI: The digitalisation of the energy system in Ireland through the upgrading of electricity meters and the electricity grid will better empower citizens to engage in ENCI. Smart meters will allow citizens to improve their energy efficiency by understanding their energy usage, while also allowing them to measure the amount of renewable energy that they are feeding into the grid. The upgraded smart grid will also support the development of ENCI by being better able to operate using renewable energies, thus not only allowing for a greater volume of energy to be accepted via micro- and small-scale generation, but by also establishing a wider renewable energy-fuelled grid to those who cannot generate their own renewable energy.

Affected ENCI types: The digitalisation of the energy system in Ireland affects ENCI in relation to ENCI types 1, 2, 3, 4, 5, 7, 8 and 9.

T4 Energy efficient buildings

How is this factor manifested in Ireland: Building Energy Ratings (BERs) are legally required if a residential dwelling is being bought, sold or rented. These certificates rate a home's energy performance on a scale between A (most energy efficient) and G (least energy efficient) and they are an important means of assessing the carbon emission of homes. Of Ireland's approximately 2 million homes, almost 1.2 million BERs have been registered with the national authority as of 2022 (CSO, 2023a). As part of Ireland's Climate Action Plan (2021), almost 30% of the residential housing stock (500,000 homes) are to be retrofitted by 2030 to a BER B2 standard and 680,000 renewable energy heat sources are to be installed in both new and existing residential dwellings. To achieve this, a number of grant schemes have been set up to support home renovation, including supports for community schemes and a €5bn fund focused on renovating social housing stock and the homes of low-income households (Oxenaar, 2021). In Ireland, emissions from the buildings account for 23% of Ireland's total greenhouse gas emissions due to the carbon released from heating, cooling and lighting, making buildings a major sector for carbon emissions (O'Hegarty et al.,

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2022).

How the factor influences ENCI: This factor holds great potential for supporting the development of ENCI. Through establishing a BER system that is accessible for citizens, opportunities emerge for citizens to better engage with the carbon emitted from their homes and thus increasing their energy literacy and enabling them to take steps to lessen their household emissions. The grant aid and financial support frameworks established by the Irish Government will also empower citizens to reduce their carbon emissions through utilising technologies that would otherwise have been unobtainable for them. Government co-funded retrofitting has been the focus of energy communities in Ireland so far.

Affected ENCI types: The ENCI types affected by this factor are types 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples: Galway City: Through upgrading and retrofitting its social housing stock, the Galway Co-Op Housing Development Society aims to increase energy efficiency among its tenants while increasing its use of sustainable energy within its co-op. The Galway Co-Op Housing Development Society is supported as a SEC by the SEAI.

T5. Smart mobility and green mobility

How is this factor manifested in Ireland: With a growing population that is expected to reach 5.7 million by 2040 from 5.1 million in 2022, Ireland's high carbon-emitting transportation sector requires significant changes in technology, infrastructure provision, travel patterns and modal share if it is to avoid failing its decarbonisation goals (CSO, 2023b; Climate Action Plan, 2021). Excluding aviation, the transport industry in Ireland accounts for 20% of its greenhouse gas emissions, with road transport responsible for 96% of those along with a range of harmful air pollutants. The Irish Government has committed to reducing Ireland's GHG emissions by 51% by 2030, a target that it is unlikely to achieve without increased actions and an accelerated rate of change. In light of this, the government set out their aims to meet a range of targets by 2030 in the Climate Action Plan (2021: 148), including:

- Provide for an additional 500,000 daily public transport and active travel journeys (travelling with a purpose while using your own energy, i.e. walking or cycling.
- Develop the required infrastructural, regulatory, engagement, planning, innovation and financial supports for improved system, travel, vehicle and demand efficiencies.
- Increase the fleet of EVs and low emitting vehicles (LEVs) on the road to 945,000, comprising of: 845,000 electric passenger cars; 95,000 electric vans; 3,500 low emitting trucks; 1,500 electric buses; and an expanded electrified rail network.
- Raise the blend proportion of biofuels to B20 in diesel and E10 in petrol
- Reduce ICE (Internal Combustion Engine) kilometres by approximately 10% compared to present day levels .
- Undertake a programme of work which will review progress and further refine measures that will seek to deliver the additional approximately 0.9 $MtCO_2$ reduction by 2030 in a fair and equitable manner.

To work towards these targets, the Climate Action Plan for transport builds from, and supports, a range of national policy plans that are driving this change such as the National Remote Work Strategy, the National Adaptation Framework, Project Ireland 2040, the National Planning Framework, Our Rural Future - Rural

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Development Policy 2021-2025, and the recently launched National Sustainable Mobility Policy – a strategic framework for making it easier for citizens to walk, cycle and take public transport (Climate Action Plan, 2021; Department of Transport, 2022).

How the factor influences ENCI: Ireland's plans to provide clean mobility for citizens through enhanced availability of electric vehicles and improved EV infrastructure, increased use of biofuels, better considered development projects that include public transport options, and better provisions of public transport, walkways and cycling routes, offers tremendous potential for the emergence of ENCI through allowing citizens to make more sustainable mobility choices.

Affected ENCI types: Smart and green mobility affects ENCI in relation to ENCI types 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples: In 2020, the National Transport Authority of Ireland launched a fleet of electric hybrid buses in Galway City to better enable green mobility in the city.

Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in Ireland: Climate Change will bring about extensive harm to Ireland and the people of Ireland, as well as all other countries globally, with the effects of a changing climate already being experienced. Some of the predicted harmful impacts of Climate Change that the Irish Government expect people to experience are:

- Rising sea-levels threatening land and particularly coastal infrastructure.
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas.
- Further pressure on our water resources and food production systems with associated impacts on river and coastal ecosystems.
- Increased likelihood and scale of river and coastal flooding.
- Greater political and security instability.
- Displacement of populations with increased numbers of climate refugees.
- Heightened risk of the arrival of new pests and diseases.
- Poorer water quality.
- Changes in the timing of lifecycle events for plants and animals on land and in the oceans.
- Increased pollutants which, combined with CO2, are not only responsible for Climate Change but are also damaging to human health (Climate Action Plan, 2021).

According to the Climate Action Plan (2021: 16), these impacts "will be felt by every individual, household, and community in Ireland and there is now a high level of awareness and understanding of this".

How the factor influences ENCI: Widespread awareness of the magnitude of the Climate Crisis is the key motivational factor for both citizens engagement in ENCI and for governmental support in facilitating and enabling ENCI. The Citizen's Assembly's (on "How the State Can Make Ireland a Leader in Tackling Climate

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Change“) work, reflected in the Climate Action Plan (2021: 16), revealed that there was “a near consensus on the need for strong and early action to reduce Ireland’s GHG emissions and to make Ireland resilient to future climate impacts”.

Affected ENCI types: This factor impacts on all ten of the ENCI types.

Local examples: In Galway City Council’s Climate Adaptation Strategy, they predict that Galway City will be particularly vulnerable from Climate Change in the areas of rising sea levels, increased storm wave heights and magnitude, more prominent seasonal changes in wind and an intensification of wind storms, increased seasonal differences in precipitation, more extreme rain events, an increased growing season due to an earlier arrival of Spring, more frequent and intense heatwaves, increased surface air temperatures, increased seasonality in hydrological regimes, and higher levels of flood risk due to higher river levels and increased extreme rain events.

EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

How is this factor manifested in Ireland: Ireland has a long tradition of extracting its extensive peat resources for energy, with much of its resources being managed by the semi-state company Bord na Móna for several decades. Peat has been extracted commercially for use as a feedstock for power generation, for the production of peat briquettes for residential heating, and for use in the horticultural industry. Given the geographical location of peat resources in the Irish Midlands region, the peat industry and related power generation have been massively significant for the area culturally, socially and economically, with these industries acting as key employers in the region. The ending of these power generation plants and peat extraction will have a serious negative impact on the Midlands, and the Irish Government has committed significant resources to supporting the region through this transition including social housing upgrades, bog rehabilitation programmes, and a just transition fund. Renewable energies have a far shorter history in Ireland, with most of Ireland’s renewable energy since the 2000s coming from wind energy. Wind energy account for over 86% of Ireland’s renewable electricity in 2020 (Sustainable Energy Authority of Ireland, 2023b). The strong winds experiences by Ireland due to its geographical location as an island surrounded by the Atlantic Ocean and Irish Sea is a deciding factor in Ireland’s use of offshore windfarms to generate wind energy.

How the factor influences ENCI: The availability of resources in Ireland offers both potential threats and opportunities for the development of ENCI. Ireland has the potential to increase its generation of renewable energy as a result of its geographical location, thus making it more readily available to citizens and enabling them to enact ENCI. However, the traditional and cultural associations of peat harvesting in Ireland may threaten the development of ENCI as citizens may retaliate against what they see as unfair and targeted measures.

Affected ENCI types: Availability of resources affect the following ENCI types in Ireland: types 1, 2, 3, 4, 5, 7, 8 and 9.

Local examples: The Midlands region extends beyond counties Laois, Longford, Offaly, Westmeath, into North Tipperary. As such, that area of County Tipperary has an economic, social and cultural association

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with the extraction of peat from bogs for heating domestic dwellings. However, in recent years, Tipperary has been at the forefront of community wind farming, with Ireland's first community wind farm operating at Templederry.

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Ireland: Overall, Ireland's air quality is relatively good compared to many of its European neighbours. However, there exist localised concerns of air pollution due to pollutants such as fine particulate matter from the burning of solid fuels in residential properties for heat, and nitrogen dioxide from road transport (EPA, 2021). Noise pollution is significant in many parts of Ireland, including major cities, with much of Ireland's most heavily noise polluted areas located along transportation lines such as major roads, trainlines and airports (EPA, 2023). The Water Quality in Ireland 2016 – 2021 report (EPA, 2022) shows that 46% of surface waters tested are in unsatisfactory condition with national water quality declining in rivers, lakes, estuaries, coastal water bodies and groundwater. The report shows that Irish water bodies have nutrient concentrations that are far higher than satisfactory, with agriculture being the largest cause.

How the factor influences ENCI: In addition to causing damage to the environment, pollution can cause series health concerns for humans. As a result of this direct impact of environmental degradation on humans, an increased awareness and evidence of environmental pollution can aid in the development of ENCI by encouraging citizens to engage in climate action to minimise pollution.

Affected ENCI types: This factor impacts on all ten of the ENCI types through encouraging individual and collective action.

Local examples: Under the Air Pollution Act, 1987 (Marketing, Sale, Distribution and Burning of Specified Fuels) Regulations, 2012, Galway City was designated as a 'Smoke Free Zone'. This legislation introduced a ban on the burning, marketing, sale and distribution of bituminous coal within Galway City. As a result, it is illegal to burn, sell, market or distribute banned fuels within this restricted area. Only smokeless coal is permissible to burn or sell and distribute. Galway City Council is responsible for enforcing the regulations, and failure to comply will result in on the spot fines or possible prosecution by Galway City Council under the Air Pollution Act 1987.

EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in Ireland: In Ireland, conflicts about land use for renewable energy generation are not uncommon, particularly in urban areas where renewable energy generation is more viable. Solar farms and wind farms are often objected to by local residents living in areas surrounding proposed developments for several reasons, including perceptions of these developments visually polluting the natural landscape, concern over the noise pollution from wind turbines, fears of health and safety risks associated with wind farms, and perceptions that such developments would reduce the amount of land available for agricultural purposes.

How the factor influences ENCI: Objections to renewable energy generation developments might

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discourage citizens from participating in sustainable energy practices and therefore dissuade them from engaging in ENCI. However, such conflicts over land use for renewable energy often results in the political mobilisation of individuals and communities both through objecting to local and planning authorities, and also by voting for political candidates that they perceive to be more considerate of local objections. This political mobilisation around energy generation may be seen as a form of ENCI, although not a form of ENCI that aligns with sustainable energy goals.

Affected ENCI types: This factor impacts on all ten types of ENCI. Types 1, 2, 3, 4, 5, 6, 7, 8 and 9 are affected by the obstacles that such conflicts raise in relation to citizens willingly engaging in ENCI, while types 6 and 10 are affected by the political mobilisation and voting resulting from objections to land use.

Local examples: Tipperary County: In 2022, the British-based company Renewable Energy Systems had their application approved by Tipperary County Council for the development of a solar farm on a 42-hectare site in County Tipperary. However, following the approval, significant complaints were submitted to Tipperary County Council objecting to the development, including from local councillors, residents, an elected TD [Member of Parliament]. Among the many objections were the impact that this development would have on the visual beauty of the area and that such a large development was removing a significant amount of viable farming land from use.

EN7. Impact of the use of existing non-renewable resources on the system

How is this factor manifested in Ireland: As of 2021, primary energy by fuel in Ireland per percentage was: oil 45.9%; gas 31.6%; renewables 11.9%; coal 6.6%; peat 1.9%; wastes non-renewable 1%; and electricity imports 1% (Sustainability Energy Authority of Ireland, 2023c). Despite an increase in the use of renewable energies in recent years, Ireland's energy supply continues to be dominated by fossil fuels. The lack of availability of renewable energies in the Irish energy supply, combined with the financial and technological difficulties in self-generating renewable energies have acted as barriers to the development of ENCIs in Ireland. However, as was discussed in earlier sections (specifically sections above on Political, Economic and Technological factors) the Irish Government aims to drastically improve citizen engagement with the energy sector through enhancing climate literacy, investing in technological upgrades, and providing financial support for citizens through grant aid and the Clean Export Guarantee.

How the factor influences ENCI: Despite the lack of access to renewable energy in Ireland and the traditionally centralised energy system, which stifled the emergence of ENCI, recent trends in policy and governmental action to increase Ireland's use of renewable energy and decentralise the energy sector hold opportunities to develop emerging ENCI.

Affected ENCI types: The ENCI types affected by this factor are: types 1, 2, 3, 4, 5, 7, 8 and 9.

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Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Ireland: The aim of the Clean Energy for all Europeans Package (CEP) is to empower EU consumers through facilitating and enabling engagement by individual consumers in energy activities and the development of energy communities. Two of the CEP directives are being transposed into Irish law. The first of these, the Electricity Market Directive (IEMD) is the directive for common rules for the internal markets for electricity (EU) 2019/944. The second, the REDII is the recast Directive on the promotion of use of energy from renewable sources (EU) 2018/2001. These laws set out a range of rights, entitlements and obligations for consumers participating in the energy sector, and contain clear requirements for consumer participation and facilitation for participation in the energy sector. (Commission for Regulation of Utilities, 2021).

While these energy communities – in accordance with EU legislation – have a narrower focus, the state-recognised “Sustainable Energy Communities” already mentioned above (P4) operate with a broader scope and represent a key framework for ENCI in Ireland. They are understood as partnerships between public, private and community sectors whose goal is centred on renewable energy or energy efficiency.

How the factor influences ENCI: Through transposing IEMD and REDII into Irish law, the development of ENCI is being supported by ensuring legal frameworks for citizens participating in the energy sector and by providing explicit requirements for this participation. These legal supports will empower and protect citizens who chose to engage in the energy sector.

Affected ENCI types: The legal framings of ENCI forms affect types 1, 2, 3, 4, 5, 7, 8 and 9.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in Ireland: Ireland’s plan to transition to a low carbon future is underpinned by the principle that this transition is a just one. The Climate Action Plan (2021: 39) states that such a just transition is one “based on recognising the transformational level of change required to meet these targets and having a shared understanding that the transition is fair, just, and that the costs are shared equitably. Our climate policies should, therefore, seek to protect the most vulnerable”. This plan also lays out progressive policies to enable and support such a transition including, a refreshed National Dialogue on Climate Action, the continuation of the National Economic and Social Council, the development of an enterprise education and training system, the establishment of a range of financial supports for the Midlands region, the appointment of a Just Transition Commissioner, and a commitment to ensuring that future increases in carbon taxation policies are complemented by targeted increases in social welfare and other fuel poverty initiatives. Further, the Irish Government has committed to ensuring that all of their climate policies will align with their just transition principles of: an integrated, structured, and evidence-based approach; that people are equipped with the right skills to be able to participate in and benefit from the future net zero economy; that the costs are shared so that the impact is equitable and existing inequalities are not exacerbated; and that social dialogue to ensure impacted citizens and communities are empowered and are core to the transition process.

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How the factor influences ENCI: Through the provision of legal measures that are dedicated to vulnerable communities, social inclusion, and energy poverty there are opportunities for ENCI to be developed by tackling the accessibility issues that prevent vulnerable people from improving their energy efficiency and from participating in the energy market. Thus, such policies of inclusivity and equity allow for passive energy citizens to become energy citizens that are empowered to action their ENCI.

Affected ENCI types: This factor impacts on all ten ENCI types, not only through enabling vulnerable citizens to engage in ENCI via their individual and collective actions, but also by promoting energy citizenship, people may become more politically engaged in sustainable energy.

Local examples:

Galway City: Galway City Council's Development Plan (2023-2029), while not in the nature of legislation, acknowledges that "the impact of climate change will not be experienced equally and will likely have a disproportionate effect on marginalised communities who do not have the resources to adapt or mitigate the impact of climate change" and that "the process of decarbonisation will impact on certain livelihoods and sectors and risk exacerbating inequality" (Galway City Council, 2022: 43). Beyond that, no legal energy-related measures could be identified at the local level that are dedicated to vulnerable consumers, energy poverty and social inclusion.

Tipperary County: TCC commits to i) ensuring that all TCC social housing stock is equipped for current and future climate impacts and ii) to "support national and regional guidance and programmes designed to ensure fairness and equality for all in making the transition" (Tipperary County Development Plan 2022-2028: 100).

L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (incl. rights for active participation of customers in the electricity markets)

How is this factor manifested in Ireland: As of 2022, utility providers are now legally required to pay citizens for renewable energy that is fed back into the grid via micro- and small-scale renewable energy generation (up to 50kW) under the Clean Export Guarantee tariff. Although utility providers are permitted to decide on their own rates of payment, they are required to pay above the "at the market value". Energy consumers, prosumers and new producers also have the right to clear information on their energy consumption, consumption costs and the amount of renewable energy that they are feeding into the grid, something that will become increasingly transparent with the upgrading of electricity meters and the electricity grid. The Commission for Regulation of Utilities (CRU) is Ireland's independent regulator of energy and water utilities. CRU works to ensure safe, sustainable and secure energy at a reasonable price for households and businesses nationally, with a commitment to working towards delivering a secure, low carbon future at least cost. CRU (2023) is guided by four strategic principles to:

- Deliver sustainable low-carbon solutions with well-regulated markets and networks.
- Ensure compliance and accountability through best regulatory practice.
- Develop effective communications to support customers and the regulatory process.
- Foster and maintain a high-performance culture and organisation to achieve our vision.

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How the factor influences ENCI: The emergence and expansion of regulatory frameworks in Ireland that define and protect the rights of energy consumers, prosumers and new producers will aid the development of ENCI in Ireland by ensuring that citizens are able to enhance their energy efficiency through having access to their consumption information and generation, and that they are being remunerated accordingly for the energy that they feed into the grid. The fact that such a feed-in tariff has only been introduced recently (unlike in many other European countries) is a key part of the explanation why energy citizenship in the area of own energy generation is not (yet) widespread.

Affected ENCI types: The ENCI types that are likely affected this factor are: types 1, 2, 3, 4, 5, 7, 8 and 9.

L4. Bureaucracy and red tape

How is this factor manifested in Ireland: As with much of the EU, the roll out of renewable energy projects in Ireland is delayed significantly by time-consuming bureaucratic and administrative processes that risk jeopardising Ireland's aims of achieving its decarbonising goals. The industry group Wind Energy Ireland warned in 2022 that despite Ireland's potential to exceed its target of increasing its wind energy generation from 5 GW to 7GW per year by 2030, Ireland will not meet its targets unless planning bureaucracy and governmental policies are changed, citing that despite the requirement for planning applications for wind farms to be decided within 18 weeks, the average wait time is more than a year due to planning delays.

How the factor influences ENCI: The bureaucracy, red tape and slow-moving administrative procedures involved with approving renewable energy installation and development permits are a serious threat to ENCI. Without a more efficient and time effective administrative and decision-making process, Ireland will not be able to increase its renewable energy supply and citizens will not be able to meaningfully participate in the energy sector. Costs and risks in connection to the planning process are a major barrier for community-owned energy generation projects.

Affected ENCI types: Bureaucracy, red tape and slow-moving administrative procedures will negatively affect eight of the ENCI types by preventing citizens from accessing renewable energy. The affected types are 1, 2, 3, 4, 5, 7, 8 and 9.

L5. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)

How is this factor manifested in Ireland: Under the Micro-generation Support Scheme that was launched in January 2021, support is offered to homeowners and businesses to generate renewable energy through Solar PV installation, with the government offering grant aid to part-finance the installation and passing the Clean Export Guarantee tariff to ensure that citizens are remunerated for the energy that they feed into the grid. However, support (financial, legal and regulatory) for the micro-generation of renewable energy is limited to Solar PV at present, with the SEAI due to assess the extension of grant supports to other suitable technologies such as micro-wind, micro-hydro and micro-renewable CHP in 2023. Thus there is a legal uncertainty, contradiction and lack of regulation surrounding the micro-generation of non-solar energy under the Micro-generation Support Scheme.

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How the factor influences ENCI: The lack of certainty surrounding the rights of citizens who (aim to) generate renewable energy through non-solar micro-generation will negatively impact on the development of ENCI. Without legal, regulatory and financial certainties, such as the ones provided to micro-solar generation by the Micro-generation Support Scheme, people may be deterred from choosing renewable micro-generation other than solar.

Affected ENCI types: Legal uncertainties will negatively affect eight of the ENCI types by deterring citizens from engaging in non-solar micro-generation of renewable energies. The affected types are 1, 2, 3, 4, 5, 7, 8 and 9.

Summary table

Factors		High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition						X
	Multi-level energy governance structure of a country					X	
	Political support for ENCI (mechanisms, networks, etc.)					X	
	Political/democratic culture and traditions					X	
	Inclusion and empowerment policies					X	
	Geo-political challenges (COVID, war in Ukraine, gas and oil supply)				X		
ECONOMIC	General economic situation / Inflation rate & purchasing power			X			
	Energy prices					X	
	Energy market				X		
	Energy taxation, state aid, fuel subsidies				X		
	Financing and investment opportunities						X
	Raw material and resource prices		X				
SOCIAL	Level of income / wealth disparity and energy poverty	X					
	Energy literacy, awareness and skills						X
	Citizen engagement and passivity in society						X
	Trust in institutions and collective endeavours	X					

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	Social norms, attitudes and perceptions towards energy-efficient products, services, technologies and appliances, and towards social innovation		X				
TECHNOLOGICAL	Availability of technologies for the decarbonisation of the energy sector and RES						X
	Decentralised energy system and storage						X
	Digitalisation of the energy system						X
	Energy efficient buildings						X
	Smart mobility and green mobility						X
ENVIRONMENTAL	Climate vulnerability					X	
	Availability of resources				X		
	Pollution				X		
	Conflicts and opportunities about land use for renewable energy	X					
	Impact of the use of existing non-renewable resources on the system			X			
LEGAL	Legal framings of ENCI forms						X
	Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion						X
	Rights and duties of consumers, prosumers and new producers in interaction with energy market						X
	Bureaucracy and red tape	X					
	Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)		X				
	Total factors per level of barrier/support	4	3	2	5	6	12

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Conclusion

What are the major barriers and opportunities to the emergence and/or development of ENCI in Ireland?

Twelve key opportunities were identified in relation to the emergence and development of ENCI. These opportunities are:

1. *Key political objectives, targets and goals for the energy transition:* In order to achieve their ambitious climate goals, the Irish government plans to foster collaboration between government, businesses, communities and individuals to implement policies, infrastructures, systems and technological innovations. Such a collaborative problem framing of the Climate Crisis can develop ENCI exponentially through providing the policy frameworks needed to empower and enable citizens to engage with the energy sector.
2. *Financing and investment opportunities contributing to a more sustainable energy system:* The provision of funding programmes will undeniably support the development of ENCI by not only incentivising citizens to participate but by also enabling otherwise marginalised individuals to partake in the energy sector.
3. *Energy literacy, awareness and skills:* Through enhancing climate literacy, skills and awareness, citizens are better able to practice ENCI by altering their lifestyles in more energy efficient and climate conscious ways, recruiting other people to practice ENCI, and mobilise politically around climate-related issues.
4. *Citizen engagement and passivity in society:* By establishing frameworks that enable meaningful citizen engagement in ENCI, there are pathways of participation available to citizens for active climate action.
5. *Availability of technologies for the decarbonisation of the energy sector and renewable energy:* The availability of these technologies is essential for impactful ENCI in Ireland. Access to these decarbonising technologies will not only allow citizens to reduce their own carbon emissions, but through feeding renewable energy back into the electricity grid, they can lessen emissions from society more broadly.
6. *Decentralised energy system and storage:* This factor will allow for the emergence of meaningful ENCI through facilitating micro- and small-scale renewable energy generation using Solar PV, with potential for other renewable sources, and the possibility to contribute excess renewable energy to the national grid.
7. *Digitalisation of the energy system:* The digitisation of the energy system through the installation of smart meters and the development of a smart grid will empower citizens to practice ENCI by providing them with clear information on their energy use so that they can improve their energy efficiency and measure the energy that they are feeding into the grid. The smart grids would also allow the energy system to better deal with renewable energy inputs thus making it more readily available to other citizens.
8. *Energy efficient buildings:* ENCI is developed through this factor as the Building Energy Rating (BER) system enhances energy literacy while financial aid allows citizens to utilising decarbonising technologies that would otherwise have been unobtainable for them financially.

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9. *Smart mobility and green mobility:* The development of green mobility systems would massively enhance ENCI by allowing citizens to make less carbon emitting transportation choices in their daily lives.
10. *Legal framings of ENCI forms:* The provision of legal framings of ENCI through the transposing of Electricity Market Directive (IEMD) and the EU-Renewable Energy Directive (REDII) into Irish law better establish ENCI through ensuring legal frameworks and requirements.
11. *Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion:* This factor establishes ENCI through promoting accessibility in the energy sector for economically vulnerable citizens.
12. *Rights and duties of consumers, prosumers and new producers in interaction with the energy market:* The accessibility of citizens to the energy market has received positive attention in Ireland and Europe more broadly, and this empowers more decentralised participation in the energy sector.

Four key barriers were identified in relation to the emergence and/or development of ENCI in Ireland:

1. *Level of income / wealth disparity and energy poverty:* A major barrier to the development of ENCI in Ireland is the worsening economic situation for citizens. Lessoning real incomes, soaring inflation, a housing and cost of living crisis, and record high levels of energy poverty disempower and prevent citizens to engage in ENCI.
2. *Trust in institutions and collective endeavours:* Citizens' lack of trust for political institutions in Ireland poses a threat to the willingness of people to engage in state-supported ENCI, thus hindering the development of it.
3. *Conflicts and opportunities about land use for renewable energy:* Conflicts over land use for renewable energy may act as a barrier to the development of ENCI as these conflicts may discourage citizen participation.
4. *Bureaucracy and red tape:* The lengthy delays and high cost of bureaucracy and administrative red tape for planning permits are a serious threat to the development of ENCI as they may dissuade citizens from engaging with ENCI while also preventing renewable energy utility companies from providing citizens with renewable energy options.

The overall evaluation of ENCI situation in the country:

Historically Ireland has lacked a culture of, and political support for, ENCI. Ireland has been, and continues to be, a country that is heavily dependent on carbon emitting fossil fuels for its energy supply. The Irish energy system has traditionally been centralised with neither the technology, funding, nor political will to decentralise it. However, over the past few decades this has begun to change. Recent years have seen a sharp rise in efforts to transition to a low carbon energy system, with ENCI increasingly becoming a central focus of environmental policies, strategies and action plans. In line with this, the Irish Government has implemented a number of policies aimed at developing ENCI in Ireland, including energy literacy campaigns, funding for renewable energy micro-generation and retrofitting programmes, investment in green mobility, providing legislative and legal frameworks to protect and include citizens in the energy sector, creating channels for citizen engagement, and working towards decentralising and digitalising the energy sector. All of these actions have started to establish ENCI, as is evidenced by the number of people engaging in retrofitting and micro-generating schemes as well as more than 600 Sustainable Energy Communities (SEC) designated by the SEAI. However, nationally, the development of ENCI has been

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arguably limited, particularly in contemporary times of rising inflation and energy prices, diminishing real income, a worsening housing crisis and record high levels of energy poverty. Overall, further significant policy, legislative and investment changes are needed if ENCI is to play a meaningful role in helping to achieve Ireland's climate targets.

An outlook of the possible developments and transformation of the national ENCI ecosystem:

There are a number of ways that the national ENCI ecosystem could be transformed and developed if the necessary policy, legal and investment changes are made by the Irish Government. These include:

- An overhaul of the planning approval and administrative process for renewable energy projects is needed if Ireland is not only going to meet its renewable energy targets, but if it is to enable citizens to access renewable energy sources in the process.
- The SEAI might consider extending the Micro-generation Support Scheme to include other forms of micro- and small-scale renewable energy such as micro-wind, micro-hydro and micro-renewable CHP so that citizens can avail of grant funding and the Clean Export Guarantee tariff for more renewable energy generation options.
- The electricity grid requires significant improvement to operate efficiently with the demands of an increased supply of renewable energy.
- Energy literacy programmes need to be made more accessible and available so that a wider proportion of the population can become climate literate and begin making more energy efficient choices.
- Significant investments into green mobility programmes are required to improve the capacity, range and energy efficiency of public transport. Investment is also needed to create safe cycling and walking routes.
- Further supports need to be made available to citizens to avail of retrofitting schemes beyond low-income households.

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11. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN LATVIA

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Introduction

The long-term objective of Latvia's **National Energy and Climate Plan 2021-2030** (NECP2030) is to promote the development of a climate-neutral economy by improving energy security and public welfare in a manner that is sustainable, competitive, cost-efficient, safe, and based on market principles. To do so it is necessary to promote the efficient use of resources, their self-sufficiency, and diversity; ensure a considerable reduction in the consumption of resources, in particular fossil and unsustainable ones, and a transition to the use of sustainable, renewable, and innovative ones; ensure equal access to energy sources to all community groups; stimulate the research and innovation. The actions of the NECP2030 are included in and further detailed by particular funding instruments. Latvia actively cooperates with other Europe Union (EU) states in the Baltic Sea region to provide energy supply security, particularly by developing power system transmission connections, offshore wind parks, and natural gas transmission connections.

Latvia is the third-largest consumer of renewable energy (RE) in the EU. In 2020 & 2021 the share of RE in gross final energy consumption had been little more than 42.1%. The share of RE in electricity has been more than 50% in 2014, 53.4% in 2020 and - 51.4% in 2021, slightly varying depending on the electricity import and hydrometeorological conditions. The share of RE in heating & cooling is constantly increasing, reaching ~57.4% in 2021. The three sizable hydropower plants on the Daugava River have the largest share in electricity production in Latvia, during 2017-2021 this share varied in the range from ~32% (2019) up to ~ 57% (2017). Most of the remaining electricity is produced by two large-scale natural gas-fuelled combined heat and power facilities. Regarding heat-only production plants, in 2021 biomass utilising plants contributed around 43%, and combined use (biomass and fossil source utilising) plants around 11% of the total capacity. A major part of dwellings, which have individual heating equipment, utilises solid biomass. Overall natural gas consumption in Latvia had decreased by 30% in 2022, compared to 2021 (CSB 2023). The following indicative targets of RE share in 2030 are currently stated by Latvia's NECP2030: in final gross energy consumption - 50%, in electricity production – above 60%, in thermal energy and cooling – 57.59%, in transport final energy consumption – 7%. These targets will be re-considered in 2023 in line with the updated EU climate-energy policy "Fit for 55 packages". To raise RE share, structural changes in the energy industry will be done. The main sources to increase the RES share will be wind (both onshore and offshore), and solar PV in electricity production; biomass utilisation, use of heat pumps, and solar heat collectors in thermal energy (NECP 2030).

Up to 31.12.2022, **the Ministry of Economics (MEC)** had been responsible for the energy policy, and **the Ministry of Environmental Protection and Regional Development (MEPRD)** for the climate policy. From January 1, 2023, the energy and climate policies development and implementation have been transferred to the new **Ministry of Climate and Energy**. At the same time, certain important functions providing synergy with energy & climate policy remain with the MEC and MEPRD. Important energy related functions are provided by the **Ministry of Transport** and **the Ministry of Agriculture.** Both sustainable

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transport/mobility policy and agriculture policy necessarily relate to energy resources demand-supply. The Ministry of Agriculture is responsible also for forestry policy. The state support programmes are supervised by several state authorities, depending on the source of financing – JSC "Development Finance Institution Altum", The Central Finance and Contracting Agency, Latvian Environmental Investment Fund, and Latvia's Rural Support Service. The **State Construction Control Bureau of Latvia** is the state authority for energy efficiency monitoring, among others, responsible for the Register of Energy Communities. In the field of education and science, the competent institution is the **Ministry of Education (MOE)**, while issues of innovation and competitiveness are under the competence of the MEC and the MEPRD.

The main legal acts are Energy Law, Electricity Market Law, Energy Efficiency Law, and Law on the Energy Performance of Buildings. From January 1, 2015, every single customer (household) could participate in a deregulated power market. However, the general framework for energy communities has been adopted only in July 2022 and the adoption process of governmental follow-up regulations still continues. For the time being climate legislation issues are regulated by the Law on Pollution, but the Climate Law is under development.

There are no second level (regional) municipalities in Latvia, but five planning regions, responsible for regional development planning, are established. Currently, there are 43 first level (local) municipalities. There are two types of administrative territories in Latvia - (i) territories of local governments of State cities, and (ii) territories of local municipality (*novads*) governments.

Development of municipal-level energy-climate action plans is voluntary; however, they have been elaborated (for the main part or whole area) by more than half of municipalities. On January 1, a new Law on Municipalities came into force, enhancing how local governments now operate by incorporating more of the public into all operations. Regarding energy citizenship (ENCI), important are the actions of the NECP2030, particularly in the directions of "Public information, education and awareness raising" and "Involvement of society in energy production". The NECP2030 envisages financial support for the household sector, both energy efficiency improvement and RES utilisation.

Society's involvement in energy self-production using non-emission technologies can generally be assessed as still low, however with a clear growing trend. The boom of solar PV installations in the single-family dwelling sector is the result of the combination of several factors, particularly, a high rise in electricity price, good grid capacity to accumulate micro-generation devices, digitalised and simple permitting procedures, and state programme for equipment purchase co-financing. In turn, communities of apartment owners operate for energy-efficient renovation of multi-apartment buildings. However, current practices are mostly limited to single multi-apartment building, as there are not yet energy communities in Latvia, as provided by the recast Renewable Energy Directive (REDII).

The Amendments to the Energy Law, in February 2021, define what constitutes energy poverty. The relationship between energy citizenship and energy poverty is a recent occurrence in Latvia that has just been addressed through (pilot) projects.

Valmiera (population 22,757 (at beginning of 2022), a city area - 19.35 km^2) is one of the eight largest cities in Latvia and has the status of a state city (development centre of national importance). Valmiera is sited in the middle of the Vidzeme region, 107 km from the capital city of Riga and 50 km from the Estonian

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border. The Gauja river divides the city into two parts. The urban space is characterised by a concentrated mansion, high-rise as well as low-rise residential construction, interspersed with mixed-type residential and construction of public services. Thanks to well-developed infrastructure, an educated workforce, and targeted support for business development, the city is home to both large manufacturing companies and companies whose main activity is the provision of services. Most of Vidzeme's largest companies are located in Valmiera. In Valmiera district heat supply in 2021, 78.5% is produced by renewable energy resources and 21.5% by fossil ones. Energy efficiency in buildings is the challenge. Valmiera city has elaborated policy planning documents for consistent energy-climate policy implementation - City Environmental Declaration, Municipal Energy Policy, a Sustainable Energy and Climate Action Plan (SECAP; elaborated at the beginning of 2023).

Riga (population 611,824 at beginning of 2021), a city area of 307 km^2) is the capital city of Latvia, also the largest city and main economic centre of the country. Approximately one-third of all Latvian residents live within the city limits of Riga, and more than half (1.07 million) of all Latvian residents live in the Riga agglomeration. Around two-thirds of Riga's residents live in multi-apartment buildings built between 1961 and 1990, the challenge is the low energy efficiency of these buildings. In the structure of economics of the city of Riga according to added value, the largest share constitutes the trade and service sector – 17.4%, the second largest economic sector is real estate, the property sector – 10.5%, the third is information and communication services 9.7%. In the city of Riga district heat supply in 2021, 29.7% is produced by renewable energy resources and 70.2% by fossil ones. Riga was one of the first European cities to ratify the Covenant of Mayors in 2008 and developed the Smart City Sustainable Energy Action Plan (Rubīna M. et al. 2014) continued with the renewed “Riga Sustainable Energy and Climate Action Plan 2022-2030”(SECAP, 2022).

Political factors

P1. Key political objectives, targets and goals for the energy transition

How is this factor manifested in Latvia: Latvia is a full representative party of the United Nations Framework Convention on Climate Change (UN FCCC), its Kyoto Protocol, and the Paris Agreement. As the EU target under the UNFCCC has only been submitted by the EU, Latvia takes on a quantified emission reduction target jointly with all EU member states (MS). Particularly, it is expected that in the amended Effort Sharing Regulation (ESR) Latvia’s GHG emission reduction target in the ESR sector will be -17% in 2030, compared to 2005. Reaching long-term climate neutrality is stated by **Latvia's strategy for achieving climate neutrality by 2050** (adopted in January 2020).

Latvia's strategy for achieving climate neutrality by 2050 (MEPRD, 2020) identifies the strategic lines of action and justifies the inclusion of the basic principles of low-carbon development in the planning documents of all sectors. In its turn, long- and middle-term key political objectives, goals and targets, basic principles, and twelve directions of action are set in Latvia’s **National Energy and Climate Plan for 2021-2030** (NECP2030, adopted February 2020).

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In July 2020 the Parliament (*Saeima)* approved the new **National Development Plan** (NDP), which coincides with the EU Funds 2021-2027 planning period. NDP2027 outlines sectoral policies and key reforms, as well as public investments from the state budget, local government budget, EU funds, and other financial sources. Latvia as the EU MS participates in a joint meeting of the binding EU-whole energy efficiency and renewable energy targets. The following indicative targets of renewable energy share in 2030 are currently stated by Latvia's NECP2030: in final gross energy consumption – 50%, in electricity production – above 60%, in thermal energy and cooling – 57.59%, in transport final energy consumption – 7%. Energy final consumption in 2030 is to be decreased by around 13%, compared to 2017. These targets will be revised in 2023 in line with the updated EU climate-energy policy “Fit for 55 packages”.

How the factor influences ENCI: Since Latvia is adopting EU practices and political goals in national policy planning, the recognition of citizen role in the energy system transition has been started. The NECP2030 includes the action line “Promoting economically justified energy self-production and self-consumption (Public involvement in energy production)” aimed to promote both individual and collective energy self-production. However, more focused regulations on collective energy self-productions are still being developed. To meet Latvia's national target of reducing GHG emissions in the ESR sector, according to the EU “Fit for 55 packages”, when reviewing NECP2030 in 2023, new measures will be defined. It can be expected that the importance of ENCI related policies and measures will increase. The practice of motivating and supporting citizens for them to be proactive and able to find opportunities to self-produce and self-consume renewable energy is very recent, therefore there are many uncertainties, and many further improvements to be done.

Affected ENCI types: Types 1, 2, 3, 5, 9.

Local examples:

Riga. In February 2021, Riga joined the Paris climate declaration “Cities leading the way to climate neutrality”. To achieve the vision of a climate-neutral and climate-resilient Riga by 2050, the new Sustainable Energy and Climate Action Plan has set 4 main groups of goals: (1) Energy goals, (2) CO_2 emission reduction goals, (3) Objectives of adaptation to climate change, (4) Air pollution reduction goals. The city has surpassed the EU's 2030 emission reduction target. Compared to 1990, CO_2 emissions have decreased by 60%. The current goal is to reduce CO_2 emissions in 2030 by 30% compared to 2019. An important focus is put on the municipality's capacities to increase energy efficiency and RES utilisation, this includes the provision of 100% renewable energy in municipal buildings. The promotion of companies' transition to electricity production for self-consumption is planned. The transition towards a low-carbon, the multi-mobility transport system is ongoing. Daily Mobility Development Plan for 2021 - 2027 has been developed (DMDP, 2021).

Valmiera. To achieve **urban development with comprehensive energy efficiencies,** the city has implemented many different activities - energy **efficiency improvement** in municipal buildings, district heating system, street lighting, and the use of electric cars by the municipality. Although the municipality promotes energy-efficient renovation of the multi-apartment residential buildings, so far citizen involvement has been insufficient, but in any case, it's stronger than in many other municipalities. At the meeting of August 24, 2022, the municipal council of Valmiera decided to support the municipality's participation in the European Covenant of Mayors. Participation in the European Covenant of Mayors and

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the municipality's sustainable energy and climate action plan will serve as support tools for the municipality to attract more successful external funding for improving the energy efficiency of buildings, introducing renewable energy technologies, as well as solving the challenges of the energy crisis and energy poverty (valmierasnovads.lv).

P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)

How is this factor manifested in Latvia: The effective linking of national and local government policies is an essential task. There are five **planning regions** (legal status - derived public entities)[12] operating under the supervision of the MEPRD. The planning regions are mainly responsible for (long-term) sustainable regional development planning and coordination/cooperation between local governments and other public administration bodies. Thus, the planning regions are the institutions responsible for sustainable regional energy policy as well. The important element of multi-level governance are **energy agencies** in certain planning regions. The new Law on Municipalities, adopted in 2022, states promoting the sustainable management of natural capital and promoting climate change mitigation and adaptation as the new autonomous functions of local governments. In September 2022, MEPRD also renewed the methodological recommendations for municipalities in the field of climate change. Thus, municipalities should develop a coordinated approach, incorporating climate change mitigation and climate resilience solutions in their development planning documents.

By the end of 2022, more than half of Latvian municipalities have developed **Sustainable energy and climate action plans (SECAPs)**. At the same time, this interest is largely promoted by the availability of EU funding for the elaboration of these plans. The 2022 amendments to the Energy Efficiency Law require all municipalities to implement an energy management system and to submit the annual report to responsible state authority on implemented energy efficiency measures and reached savings thus contributing to meeting Latvia’s national energy efficiency target.

How the factor influences ENCI: The exchange of local governments' international experience and the development of SECAP contribute to the actions promoting the development of decentralised and citizen led renewable energy production and citizens’ initiatives in energy saving. Also, the MEPRD methodological recommendations (2022) stipulate wide advising of residents on energy saving by changing both habits in households and travel habits. In practice, the challenge is the municipality’s capacity to provide advising, consultation, and capacity-building services for the residents. It can be hoped that as a result of the administrative-territorial reform (2021) with the creation of larger municipalities, their ability to provide such support to their residents will be correspondingly greater.

One of the current tasks is the coordination of national and local development interests. The wind park development, which in Latvia practically came to a standstill, is an example in which local-level policy

[12] Derived public entity is a public entity established by the State Administration Structure Law or on the basis of law. Such public entity has been conferred its own autonomous competence by law which includes also establishing and approval of its own budget. Such an entity may have its own property.

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instruments may conflict with state-level objectives. As the state policy instruments did not provide clear sufficient benefits for local communities and the residents perceived the risks of different types and thus objected, the municipalities, by controlling spatial planning, posed a serious obstacle to the wind park projects. To promote wind parks development, in 2022 the powers of local governments in the spatial planning of wind parks have been reduced. In its turn, starting from 2023, the new wind parks of ≥1 MW capacity must make a compensatory annual financial payment to the local municipality budget. Only time will tell whether the local community will consider the compensatory payment as sufficient compensation.

Affected ENCI types: Types 1, 3, 7, 9.

Local examples: The requirement to implement environmental management system (EMS) is practically the only currently existing mandatory requirement for municipalities in the energy sector. In Riga city in 2022, the implementation of the EMS is being started in 355 municipal institutions. The municipality of Valmiera also has implemented an EMS.

P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in Latvia: Latvian legislation incorporates a **strong foundation for civil society participation in the decision-making process** at all levels and for participation in public administration procedures, stating a range of instruments and methods of it - working groups and consultative advisory councils, public consultations, discussion groups, forums, public opinion polls, entrust/delegation of the implementation of certain public administration tasks to private persons, including NGOs. Governmental regulation obliges all websites of public authorities to have the section "Public participation". On September 9, 2021, the Unified portal for the development and coordination/harmonisation of draft legislation (*TAP portal*) has been created to ensure a more transparent, modern, and faster circulation of documents and a wider opportunity for creative public participation in the process of legislation. The Parliament (Saeima) also conducts regular consultations with the public at annual events - the Saeima and NGO Forum, the Youth Saeima, while various parliamentary commissions involve NGOs in their daily work processes. At the state level, the political support for certain types of ENCI might be concluded based on the adopted financial aid programs financed by the state budget (see factor EC5).

How the factor influences ENCI: A **general framework for political participation** is in place, and existing procedures ensure that the public is given early and effective opportunities to participate in the drafting of the national energy and climate plans and policy documents, at the establishment of multilevel and multi-stakeholder climate and energy dialogues. Also, the new Law on Municipalities, which entered into force on January 1, 2023, requires more public participation in developing binding municipal regulations, ensuring the transparency of drafts and sufficient time for public consultation. The municipal councils have the right and, in the cases stipulated by law, also the obligation to organize consultations with residents. **The participatory budget of the municipality** is an opportunity for residents to directly recommend very specific infrastructure development needs of the county, while for the municipality - with the help of a poll, to implement those ideas that address the residents' most urgent needs. Although up to now citizens saw other priorities, the participatory budget might be also the instrument for the development of ENCI collective forms. **Advisory Councils** are one of the effective tools for public

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participation. **The National Energy and Climate Board** provides contributions to coordinated, integrated, and sustainable national policy for energy and climate, including the NECP2030 and long-term climate neutrality strategy for 2050. The Board includes representatives of the relevant ministries, energy transmission and distribution companies, the Public Utilities Commission, and relevant energy-climate policy stakeholders, representing civic society, businesses, universities, municipalities, etc. Also, it must be noted advisory councils such as the **National Economic Council** (*Tautsaimniecības padome*), **Latvian Construction Council, Consultative Council of national green investment schemes** (joint council for Climate Change Financial Instrument and Emissions Allowances Auctioning Instrument), **Environmental Consultative Council.**

Affected ENCI types: Types 1, 2, 3, 5, 7, 9.

Local examples:

Valmiera. There is a range of public participation promoting instruments in which different ENCI activities might be framed, the challenge is to apply them for ENCI development. To promote citizens' involvement in decision-making processes and activate dialogue between the city's municipality and local stakeholders, a consultative and expert council operates under the auspices of the municipality of Valmiera, for example, the youth affairs advisory commission, and the entrepreneurs' advisory council. One of the tools is the annual project competition. Societies, foundations, and organisations registered in Valmiera can submit applications for financial support for the implementation of public initiatives, projects, and ideas in different fields (valmierasnovads.lv).

Riga. The residents of Riga are provided with various opportunities for participation in the work of the municipality: participation in advisory councils, public consultations, sectoral committee meetings, etc. Riga City Municipality's active cooperation with non-governmental organisations is taking place. **The Riga Energy Agency (REA)** ensures cooperation with state, municipal, and non-governmental organisations, organizes community involvement and co-creation events within the framework of projects, consults the public on the energy efficiency of apartment buildings, sustainable heat supply solutions, renewable energy technologies, particularly solar PV, and other issues. Recently REA, in parallel with the development of the national legal framework, has started activities to promote energy communities (rea.riga.lv). The municipality promotes **the neighbourhood movement,** also by providing regular project competitions targeted toward neighbourhood associations, as the instrument both to self-organize the residents to improve the community's living environment and provide for cooperation between the residents and the municipality (apkaimes.lv).

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in Latvia: The government's dialogue with civil society is formed within the framework of the 2005 Memorandum of Cooperation between Non-Governmental Organisations and the Cabinet of Ministers (Memorandum). From the point of ENCI, the homeowners (apartment owners of multi-apartment buildings) associations have already an important role in energy efficiency improvement in residential buildings and might promote collective energy prosumerism. In its turn, in the perspective promotion of energy communities the neighbourhood associations, grass-roots NGOs, and expert

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NGOs/foundations should be understood as one of the important actors in terms of promoting dialogue between stakeholders. Also, important are the local leader groups (Latvian umbrella – Latvian Rural Forum) and the Smart Villages movement. **The Civil Alliance of Latvia** (nvo.lv) is the largest umbrella organisation in defence of the interests of the non-governmental sector. Among the grass-roots NGOs, must be noted Latvian **Green Movement**. Among the expert NGOs, must be noted: Renewable Energy of Latvia Federation, Solar energy Association, Zero emission mobility support society; Baltic Environmental Forum; “Green Liberty”; association “Green Houses” and others. Important representative of the business sector is the Latvian Chamber of Commerce and Industry. An important role has the associations of businesses. In its turn, the Latvian Union of Local Governments represents the interests of municipalities in negotiations with the government.

How the factor influences ENCI: All these organisations are to a certain extent representing and promoting ENCI in Latvia. For instance, Latvian Rural Forum currently promotes the establishment of the first energy communities in Latvia’s rural areas/towns. The existence of an effectively operating homeowner’s association is the precondition for the energy-efficient renovation of multi-apartment residential buildings and further development of buildings-scale ENCI. Wide scope of methods is applied by the national-scale program “Let’s live warmer!’’, having already 13 years of history, to consult communities of the apartments’ owners regarding conditions and benefits of energy efficiency increase and the best practices of it. The program involves a high number of relevant stakeholders to provide trustable information. The 2020 Memorandum of the “Let’s live warmer” programme has been signed by 40 stakeholders of different types representing public and private sectors (em.gov.lv).

Affected ENCI types: Types 1, 2, 3, 5, 9.

Local examples:

Valmiera. The municipality's activities in the field of environment are carried out in accordance with Valmiera’s **Environmental Declaration**, approved in 2015. The Declaration expresses the commitment of the municipality to work and develop the city sustainably in cooperation with various involved parties. A wide environmental communication is ongoing in Valmiera city. In relation to ENCI, worth noting is the non-formal education course “Balanced life: environment, man, society”, Earth Hour activities, European Mobility Week activities, Eco-schools, a bicycle ride “Velosipeds vieno” and others (valmierasnovads.lv).

Riga. In order to promote citizens' cooperation with the Riga municipality and ensure the effective participation of non-governmental organisations (NGOs) in the decision-making process, a cooperation memorandum between the Riga municipality and NGOs has been in force since 2013. On September 25, 2013 (riga.lv), at the suggestion of Riga residents, the Riga City Council opened an NGO house. To implement a targeted public integration policy in Riga and develop it as a municipal policy direction, the “Riga City Public Integration Guidelines for 2019-2024” were developed. In the context of municipal development planning, community integration as a course of action for achieving long-term development goals is defined in the “Riga Sustainable Development Strategy until 2030” (RSDS, 2014).

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P5. Inclusion and empowerment policies

How is this factor manifested in Latvia: Since 2009, energy-efficient renovation of multi-apartment buildings has been financially supported by the state. Financial support is gradually increasing, enabling more and more residents to apply for it. However, regarding single-family buildings, the national green investment scheme program was implemented in 2010/2011 and renewed in 2022 only. Thanks to favourable support conditions, this new program has become a turning point in the development of solar PV in the single-family building sector.

Support programs have been launched in 2021 and 2022 for families with children: (1) for energy-efficient renovation and installation of RES technologies (particularly including solar PV) in single-family and two-apartment buildings, (2) residential premises for purchase or construction, including increased support if an "A" energy efficiency class building is purchased/built. However, the entire investment is not subsidised at the same time, so the family must have the ability to invest their own or borrow funds (varam.gov.lv).

The approach to the prevention of energy poverty in Latvia is mainly social policy assistance (see more in factor L2). Regarding energy poverty, Latvia determines that in the period up to 2030, it is necessary to continuously reduce the energy poverty rate and ensure that it is lower than the EU average. The new program "Renovation of social housing or construction of new social housing", financed by Latvia's Cohesion Policy Program, will start in 2023 and aims to establish at least 1865 municipal social or rental apartments by the end of 2029 (em.gov.lv).

How the factor influences ENCI: Linkage of energy poverty with energy citizenship is a new issue in Latvia, up to now dealt within framework of international projects. For instance, "Consumers Interest Defence Association" in cooperation with Ltd "Jelgava real estate management" participates in the international **project "STEP"** within which energy poverty criteria will be determined based on the experience of other countries, and solutions will be sought to prevent energy poverty. Another example is the Power Poor project (Zemgale region agency is Latvian partner) which develops advising instruments and support schemes for energy poor citizens and encourage the use of alternative collective financing instruments, such as energy communities, energy cooperatives, as well as crew funding; Solutions to reduce energy poverty are also developed through the implementation of the **project "Sustainable energy infrastructure and market**" (stepenergy.eu), within the framework of which an assessment of the energy poverty situation in Latvia has been carried out, the results will be included in the update of the NECP2023 in 2023.

Affected ENCI types: Types 1, 2, 7, 9.

Local examples: See factor L2.

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P8. Geo-political challenges

How is this factor manifested in Latvia:

- In 2022, the prices of electricity, gas, and fuel have risen rapidly, and the state's energy policy is facing changes and risks caused by the geopolitical situation. In such circumstances, an increasing emphasis is placed on the need to promote the use of local RES in energy production and to stop supply from Russia;
- Since May 22, 2022, in relation to the sanctions imposed by Russia's invasion of Ukraine, it is no longer possible to import electricity from Russia;
- As the LNG terminal capacities in the Baltic region are becoming adequate, Amendments (adopted July 14, 2022) to the Energy Law state that natural gas import from Russian Federation is prohibited from January 1, 2023;
- On June 28, 2018, a political decision was made on the synchronisation of the Baltic States' power system with Continental Europe and disconnection from the electricity systems of Russia and Belarus. The implementation of the Synchronisation project is planned until the end of 2025 but due to the complicated existing geopolitical situation, desynchronisation from the electricity systems of Russia and Belarus could happen even sooner;
- As an interesting reaction to the situation, an obligation was included in the Energy Law in July 2022 for the government to submit a report to the Saeima (Parliament) on the national nuclear energy program by December 31, 2023, which should take into account the geopolitical situation, the costs, and availability of energy resources.

On the other hand, in order to reduce the increase in energy prices for residents, the government has adopted energy price compensation support programs for this season until April 30, 2023.

How the factor influences ENCI: It could be seen as positive - because individual and collective energy prosumerism, including energy communities, can be promoted. Likewise, the development of energy self-production in state institutions, municipalities, and the business sector is predictable. The increase in the price of energy opens the possibility for the active development of ENCI at the organisational level. On the other hand, the risk for the development of ENCI can be created by the emphasis of the state policy on large generating capacities, for example, large-capacity wind farms, the development of which takes place with insufficient public involvement.

Affected ENCI types: Types 1, 3, 5.

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Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Latvia: As of 2021, Latvia's Gross domestic product (GDP) has increased by 15% compared to 2015, representing an annual growth rate of 2.5%. Despite the challenges posed by the COVID-19 pandemic, Latvia's economy has performed well overall. However, the year 2022 brought a lot of new challenges. Although the annual GDP in 2022 compared to 2021 had increased (by around 2%, chain-linked reference year 2015), during 2022 the GDP growth decreased and in Q42022, compared to Q42021, the GDP growth was only around 0.3%. Latvia experienced one of the highest inflations in the EU. In 2022, the unemployment rate in Latvia was 6.9%, which is 0.7 percentage points lower than in 2021.

Latvia's consumer prices increased by 20.8% in December 2022 compared to the year before. It was the lowest monthly inflation rate since June 2022 due to a slowdown in the cost of housing and utilities (42.8%), transportation (12.6%), and some other sectors. Prices for natural gas have nearly tripled since last year. Increasing energy costs have led to increasing costs for business and thus raised prices of other commodities and products as well. Net earnings in Latvia increased by 6% less than gross earnings during the year 2022 (eng.lsm.lv). However, net wages decreased by 12.9% when taking into account substantial increases in consumer prices. Increasing overall commodity prices but especially energy and utility costs have lowered the purchasing power of society and increased the poverty risks.

How the factor influences ENCI: Due to rising energy costs, from one side we can see a significant increase in the public interest and policy support for energy conservation, energy efficiency action, and installation and use of renewable energy in housing as well as in other sectors. For example, at the end of 2022, one in fifty kWh of electricity consumed in Latvia has been produced by photovoltaics (PV). In 2022 consumption of natural gas decreased by 30% (one of the largest decreases in the EU), and electricity by 3.7%. Even though total oil consumption has increased, however retail oil consumption was slightly lower than last year (eng.lsm.lv). At the same time, increasing costs of energy-efficient renovation are slowing down the interest in these activities. On the other hand, the activities taking place at the organisational level promote the cooperation of employees and employers and ENCI forms in the organisation.

Affected ENCI types: Types 1, 2, 3, 7.

Local examples: Riga region as a metropolitan area provided around 53% of the national GDP in 2020, while in Riga region GDP per employee was 2 times higher than in the rest of the country. Thus, a balanced sustainable regional development is the challenge. The per capita GDP in 2020 in the Vidzeme region, where Valmiera city is located, was only about 43% of that in the Riga region. As a result of higher purchasing power, most new RES projects have been implemented in the Riga metropolitan area, with a total of 1,768 projects, while Riga City had 441 projects and Valmiera Region had only 155 projects (ekii.lv). These figures are illustrative and pertain to the national support program for RES technology purchases in households that require significant (more than 50%) household co-financing.

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EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in Latvia: Wholesale natural gas prices jumped from ~€50/MWh in the summer of 2021 to €250/MWh a year later (Households gas prices, band D2, EUROSTAT), wholesale electricity prices increased from €32/MWh in July 2020 to almost €500/MWh two years later. A similar increase can be seen also in the retail energy markets. However, there is a significant variation in prices (Households electricity prices, band DC, EUROSTAT), e.g., at the end of 2022 electricity hourly prices in the Baltic states varied from €0.09/MWh to €549.91/MWh, but the monthly average price dropped to €264/MWh in December 2022. Diesel and gasoline retail prices have also been going up from €0.9/l for diesel and €0.98/l for E-95 in May 2020 to €2.1/l in June 2022 (https://www.fuel-prices.eu/). However, fuel prices have also seen a slight decrease over the last months of 2022. The price of renewables followed the same trend. In September 2022, firewood cost as much as €90/m^3, but by December it had already dropped to €55/m^3. Briquette and pellet costs have also decreased by roughly 20%. This can be explained by the relatively warm winter and related decrease in demand.

How the factor influences ENCI: As already noted above, we can see a significant increase in the public interest in energy efficiency and local renewable energy solutions. On the other hand, we do not see collective action such as protests and the ignition of social movements to be induced by increasing energy prices. But at the same time social dialogue has grown. The war in Ukraine has contributed to a growing sense of national unity. Support programs to compensate for energy price increases implemented at the national level to a certain extent diminishes the negative effects increases. Regarding households, support is provided for all types of energy consumption – electricity (fixed price for the first 100 kWh monthly), natural gas, oil products, solid biomass use in heating, as well as district heating. In addition to that, the monthly benefit is granted to seniors, persons with disabilities, persons who have lost their breadwinners, and the threshold of the guaranteed minimum income for the calculation of the amount of the housing benefit has also been raised.

Affected ENCI types: Types 1, 3, 5, 7.

Local examples: One of the sectors that can be significantly affected by the actions of the local government is the district heating (DH) tariffs, which depend significantly both on the fuel used (natural gas or biomass) and on the overall energy efficiency of the DH system. Although DH tariffs in 2022 have significantly increased, at the same time in Latvia we see very significant differences between municipalities. Two-level differentiated state support for DH supply for households (the government compensates 50% of the tariff for district heat supply from €68-150 per MWh and 90% of the part that exceeds €150 per MWh) is significantly reducing these differences, but at the same time, it may not sufficiently help the people to understand the causes of these differences. Many municipalities in Latvia have intensified the extraction of wood fuel from the forests owned by the municipality. For the measures dedicated to vulnerable consumers see also factor L2.

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EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in Latvia: The liberalisation of the electricity market was done in Latvia in several steps and was finished on January 1, 2015, when every single customer (household) could participate in a free power market. In 2020, 14 electricity retail traders were operating in Latvia, each of them with an annual amount of electricity sold exceeding 10 GWh. Nord Pool electricity exchange's bidding areas are open in all three Baltic States, in Latvia it began operating on June 3, 2013. Thus, companies and households can choose to purchase electricity not at fixed but at market prices. A similar liberalisation process has happened to the natural gas market. Since April 2017, the historical natural gas monopoly *"Latvijas Gāze"* had to legally separate its natural gas transmission and storage infrastructure from the natural gas trading and distribution functions (sprk.gov.lv). 11 natural gas retailers have started operations in Latvia.

How the factor influences ENCI: The process of liberalisation has already encouraged individual homeowners to produce their own renewable electricity, paving the way for collective self-production. However, the development of energy communities in Latvia is still in its early stages due to various reasons, primarily the lack of a fully established legislative framework that enables their formation. As energy prices have become more transparent, Latvian citizens have become more conscious of their energy consumption habits. This has led to a greater emphasis on energy efficiency and conservation, as well as a growing interest in sustainable and renewable energy sources.

Affected ENCI types: Types 1, 3, 7.

Local examples: Since the energy market liberalisation in Latvia, there has been a notable increase in the number of households installing solar PV panels to generate their own electricity (for more details see below in factors T1 and T2). This has led to a greater sense of energy autonomy and a feeling of being actively involved in the energy system.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in Latvia: Energy taxation in Latvia is designed following the EU Energy Taxation Directive 2003/96/EC which establishes the minimum tax rates. The main energy taxes are:

- *Excise tax* on natural gas. Discounted rates are applied for industrial production as well as agriculture and fisheries.
- *Excise tax* on diesel oil and residual fuel oil utilised for heat production. Oil gasses and other hydrocarbons, if supplied to persons who use them as heating fuel or in gas furnaces, are exempted.
- *Natural Resources Tax* applies to coal, coke, and lignite.
- *Electricity tax.* Currently, transportation of goods and passengers using electricity, household users, and street lighting services are all excluded.

Latvia has introduced a *Natural Resources Tax* on CO_2 emissions from the combustion installations, the total rated thermal capacity of which does not exceed 20 MW (the cut-off for inclusion in the EU ETS). The current tax rate is €15/t CO_2 (rate from January 1, 2022) unless the installations make use of RES. As the

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general principle, the households are not taxpayers.

Natural Resource Tax provides for taxation of certain RES technologies as well, such as hydropower plants (at a rate of €0.00853/100 m^3 of water flowing through the hydrological structure) and wind power stations or power station parks with a total capacity of more than 125 kW (as the "C" category polluting activity, €250 per year). As the local social acceptance promoting the measure, Energy Market Law provides new wind parks, put into operation from January 1, 2023, shall pay the compensatory payment to the municipal budget, the draft governmental regulation provides the annual payment in the range of €2500 to €3500 per installed MW depending on capacity utilisation.

The use of solid biofuels is not taxed. Moreover, regarding the household sector users, the reduced VAT rate (12%, compared to the normal rate of 21%) is applied to supplies of wood fuel and thermal energy (independently of the utilised fuel).

In 2011 -2012 Latvian government has cancelled the entry of new entrants in both the RES-electricity and RES-CHP feed-in support schemes and currently the controlled closure of the feed-in-tariff (FIT) scheme is ongoing. Neither feed-in premiums nor competitive bidding/auctions are currently applied in Latvia.

In the transport sector, the emissions-based taxation policy has been introduced in Latvia in several steps. Currently, annual vehicle operation tax based on the specific CO_2 emissions is applied (1) for cars, first registered after 2008, and (2) light duty vehicles first registered after 2011. In case of the specific CO_2 emissions are below 50 g/km zero tax rate is applied. For buses and heavy-duty vehicles (gross weight above 3500 kg) annual operational tax is based on EURO class, starting from 2021. The conditions of the *annual company car tax* encourage the purchase of electric cars in companies. The excise duty is applied also in the transport sector.

How the factor influences ENCI: Excise duty affects the price of common transport fuels and indirectly contributes to mobility patterns. Despite the reduced excise duty rates for E85 and B100 fuels in the transport sector, the utilisation volumes of these fuels are very low. Similarly, despite the temporary promotion of natural gas in the transport sector (the reduced rate – 19% of the normal rate – is applied for the period 2021-2025), the number of vehicles running on gas is below four hundred. Latvia has the "traditional approach" to applying a reduced excise tax rate for a certain volume of diesel used in the agriculture sector. On the one hand, the desire to support the agricultural sector is understandable, but from ENCI's point of view, this could be considered a harmful subsidy.

Affected ENCI types: Types 1, 3, 5, 7.

Local examples: Latvian local governments can influence ENCI with real estate tax conditions - by setting allowances for buildings that have been energy-efficiently renovated. The city of Riga has established a significant tax cut for energy-efficient renovation of multi-apartment buildings (90% cut for 10 years) and a 90% tax cut for 5 years for already built individual near-zero energy buildings. Similar tax cuts for multi-apartment buildings are also available in several other Latvia municipalities. In Valmiera one year after the completion of construction works that increase energy efficiency, buildings in which economic activities are carried out can receive 50% property tax relief.

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EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Latvia: Latvia is intensively using EU funds to promote the energy system transition. To promote energy efficiency improvement and RES utilisation, particularly electricity generation for self-consumption, Latvia currently has a rather wide investment co-financing system, based on the EU funds, Resilience and Recovery facility as well as national EAAI instrument. Different buildings are targeted: multi-apartment and single-family/two-apartment buildings, state buildings, municipal public buildings and infrastructure and public services providers, education, culture and health sector institutions, manufacturing industry, and others.

In the transport sector, state co-financing is provided for the purchase of electric vehicles of the M1 and N1 category by both individuals and the manufacturing industry sector. Support is also provided for further expansion of the recently established EV charging network, for clean public and municipal transport as well as electrified passenger railway, particularly in the Riga metropolitan area. Particular support programs further develop bicycling routes.

In many cases, the combined financial instrument approach is applied, e.g., regarding the energy-efficient renovation of multi-apartment buildings - a loan issued by the JSC "Development Finance Institution Altum" (if the commercial financial institution refuses the loan), a guarantee for the loan issued by the commercial financial institution, a subsidy (grant, up to 49% of the project eligible costs). "Altum" also has soft loan programs. The areas, for which the loan is available, are energy efficiency, renewable energy, green non-residential buildings, and sustainable mobility. The main criterion is adequate flow of money – payment of loan due to cost savings. The loan can be received by a wide range of interested parties – individual merchants, micro, small and medium-sized enterprises, and large enterprises, and state and municipality-owned companies. In addition, to ensure qualitative investments "Altum" offers grants for energy audits in the frame of the ELENA program[13], on condition the technical assistance grant recipient undertakes to make the investments at least 20 times in relation to the amount of technical assistance received.

How the factor influences ENCI: Effective support programs for households promote both energy efficiency measures and solar PV panel installation (especially in combination with the electricity net accounting system), while at the organisational level, cooperation between employees and employers is promoted. State aid programs support single-family houses and multi-apartment buildings relatively well. In multi-apartment buildings focus is on energy efficiency improvement, while in single-family buildings – on renewable energy self-production, particularly by solar PV. Renewable energy communities are planned as one of the beneficiaries of state aid programs, however, the details are not elaborated, and energy communities are still in the embryonic stage in Latvia.

Affected ENCI types: Types 1, 3, 5, 7.

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[13] ELENA (European Local Energy Assistance) is a joint initiative of the European Investment Bank and the European Commission under the Horizon 2020 programme. ELENA provides technical assistance for energy efficiency and renewable energy investments targeting buildings and innovative urban transport, https://www.eib.org/en/products/advisory-services/elena/index.htm

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Local examples: Riga city has a support system for the development of the multi-apartment residential building energy certificates, covering up to 70% of the costs. On the other hand, the municipality is also co-funding the technical survey of multi-apartment residential buildings, up to €1,100 per project.

EC8. Green industry development and green job creation

How is this factor manifested in Latvia: Latvia seeks to take on the green and digital transitions, expecting positive effects for its economy and labour market. The study from the Bank of Latvia reveals that sectors with the highest carbon intensity are those of food and agriculture, transportation, forestry and logging, and several industrial sectors. These sectors will have to go through significant changes if they want to take part in the decarbonisation of Latvia's economy. This will have also a significant impact on the labour market. However, according to the Green-Tech Cluster, which brings together 66 Latvian companies, and educational and research institutions, the main green economy sectors in Latvia are renewable energy (biomass, wind energy, hydroelectric energy), component manufacturing for the energy industry, sustainable materials, recycling (biodegradable materials, waste management, wood waste, construction materials), and organic food. Latvia's national support programmes, co-financed by the EU funds/Recovery and Resilience Facility envisages promoting the research and development of new products and services.

The green economy is an interdisciplinary sector and falls within the responsibility of several ministries: the MEC, the MEPRD, and the newly established Ministry of Climate and Energy. Latvian Investment and Development Agency help entrepreneurs become more circular and climate-friendly in their businesses.

How the factor influences ENCI: One way in which green industry development and green job creation can promote energy citizenship is by increasing awareness and understanding of energy issues among citizens. As more green jobs are created, more people become engaged in the green economy and have a better understanding of the environmental impacts of energy production and consumption. This, in turn, can lead to more informed and active participation in energy-related decision-making processes at the local and national levels. In addition, green industry development and green job creation can foster a sense of ownership and responsibility and provide opportunities for citizens to actively participate in the transition towards a sustainable energy future.

Affected ENCI types: Types 1, 3, 7.

Local examples: On August 30, 2022, the regulations of the Cabinet of Ministers on Resilience and Recovery Facility investments have been adopted, as a result of which the creation of at least one industrial park of national importance is foreseen in each of the four regions of Latvia (except the Riga region), creating a total of at least 328 new high paying jobs. In turn, Latvia's Just Transition Territorial Plan envisages regional-scale training programs for increasing the skills and knowledge of municipal and regional specialists and/or retraining for working with climate-neutral economy issues.

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Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Latvia: The Russian invasion of Ukraine in 2022 and the COVID-19 pandemic have posed difficulties for Latvia's efforts to reduce poverty and prompted the government and NGOs to take action to make sure Latvia is still on schedule to reach the U.N. Sustainable Development Goals by 2030 (SDGs). Although since 2014 the proportion of the population at risk of poverty or social exclusion has decreased by 3.8 percentage points, Latvia is still one of the EU member states where this indicator is one of the higher ones. Although disposable income is gradually increasing, this process is not consistent or equal among quintile groups of income. In recent years, a significant increase in wages has been observed, and the average gross monthly pay climbed by 11.7% in 2021 (Risk of poverty and social exclusion in Latvia in 2020, CSB), reaching an average of €1,277/month. This represents the average wage's fastest rate of growth in the previous 13 years. Despite improvements, a high proportion of the population is at risk of poverty or social exclusion (in 2019 – 27.3% or 518,000 people). Additionally, a significant portion of these inhabitants (in 2019 - 22.9% or 434,000 people) have disposable incomes that are below the poverty risk level. Statistics show that the aged, single persons over 65, the unemployed, those dependent on social benefits, etc. are the groups most affected by energy poverty (Zalostiba, Kiselovs, 2021). Energy poverty in Latvia has been addressed in three characterising dimensions: low income, high costs of energy services, and unsatisfactory housing conditions (primarily related to energy efficiency aspects).

The Central Statistical Bureau of Latvia's figures shows that the percentage of citizens living in homes with subpar housing conditions is steadily declining. According to an examination from the perspective of the household, this issue was most prevalent in homes with one adult and a child (27.4%) as well as those with just one adult (18.6%). Households with lower incomes are particularly impacted by this issue. The ability to keep dwellings warm enough is nearly at the EU average level (7% in the EU, 8% in LV); the indicator is better among people whose income is below the poverty line (18% in the EU, 16% in LV). According to data from the Central Statistical Bureau of Latvia the rate of households, which could not afford to pay arrears on mortgage or rent, utility bills, or hire purchase instalments due to the lack of money has gradually decreased over the past year for both –all the households and households below the poverty risk (see Fig.1)

How this factor influences ENCI: Energy poverty in general is hindering ENCI due to households in energy poverty have no own resources to develop ENCI forms, and, as already noted above, there are no yet systematic approach developed by the government how to involve energy poverty households in energy transition processes.

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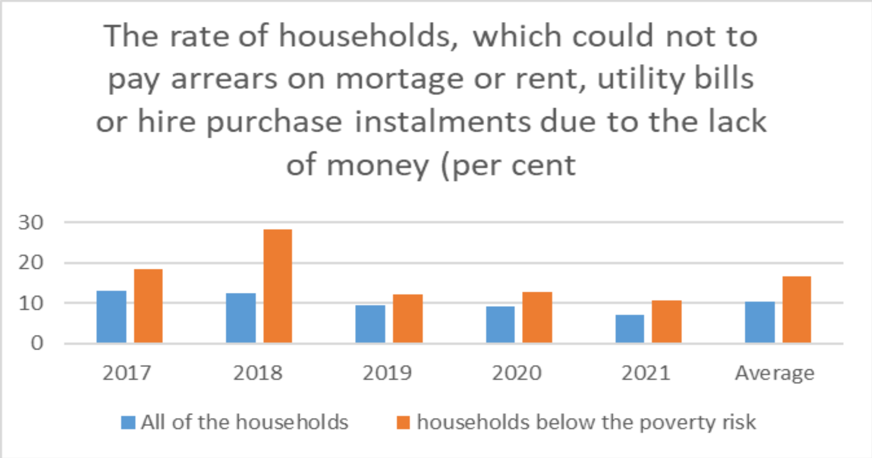
Figure 11.1: The rate of households, which could not pay areas on mortgage or rent, utility bills, or hire purchase instalments due to lack of money.



Source: Source: CSB, database NNN010:

https://data.stat.gov.lv/pxweb/lv/OSP_PUB/START__POP__NN__NNN/NNN010/

Affected ENCI types: Types 1, 2, 3, 7.

Local examples: The average gross monthly salary in Latvia varies significantly across its regions, with three distinct levels observed. The Riga planning region has the highest average salary of €1,410/month, followed by Zemgale and Kurzeme at €1,089/month and €1,079/month, respectively, while Vidzemes has an average of €1,011/month. The lowest average salary can be found in Latgale, where it is only €896/month, according to 2021 data (nva.gov.lv).

Riga. According to the data of the State Employment Agency on December 31, 2022, the unemployment rate in Riga was 4.3%, which is lower than the national average (6.1%). In the public sector, the average gross salary in 2022 was €1,336/month, while the national average is €1,151/month. In the private sector – €1,245/month, the national average is €1,138/month (nva.gov.lv).

Valmiera. On December 31, 2022, the unemployment rate in Valmiera was 3%, which is lower than the national average (6%), and one of the lowest in the country.

S2. Energy literacy, awareness and skills

How is this factor manifested in Latvia: In Latvia, financial literacy in local strategies is more formalised, developed, and evaluated than energy literacy. Therefore, there is a lack of available information on the energy literacy of the population. Literacy in energy efficiency in residential buildings is particularly strongly promoted by the information program "Let's Live Warmer", which started in 2010. It can be assumed that the start of a new program of state subsidies available for RES technologies in single-family buildings in 2022 will also contribute to the increase of energy literacy.

Individual heat energy metering enables residents to supervise their consumption and energy costs thus encouraging them to save energy and thus directly relates to energy literacy (see Riga example below). The

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end-users of electricity, natural gas, thermal energy, and energy used for cooling, should have the opportunity, without requiring a separate payment, to receive from the trader at least once a year additional information that promotes a change in the end user's habits. The electricity trader provides the end user with informative material about the origin of the electricity supplied.

There still are no official statistics on energy literacy in Latvia. Thus, we looked at the energy-related behaviour of the survey conducted by ltd. “Latvijas Fakti” (Latvian Facts) in September 2022, commissioned by the Bank of Latvia. More than half (56%) of respondents had already reacted to the increase in energy prices. The most popular of the answers was the implementation of energy efficiency measures in the home (38% of all respondents) (bank.lv). The next most frequently mentioned reactions were direct money-saving measures (these respondents saved money to pay upcoming bills or drove less). 4% of respondents have installed an energy microgeneration device on their property. In its turn, for the respondents who planned to react, the nearest measure in the future was also associated with saving funds by limiting other non-primary consumption, without significantly changing the level of comfort. It can be assumed that the cost crisis created by the energy sector has, in its way, increased energy literacy among different population groups (makroekonomika.lv).

In December 2021, the power distribution system operator “Sadales tīkli” conducted a customer survey (in cooperation with the research centre “Kantar”) on the use of smart meter indicators. At the time of the survey, smart meters had already been installed in 90% of households. 33% of those residents who have a smart meter installed have already used their data to review their electricity usage habits or choose the most appropriate electricity tariff plan. About 18% of the respondents planned to start doing so in the near future. The option of consumption analysis was used less often, mostly by financially well-off residents (family income per person is over €1,000/month) or by seniors aged 65-75. It might be assumed that the first group has no interest, and the second group lacks skill. When asked about the reasons why they have not used the opportunity to track their electricity consumption in detail, the majority (81%) of respondents answered that they do not have the need or desire to do so, while 14% stated that they do not do it because they do not know how. Regarding skills, it is important that the Energy Efficiency Law, among others, provides that the system operator in case of installing a smart meter shall provide end-users with information regarding the management of smart metering data (sadalestikls.lv).

How the factor influences ENCI: Based on the presented surveys it might be concluded that more than a half of population has knowledge and awareness on the benefits of energy efficiency (although mostly focusing on economic benefits) and are ready to perform relevant activities.

Affected ENCI types: Types 1, 2, 3, 7.

Local examples: In the Vidzeme region, the project “Smart Living” had been implemented from March 2020 – December 2022. The project aimed to promote public awareness for environmentally friendly lifestyles and thoughtful/smart use of energy resources, emphasising also the use of RES, in Vidzeme and South Estonia by combining the knowledge of both countries and the competence of partner organisations. Particular activities included: an interactive platform allowing to evaluate in an attractive way the energy processes taking place in the building; several dozen events for residents and building managers on current topics such as lighting, heat supply, water consumption, building insulation, transition to RES, and other activities. The final event of “Smart Living” in October 2022 had been devoted

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to the development of energy communities. The partners of the project had been: Green and Smart Technology Cluster (Latvia), Vidzeme Planning Region, and Tartu (Estonia) regional energy agency (vidzeme.lv).

The individual accounting of heat energy consumption in multi-apartment buildings developed by SJ "RĪGAS SILTUMS" ("RIGA HEAT", city district heating utility) includes not only the technological creation of the system, but also the education of residents in energy saving by distributing educational materials. During the heating season, a visual overview is prepared, in which the apartments are divided into three heat energy consumption groups - high, medium and low consumption (kWh/ m2). The building manager places these visual reports in the stairwell on the information board. This allows the residents to compare the consumption of their apartments and make changes as far as possible. As a result, comparing the thermal energy consumption groups of January 2014 and January 2021 reveals that the population's energy literacy has increased significantly. If in 2014 only 27% of apartments corresponded to low heat energy consumption, then in January 2021 this group already included 53% of apartments.

One of the most vocal recently is the campaign "Energovienoti" (*Energy United)* which was launched by a group of stakeholders in Spring 2022. In May 2022 it has been formed as a project led by the Riga Technical University's Institute of Energy Systems and Environment. A range of tools to promote energy literacy is envisaged. Among them, we would like particularly to note the promotion of energy literacy of energy-poor households. One small settlement is selected for a pilot project and the implementation of a real energy efficiency action plan for energy-poor households will be demonstrated. (lvafa.vraa.gov.lv).

S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in Latvia: The results of the Organisation for Economic Cooperation and Development (OECD) survey show that in the EU, Latvia has one of the lowest ratings for climate change awareness. For instance, barely 10% of Latvians believe that climate change is a significant matter that has an impact on their daily life (the lowest in the EU). However, there is a strong perception that the EU is the primary player in the fight against climate change and that national institutions (such as the parliament and the government) are not required to address the issue. When it comes to people's belief that they can help solve the problems caused by climate change, the picture is similar: only 44% of people believe they can have an impact (oecd-ilibrary.org). However, it should be mentioned that the situation started to change in 2022 in connection with the geopolitical situation and the increase in the prices of energy resources. The discussions on both energy efficiency and the issue of climate change prisms on energy transition have increased.

Regarding participation in decision-making, Latvian legal acts and policy documents include various public involvement mechanisms (see section L3), however, public engagement is still rather low as people think these mechanisms are not effective. The same applies to the public participation of NGOs, e.g., although 72% of organisations have participated in public discussions, only 42% evaluate them as effective. There is an assessment that these participation mechanisms are rather formal and inherently unable to influence the decisions made. It is also often pointed out that state representatives are rarely interested in the participation of the non-governmental sector. At the same time, this might be also too

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exaggerated an opinion as a range of Advisory Boards can be evaluated as well working. A study conducted between 2020-2021 found that 60% of legislative projects requiring public participation resulted in NGOs providing opinions or reconciliations. Despite some ministries sending draft legislation to advisory councils, working groups, and expert groups, low motivation and/or limited resources of organisations may be hindering cooperation in the legal drafting process (Latvian Civic Alliance, 2021).

Social protests are mostly part of the not-in-my-backyard movement against wind farm projects and the construction of an LNG terminal in Skulte. Also, see Political factor P4. regarding civil society organisations and NGOs' participation in the energy sector.

How the factor influences ENCI: Participation in energy decision-making is manifested mainly through advisory councils and the participation of NGOs in the discussion of legal and policy planning documents. Regarding actions that are taken for the energy transition process, on the one hand, people in Latvia have so far not seen climate change as a direct threat locally, however, the year 2022 showed that with state support subsidies, people were actively involved in installing solar PV panels in their households as the form of individual ownership. Motivation can be discussed; however, if there is financial support and infrastructure available, as easy digitalised permitting procedures, citizens are ready to give their contribution in the direction of the energy transition. High energy prices provide additional motivation. Also in 2022, discussions about climate change and the need for a low-carbon energy transition have appeared significantly more in the public space and in the media.

The collective action is a joint agreement of apartment owners for the renovation of a single multi-apartment building. However, these activities are mostly related to the geographical area of the house. Collective prosumers in the electricity sector do not exist now, because the general legislation of the energy community was adopted only in July 2022 and the governmental follow-up regulations are still being developed, particularly regarding energy sharing. The organisation of the first REC pilot projects, which meet the conditions of REDII, has been initiated.

Affected ENCI types: All types.

Local examples: Broader neighbourhood associations and the “smart villages” movement are developing in Latvia, but in most cases, with some exceptions, they have not yet included energy issues.

S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Latvia: The results of the OECD survey on public trust in state institutions show that only every fourth resident of Latvia trusts the government and/or state administration, while around 62% do not. Only a little more than 13% of Latvian citizens believe that the political system provides them with the opportunity to influence government decisions. Trust in the state institutions is much lower than in other OECD member states. At the same time, Latvian residents have shown a very high level of satisfaction with administrative services - 61% of respondents gave a positive assessment, which is very close to the average of OECD countries - 63%. However, the public believes that more needs to be done to improve long-term national planning and preparedness (oecd-ilibrary.org).

How the factor influences ENCI: When there is a lack of trust in institutions and collective endeavours,

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individuals and communities may be less likely to engage with the energy system or may engage in ways that are not productive or effective. For example, low trust in institutions in Latvia makes it less likely for people to participate in energy policymaking processes and makes them more sceptical of RES technologies and their potential benefits if they are promoted by the government. This lack of trust is particularly challenging in the context of the energy transition, where significant changes are required to move towards a more sustainable and equitable energy system. Such changes often require collective action, coordination, and cooperation across different sectors and levels of government, as well as the participation and engagement of local communities.

To promote energy citizenship in Latvia, it is therefore important to build trust in institutions and collective endeavours. This can be done by promoting transparency, accountability, and participation in energy policymaking processes. This will also raise trust in renewable energy technologies and their potential to create a more sustainable and equitable energy system. By fostering a sense of trust and collective action, Latvia can make significant progress towards a more just and sustainable energy future.

Affected ENCI types: All types.

Local examples: Latvian residents still express more trust in local governments. According to the noted above OECD survey, 42.1% of respondents expressed trust in local governments, which is close to the average indicators of OECD countries - 46.9%. 35.24% of respondents trust civil servants (oecd-ilibrary.org).

Riga. A survey was conducted among Riga residents in November 2022, in which respondents were asked to assess the performance of the Riga City Council. Out of all the respondents, 45% expressed satisfaction with the council's activities, while 8% identified issues with the council's work as being among the most significant concerns. This included 3% who mentioned concerns about corruption.

S9. Willingness to invest in the energy transition

How is this factor manifested in Latvia: Currently, with the high energy prices and the wish to move away from Russian gas, there is a very strong willingness to invest in renewable energy and energy efficiency. For more about these investment projects see Economical factor (EC1.). In this sub-factor, we assess the willingness of Latvian citizens to invest in collective energy production systems. The *Choice Experiment* study by Brauwer and Cohen (2020) estimated the respondents' willingness to invest in community-administrated wind parks, the probability that Latvia's respondents will invest was evaluated to be 14.73%. In its turn, the (non-representative) survey, done by Dance (2020) covered 129 respondents and, among other issues, also investigated the willingness to invest in community wind parks. 15.5% of respondents in this survey answered that they would participate. Thus, the results of both studies coincide. Even though these data focus on community wind parks, it makes sense to use these results as a proxy for willingness to invest in other RES technologies potentially implemented by energy communities.

How the factor influences ENCI: Willingness to invest in the energy transition can have a significant impact on energy citizenship in Latvia where is a growing interest in renewable energy and the need to move away from fossil fuels. It can also empower individuals and communities to take more control over their energy use and become more actively engaged in energy decision-making processes. Furthermore,

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investing in the energy transition can help to address environmental and social challenges, such as air pollution and energy poverty. This can contribute to a more sustainable and equitable energy system, which is an important aspect of energy citizenship.

Affected ENCI types: Types 1, 2, 3, 7.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, onshore and offshore wind, renewable hydrogen)

How is this factor manifested in Latvia: Total capacities for power generation in Latvia consist of around 3 GW, of which RES plants are around 64% and natural gas plants around 36% (CSB, theme "Energy"). RES plants are large hydro (the Daugava River cascade) ~50%, small hydro (small rivers) ~1%, wind ~4.5%, solar PV ~3.5%, biomass (solid and gaseous) ~5% of the total share of current power plants capacity. NECP2030 foresees to increase in the installed capacity of wind power and solar PV***.*** In its turn, expanding solid biomass and biogas capacities for the production of electricity is not planned (energy.ec.europa.eu).

In 2022 boom in the installation of solar PV micro-generators (capacity below 11.1 kW), particularly in households, took place by increasing their total capacity by more than 10 times. At the end of 2022 the total capacity of solar PV micro-generators, connected to the power distribution grid, reached 94 MW and is expected to double in 2023. Simultaneously, larger-scale solar PVs are installed in companies as well as the municipal sector (the average capacity of the installed unit is around 70 kW, and at the same time very differs in the range (em.gov.lv). The important newcomers will be also ground-mounted solar PV parks. The interest in solar PV parks is huge, in 2022 it was reserved around 1 GW total capacity for them and more than 150 MW connection to the grid already in 2023 might be expected.

In turn, the current wind park's total capacity in Latvia is low, slightly more than 100 MW. At the same time, the interest in future wind parks is huge. The state-owned electricity utility company Latvenergo and Latvian State Forests have established in July 2022 the joint Ltd "Latvia's Wind Parks" ("*Latvijas vēja parki*") and are planning to set up 100 to 120 wind turbines with a total capacity of 800 MW up to 2030 (https://eng.lsm.lv/). The other private investors envisage onshore wind parks with a total capacity of around 2 GW. In September 2022, the particular law on facilitated construction procedure (see in Environment, factor EN4) has been adopted providing a clear signal for the development of large-scale wind (≥50 MW) as well as solar PV parks ((≥10 MW), onshore wind parks may apply for the status of national significance energy production object. In addition, the development process of the Latvian-Estonian off-shore wind park ELWIND has started. If the project will be implemented at full scale, Latvia's planned assigned capacity will be 500 MW in 2030.

It is planned by NECP 2030 to increase the share of renewable energy in heating and cooling by modernising the installed capacities of biomass-use equipment, increasing the capacity of installed heat pumps and cold pumps, as well as increasing the use of solar energy in the production of heat energy.

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How the factor influences ENCI: Renewable energy self-production in Latvia has been for now mostly limited to the single household level, because the full legislative framework for collective self-production/energy communities has not been adopted yet by the end of 2022. From the ENCI point of view, small-scale solar PV installations must be considered as the most appropriate technology for renewable electricity self-production in the near future. During 2022 the number of solar PV micro-generators in households, compared to 2021, has increased sixfold and has reached 12,000. This number covers around 3.7% of the total number of single-family and two-apartment buildings. As pointed out by the distribution system operator (DSO) (nra.lv), on a sunny summer day, the microgenerators might provide more than 10% of the total electricity production capacity needed to cover Latvia's electricity consumption. There are no special restrictions for the connection of the micro-generators. An additional motivation tool for the citizens is the availability of state support for solar PV panels. Although this state support programme co-finances equipment purchases costs for different RES-heat and RES-electricity technologies, the interest in solar PV panels dominates (~89% of the total number of installed technologies, followed by heat pumps, around ~9%) (ekii.lv). It is expected that the total capacity of micro-generators in the household sector would double in 2023 if grid connection service tariffs and net exchange conditions with the grid remain favourable to the population (see factor L3).

It is not clear whether and how the simplified procedure for the construction of wind parks will affect in practice the public participation process. At the same time, the construction of wind parks 'in the forests, out of sight", combined with the compensatory payment for local communities (see factor EC4) can reduce local public opposition. Wind turbines, owned by energy communities, are hardly possible in Latvia. One of the reasons is the lack of cooperative cooperation and "bad memories" of it from the time of the Soviet Socialist Republics. From a technology perspective, building a wind energy community will require more members compared to building a small solar PV community, to minimize the investment cost for a single household due to the cost effective large-scale wind turbines. The challenge also is providing adequate financial support for energy communities to ensure their economic viability (see the Economic factor).

Affected ENCI types: Types 1, 5, 7.

Local examples: In October 2022, the largest number of solar PV micro-generators had been installed in Riga metropolitan area – Marupe municipality (around 1020 with a total capacity of 8.2 MW), capital city Riga – 860 with a total capacity of 6.9 MW and Ropazi municipality – 660 with total capacity 5.6 MW) (lsm.lv). Thus, one can see here a certain relationship with the level of household wealth.

T2. Decentralised energy system and storage

How is this factor manifested in Latvia: It is possible to connect to the power distribution grid: (1) a micro-generator with a capacity of up to 11.1 kW, as well as (2) a power station with a capacity of up to 14,999 MW. Larger power plants are connected to the electricity transmission network. It shall be underlined that Amendments (July 14, 2022) to the Electricity Market Law directly provide that the energy community does not have the right to acquire and hold in ownership, to establish, purchase or lease the power distribution networks, and to operate them autonomously. Thus, sharing of electricity by energy communities, as well as jointly acting renewables customers (self-consumers) shall be done through the power distribution grid. The major power DSO in Latvia is SJSC "Sadales tīkls" ("*Distribution network"),*

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having 1.1 million end-user objects connected. Thus, before the start of the energy community, its initiators shall ensure there are **available system capacities.** The published by the DSO (SJSC "Sadales tīkli") map, showing the substations (110/ (6-20) kV) and their available capacity for electricity production and consumption, facilities the process. One must apply to DSO to connect the electricity generation facility with a capacity below 500 kW (which could be a capacity for energy communities utilising solar PV technology) (sadalestikls.lv). For the facility with a capacity above 500 kW before the submission to DSO, receiving of permit from the Ministry of Climate and Energy is necessary.

How the factor influences ENCI: The economic viability of the energy community requires the application of transparent, non-discriminatory, and cost-reflective power network charges, ensuring that they contribute in an adequate and balanced way to the overall cost-sharing of the system When developing the differentiated power grid services tariffs, it is necessary to consider the extent to which the public grid (low, medium, and high voltage) is used by the energy community, thus resulting in the specific tariff regime for electricity sharing. This is a highly important factor that may promote energy communities. In its turn, the non-existence of such tariffs will hinder the renewable energy community's development. However, up to now, the assessment has not been made in Latvia for the elaboration of such tariffs, considering the positive impact of renewable energy communities' operation on reducing the losses in the power system.

Affected ENCI types: Types 1 and 7.

T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in Latvia: Good overall development in smart power metering in Latvia. The national DSO SJSC " Sadales tīkls" has almost finished the transition programme to smart power meters, namely, already more than 98% of all clients (objects) have smart power meters (sadalestikls.lv). However, regarding **electricity sharing,** the DSO has no obligation to organize it. Electricity sharing shall be provided by the energy community or jointly acting renewables self-consumers, for this, the agreement with the electricity trader shall be concluded regarding the sharing of the electricity and the selling of surplus (not shared) electricity to the trader at the agreed price. ICT solutions for peer-to-peer energy trading/virtual power plants are not developed yet in Latvia.

District heating (DH). Individual heat energy metering, if heating is supplied from a common heat source or a DH system, has been introduced in several steps and currently is mandatory for all existing (residential) buildings, on condition that the individual accounting (installation of individual heat meters and heat cost allocators) is economically justified. Remotely readable metering devices have to be installed, for the devices installed before January 1, 2021, remote readability must be ensured by January 1, 2027(COM, 2020).

How the factor influences ENCI: Digitalisation and smart metering provide the option for citizens to control their energy consumption and change their energy consumption behaviour. For example, the survey, provided by the DSO "AS Sadales tīkls" in 2021, had indicated that at least one-third of end-users already use the options provided by smart meters, and around a one-fifth plan to do soon

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(sadalestikls.lv/lv).

An important aspect of promoting the energy community is state support for the development and implementation of digitalised tools so that renewable energy communities can effectively manage their electricity flows and electricity sharing. Similarly, the condition of the Latvian Electricity Market Law that the energy community shall agree with the electricity trader should not in practice lead to a situation where members of the potential energy community would be forced to choose the same electricity traders. These considerations should be adequately discussed.

Affected ENCI types: Types 1 and 7.

T4. Energy efficient buildings

How is this factor manifested in Latvia: The Latvian national Construction Standard LBN 002-19 “Thermometrics of Building Envelopes” (Latvia Construction Standard, 2020) provides that **new residential buildings** shall be nearly-zero energy buildings, starting from January 1, 2021. Namely, it should be provided the energy consumption for heating is not higher than 40-60 kWh/m2 per year (depending on the heated area, a smaller building may have a higher threshold) on condition it is technically and functionally possible and cost-benefit analysis on the useful lifetime of the relevant building does not indicate to losses (COM, 2021). According to the noted Standard, from January 1, 2021, the **reconstruction projects** of multi-apartment buildings should limit the energy for heating to 80 kWh/m^2 per year, and in one-apartment and two-apartment buildings – to 90 kWh/m^2 per year. The information programme *“Let’s live warmer!”* started in EU Funds 2007-2013 planning period. In 2020, the Ministry of Economics, Ministry of Environmental Protection and Regional Development, and 34 stakeholders signed the renewed Memorandum of Cooperation, committing to jointly ensure the availability of information on possibilities of the renovation, reconstruction, and energy efficiency improvement of buildings. The programme consults also regarding the practice of maintaining the apartment building after renovation. Now the “Let’s live warmer!” has extended the activities to the target group of single-family and two-apartment buildings as well.

In order to provide financial support, an investment co-financing program for energy-efficient renovation of apartment buildings has been operating since 2009. The renovation projects under the National Operational Programme “Growth and Employment” for the 2014-2020 programming period will be finished by October 1, 2023. Continuing, on December 8, 2022, the new programme financed by Latvia’s Recovery and Resilience Plan (RRP) started. In its turn, Latvia’s Cohesion Policy Programme for the 2021-2027 programming period will be started after the RRP. The support is provided in the form of a combined financial instrument (see factor EC5). Currently, the support program for single-family and two-apartment buildings is also operating, which is financed by the State Energy Efficiency Fund, but after that, it is planned to be financed from the funds of the Cohesion Policy Program for the 2021-2027 period.

How the factor influences ENCI: This factor is an opportunity for ENCI, since the wide scope of methods is applied to reach and consult communities of the apartments’ owners regarding conditions and benefits of energy efficiency increase and the best practices of it, also financial support from the state is in place.

Affected ENCI types: Types 1 and 7.

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Local examples: The most active citizens in terms of energy efficiency of buildings are the residents of Liepaja, Valmiera, Ventspils, Jelgava, and Riga. Considering that most multiapartment buildings in Latvia are in Riga, the city is lagging behind many other municipalities. In the national competition, Valmiera city won the "Most Energy Efficient Multiapartment Building" in Latvia 2019.

The municipal capital company "Valmieras Namsaimnieks", Ltd which is the largest operator of apartment buildings in Valmiera, is very active in the renovation of apartment buildings to improve their energy efficiency. At the same time, it also means the proper operation of the house after renovation. In connection with this, the elders of the houses, are instructed, and information is given to the apartment owners.

T5. Smart mobility and green mobility

How is this factor manifested in Latvia: In order to promote traveling via public transportation it is crucial to provide citizens with **travel information**. Two frequently used systems can be used to organize public transportation trips across Latvia. These services are offered to the public and are shown as webpages – "Information service 1188". This program offers the chance to organize a trip using public transportation (intercity buses, trains, ferries). The second service is a website that focuses mostly on ticket sales. The website offers the ability to organize a trip by looking at routes. The program offers the chance to locate routes between stations that are not immediately connected (Yatskiv, I. et al. 2017). **Mobile app "E-mobi"** is the tool on the national network of electric car charging stations, the network of 141 fast charging stations throughout the territory of Latvia is maintained by the "Road Safety Directorate" (CSDD)(e-transports.org). To facilitate the process, a mobile app also has been created by one of the largest electricity traders Latvenergo Group, the trademark "Electrum" (elektrumveikals.lv). Investing the green bond loan, issued by the state-owned JSC "Development finance institution Altum", the electric car-sharing fleet (100 cars) had been established by the Latvian trademark company "Figsy" in July 2017. Another financed by loan project is an electric bicycle sharing fleet.

How the factor influences ENCI: In general, positive trends can be observed, although it is necessary to distinguish big cities from rural areas, where the situation is different. In the capital, there are ample opportunities for car sharing, electric scooters, and bicycle rentals, as well as a close public transport network. It would be necessary to work on the development of "park and ride" infrastructure throughout the country as well as bicycle infrastructure regarding mobility. In connection with electric charging stations, their coverage tends to grow, and at the moment it could meet the demand, considering the small number of electric cars from the total car park. Good internet coverage facilitates the use of various applications to plan a public transport route, and rent cars, electric cars, scooters, and bicycles. Various initiatives are being introduced such as the regional innovation scheme centre of the mobility knowledge and innovation community "EIT Urban Mobility" of the European Institute of Innovation and Technology has been opened in Latvia. It will provide cities, companies, and universities with a platform and a range of additional tools to meet the greenhouse gas emission reduction targets set by the European Commission. Also, in the Latvian Resilience and Recovery Plan (RRP), slightly less than €300 million are earmarked for the reform or greening of the Riga metropolitan area public transport system. With the funds of the RRP it is planned to improve the speed of movement by public transport in the Riga Metropolitan

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Area, integrate the railway with other modes of transport, purchase new zero-emission public transport vehicles, as well as improve the infrastructure for cyclists.

Affected ENCI types: Types 1, 2, 3, 4.

Local examples: Riga. The first **mobility point** in Riga and Latvia, introduced in 2020 by the Riga Municipal Agency's "Riga Energy Agency," connects several sustainable means of transportation and provides easy access to micromobility and public transportation options. With a counter for both bicycles and pedestrians as well as a testbed for smart-city technologies, the mobility point also serves as a trial area for the introduction of novel, data-based solutions. Bicycle parking spots, bicycle repair station, electric scooter rental station, bicycle sharing rental point, and smart solar bench that gives free Wi-Fi and solar charging for smart devices are all features of the mobility point infrastructure (Cepeliauskaite, G. et al., 2021). **Car-sharing** options available in Riga: CarGuru, CityBee, Fiqsy, and OX Drive (Tesla car sharing). **Electric scooters:** the following mobile applications for short-term rental electric scooters are available in the city - "Bolt", "Jungo", "Fiqsy" and "ATOM Mobility." **Electric moped** rental in Riga is available using these mobile applications - "Ride" and "Skok". The application for the **"Urban Mobility Incubator"** program, in which participants will have the opportunity to develop their idea, and deploy a prototype in a real urban environment, participants are encouraged to submit suggestions that address one of the city-defined climates-neutral mobility problems, such as promoting e-mobility, enabling low-emission zones, developing next-generation public transportation stops or creating a Mobility-as-a-Service (MaaS) platform.

Environmental factors

EN1. Climate vulnerability

How is this factor manifested in Latvia: From 1961 to 2020, a **steady increase in air temperature** has been observed both in the values of average air temperature (AAT) and the minimum and maximum air temperatures. The climatic standard norm of the AAT in the 1991-2020 and 1961-1990 periods are respectively +6.8^{0}C and +5.7^{0}C. The climatic standard norm of **annual precipitation** in the 1991-2020 period (685.6 mm) is 18.9 mm higher than in the 1961-1990 period. In the 1961-2010 period, the annual average number of **frost and ice has** decreased by 9 days, in some locations even by 10-16 days (LEGMC, 2017).

Extreme hot weather conditions. The annual number of **summer days** (temperature above 30°C) is on average from 4 to 26 ones, and as a result of the past climate change it has increased by an average of 1-5 days. Also, an increase in the frequency of **tropical nights** (temperature above 20°C) has been observed during the last couple of decades. The number of **calm days** (wind speeds below 3.4 m/s) has increased by about 13 days. Since 1966 average wind speed in Latvia has decreased by 8%; however, extremes of the maximum mean wind speed values may be observed both at the start and the end of the period. Meanwhile, **stormy days** in Latvia are observed rarely. **The number of annual heating degree days** is decreasing. Based on EUROSTAT data, a decreasing trend in the number of these days is visible. In the 2010-2020 decade, the number of these days has decreased by about 10% compared to the 1980-1989

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decade (LEGMC, 2017).

How the factor influences ENCI: The national-level political response to climate change is the national Adaptation Plan to Climate Change up to 2030 and national energy-climate policy planning documents (see factor P1). At the municipal level, municipalities develop Sustainable Energy and Climate Action Plans. In the national regulatory framework, the effects of climate change - changes in air temperature, changes in precipitation, icing layer on overhead pipes, etc. - are considered in the national Construction Standard “Construction climatology”. EU fund support programs require considering the potential risks caused by climate change, as well as preventing their effects, in measures to improve the energy efficiency of buildings.

The impact of climate change in Latvia is not so dramatic as to directly affect ENCI and is mostly related to the public's attitude towards global climate change. As shown by the annual survey performed by the European Investment Bank (2021), Latvia has one of the lowest ratings for climate change awareness - in 79% of the situations, the results are below the EU average (see more in factor S3).

It should be mentioned that the year 2022 has been significant in actualising dialogues with the public in various forms about climate issues, thus the relevance and interest in this issue has grown, it could promote environmental awareness in the context of climate change, as well as change people's opinion about how important climate change is.

The results of this EU-wide survey are also confirmed by the annual national 2021 survey (commissioned by the Latvian Wind Energy Association). If previously the cost criterion was equally important with the impact on human health and on the environment/nature, now it has confidently taken the first place, increasing by almost 10 percentage points during the year and reaching the highest indicator so far. The criterion of impact on human health has experienced a slight decline, but the importance of the criterion of impact on the environment/nature has decreased by more than 10 percentage points during the year. At the same time, an important result of the survey is that the respondents see that RES can contribute to meeting the challenges. If the price is the same, ¾ of the respondents would prefer electricity produced from renewable energy sources.

On the other hand, the results of the 2022 survey showed a slight drop-in support for the cost criterion and the support for the environmental criterion continued to decrease, while support for the population health criterion increased slightly. The most significant result of the 2022 survey is a rapid increase in the criterion of energy independence (respectively 39% of respondents in 2022 compared to 30% of respondents in 2021.

Affected ENCI types: Types 5, 6, 8, 9.

EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

How is this factor manifested in Latvia: Forests cover slightly more than 50% of Latvia’s area, providing a high opportunity for use of forestry and forestry processing industries residues in heat energy production, both district heat supply, in companies, and in individual or collective heating in residential buildings as well as in public buildings. Restrictions for the availability of forestry residues could be the

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competition with the forestry products processing industry, as the options of use of them in the industry grow. Another challenge is the high export of wood fuel, processed in pellets and wood chips, in the open EU market. Solar PV technologies can be considered the most appropriate technology for individual and collective active customers (renewable self-consumers) in Latvia in near future. The public sector also could install rooftop and ground mounted solar PV technologies. Latvia's rooftop solar PV technical potential is evaluated to be 1.43 TWh (Katalin Bódis, et al., 2019) which corresponds to slightly more than 20% of electricity total (in all sectors) final consumption. It might be assumed that around 60% of this technical potential could be untapped by energy communities. We cannot include small hydropower plants (HPP) in the future technologies for energy communities, as in the early 2000s more than 140 small HPP were built and has led to significant conflicts with nature conservations. Currently, the funds are invested in taking down some of these dams especially on the salmon migrating rivers. Even though there are no resource-type restrictions, we cannot include also wind plants as the technology for energy communities, at least for the near future due to other reasons (see factor T1).

The electricity trader "Enefit"(enefit.lv) provides an option to purchase green electricity with a small additional price (€1-1.99 addition to the monthly electricity bill): (i) a mix of renewable sources, (ii) wind energy, and (iii) solar energy. The **electricity trader "Electrum''** offers electricity having a share of renewable resources around two-thirds. In its turn, the **Electrum Drive** provides the charging of electric vehicles with 100% green energy.

How the factor influences ENCI: In combination with the EU Solar Strategy targets, the development of solar PV is the solid base for ENCI development. In turn, solid biomass is usable fuel for ENCI in the heating sector. There is an option to choose consumption of 100% green electricity, however, at the same time, it would be necessary to inform the consumer about the fairness of this energy, informing especially about the wind farm relations with local communities (transition from the concept of "green energy" to the concept of "fair energy".

Affected ENCI types: Types 1, 3, 5, 9, 10.

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Latvia:

Air Pollution. As most of the wood burning equipment used in individual households in Latvia is relatively old and the number of modern pellet boilers is small, a contradiction arises between the use of biomass as a climate-neutral fuel and air pollution.

Wind parks. In general, support for wind energy is visible (77% of Latvian residents in the 2022 survey supported the construction of wind parks), but at the same time residents are concerned about them. On July 14, 2022, Amendments to Electricity Market Law were adopted, including a new section "Compensation payments for the discomfort caused by wind power plants to the local community" (see factor EC4).

Solar PV parks. In Latvia, there are several large solar PV parks in the planning stage, with a capacity of 10 MW and more. However, Latvian legislation does not require an initial environmental impact assessment for these parks. The topic is still unknown, and it is not clear whether there could be objections from

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residents.

Waste. Since the intensive installation of solar PV has started only in the last two years, the potential dismantling of solar PV technologies in Latvia is not yet a topic of discussion. However, in 2021 and 2022, several articles on this topic have been published, especially in the Internet environment, describing EU requirements for the depth of processing and existing processing levels and several processing plants in EU countries as good practices. It can be assumed that when the technical life of the newly installed solar PV panels in Latvia will be over, by then both recycling technologies and the EU regulation on their recycling will have developed. There is no nuclear waste in Latvia.

How the factor influences ENCI: A series of state support programs promote the connection of residential buildings to district heating systems and the introduction of modern pellet boilers. In 2023, a state support program (co-financed by European Regional Development Fund (ERDF)) will be launched for the replacement of inefficient wood boilers with modern ones. These measures will promote the citizens' understanding of the need for synergistic reduction of GHG and noxious air pollution. However, the total financial volume of support programs is limited.

Regarding wind farms, the powers of local governments are reduced (increasing governmental powers) in the field of spatial planning in order to speed up the implementation of these projects. Thus, onshore wind parks may apply for the status of national significance energy production objects. At the same time, the compensatory instrument for the local community is introduced. Dialogue with the local community and the perception of the local community that the received compensation is claimable is an aspect of positive ENCI formation. As the measure is just being launched, it is difficult to assess its potential impact.

Affected ENCI types: Types 1, 3, 5, 9, 10.

Local examples:

Riga city, mitigation of noise pollution. The action plan for reducing environmental noise in the Riga agglomeration envisages such measures as reducing the noise caused by public transport (both by improving the public transport infrastructure and the vehicles themselves), the development of electric transport, and the promotion of the use of electric cars. Promoting the use of bicycle transport (expansion of the network of bicycle paths and bicycle lanes) and the construction of parking lots are also indirect tools for reducing noise pollution. It is planned to study the possibilities of applying “quiet” road surfaces.

Riga city has foreseen the creation of a low emission zone (LEZ). It is planned to complete the preparation of research and technical planning actions, traffic reorganisation plans, and LEZ implementation action plans in 2023. On the other hand, LEZ implementation activities should be gradually introduced until 2027.

Protests against wind farms. In 2018 and 2019, visual pollution was one of the reasons for residents' movements against wind farms in Zemgale (Dobele-Pienava) and the Ventspils region. Currently, there are construction plans for large wind farms in the Kurzeme region. In the initial discussion of wind parks in 2022, residents opposed wind parks in South Kurzeme. In 2021 and 2022, residents actively stood up against wind parks in North Kurzeme, including preparing visual material.

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EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in Latvia: It is positive that a number of companies are creating smaller scale solar PV parks in unused land areas inside the company's territory. Several larger scale solar PV parks are planned on uncultivated land. Among them, the construction of wind parks and solar PV parks in former peat fields is positively evaluated. Re-powering of existing wind farms would also be positively evaluated, as the residents of these areas already have experience with wind farms. However, due to the low development of wind energy so far, there are few potential repowering areas, for example, the Grobiņa wind farm

Plans to build large-scale wind farms, as well as solar PV parks on agricultural land, will certainly cause concerns and objections from residents. Also, plans for the construction of wind parks in forest lands may cause objections. Regarding solar PV parks, the existing legislative framework does not directly limit their theoretical establishment in areas of scenic value.

On September 29, 2022, the Law "On Facilitated Construction Procedure of the Energy Supply Structures Necessary for the Promotion of Energy Security and Independence" has been adopted. Regarding wind and solar PV parks, the facilitated construction procedure, **also in relation to** environmental impact assessment **(EIA),** is stated for: (i) wind parks with a capacity of 50 MW and above, (ii) solar PV parks with a capacity of 10 MW. However, this new regulation should not be perceived as an "indulgence" for project developers to cooperate as little as possible with the local community and local government.

How the factor influences ENCI: The key condition is cooperation with the local community and local government. Ideally, this cooperation should go beyond the legislative framework. When the local community understands that significant land use conflicts will not arise and they will be compensated, a positive ENCI will develop. The second key condition is fair treatment and fair rent payments to local landowners if their land is rented by a wind farm.

Affected ENCI types: Types 3, 5, 6, 8, 9, 10.

EN5. Biodiversity protection issues connected to renewable installation

How is this factor manifested in Latvia:

Biodiversity. The issue of biodiversity directly relates to such technologies as wind turbines and hydropower plants. Ground mounted solar PV systems might be the potential "client" as well. Indirectly, through the issues of harvesting input material, biodiversity issues relate to biomass technologies.

Biomass. Current governmental regulations stipulate that biofuel, biological liquid fuel, and biomass fuel may not be produced from raw materials obtained from land areas of high value in terms of biological diversity, as well as from raw materials obtained from land areas with a high carbon concentration. Among other criteria, logging must maintain or improve the long-term productivity capacity of the forest. Biomass sustainability certification systems will be introduced in Latvia in 2023.

Wind farms. The new (2022) Law "On Facilitated Construction Procedure of the Energy Supply Structures Necessary for the Promotion of Energy Security and Independence" stipulates that an initial EIA can be applied for wind farms that are planned outside the following areas: specially protected natural areas,

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Natura 2000 areas and 2 km buffer zones around them, micro-sanctuaries (including for the protection of certain bird species), coastal protection zones of the Baltic Sea and the Gulf of Riga, as well as protection zones of surface water bodies and protection zones around cultural monuments. The initial EIA includes at least the opinions of a certified habitat, bird species, and bat species expert, as well as a noise assessment. Namely, the new law does not exclude the possibility of applying the full EIA in certain cases, while creating conditions for the EIA process to be applied only in cases of necessity.

Hydropower plants. (HPP). The current regulation stipulates that an initial EIA is required both for (i) the construction of a new HPP and (ii) the reconstruction of an existing HPP, thus affecting the hydrological or hydrogeological regime.

How the factor influences ENCI: Electricity self-production in Latvia is currently developing using solar PV panels located on the roofs of buildings or in related areas. It can be assumed that potential energy communities will also develop in a similar way, there are currently no community-owned wind parks or ground-mounted solar PV parks in Latvia and, most likely, there are no such creations expected also in the near future perspective. From this point of view, the impact of the factor on ENCI is not expected.

Therefore, the impact of the factor on ENCI is related to the attitude of the population and (local) society. Here, the quality of the input data for the EIA and the chosen siting place will say a lot. Since both large-scale wind farms and ground mounted solar PV systems will be new phenomena in Latvia, only the future will show the real attitude of society, especially local society.

Affected ENCI types: Types 5, 6, 9, 10.

Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Latvia: The summary of ENCI legal framing (on February 1, 2023) is presented in the Table 11.1 below. Energy Law introduces the single term “Energy community” and further specifies the renewable energy community and electricity (citizens) energy community. **Electricity Market Law** step-by-step introduces provisions promoting electricity self-production and sharing (see more in L3). Latvia’s legislation incorporates a strong foundation for civil society participation in the decision-making process (see factor P3) at all administrative levels. A new **Law on Municipalities**, entered into force on January 1, 2023, is oriented towards involving the public more widely and provides for new instruments – local citizens councils, participatory budget (to be used for the development projects proposed and decided by the residents), strengthens the role of consultative councils and commissions, public consultations, others.

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Table 11.1 : ENCI manifestation Legal frame

ENCI manifestation	Legal framing
Household self-consumer.	Electricity Market Law.
Energy communities.	Energy Law, Electricity Market Law (both amended July 14, 2022).
Active renewables self-consumer (active customer); Jointly acting renewables self-consumers; Electricity community.	Electricity Market Law, 2022 (Amendments July 14, 2022).
Communities of apartment owners.	Three legal forms exist: (1) Association according to the Association and Foundation Law; (2) Cooperative society, according to Cooperative Societies Law; (2) Community of Apartment Owners, according to the Law on Residential Properties; Chapter III "Community of Apartment Owners".
NGOs.	Association and Foundation Law.
Church communities.	Law on Religious Organisations.
Public benefit organisations.	Public Benefit Organisation Law.
Neighbourhoods and Neighbourhood associations.	Cabinet of Ministers Regulation No. 240 (2013) "General regulations for the planning; use and building of the territory'; Association and Foundation Law; Riga City Council's binding regulations "On municipal support for Riga city neighbourhood development associations".
Consultative and participative processes.	the Constitution (Satversme); Law on Administrative Procedure; Rules of Procedure of the Saema, Cabinet of Ministers Structure Law; Law on Submissions; Law on Disclosure of Information; Law on State Administration; Rules of Procedure of the Cabinet of Ministers; Law on Municipalities.
ENCI in organisation.	The duties of energy managers and employees are determined by the inner documents of the organisation; In September 2022, the Ministry of Economics, in cooperation with Electrum Energy Efficiency Centre, published the Guidelines for Short- and Long-term Energy Consumption Reduction measures (employees and energy managers).

How the factor influences ENCI: The legal adoption (July 2022) of the terms of **active renewables self-consumer (active customer) and jointly acting renewables self-consumers** (operating in a single building or single other types of real estate) is an important step forward. **Energy communities,** as defined by EU REDII and IEMD directives, are still in the embryonic stage in Latvia. Even though the general legal framework is adopted, governmental follow-up regulations are still under elaboration. With the establishment of the full legislative framework, collective self-consumption might become more common

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in Latvia. However, there are still no elaborated national support instruments for energy communities (see more in L3)

Homeowners' associations (HA) are an instrument to implement energy efficient renovation of private multi-apartment buildings. HA, established by the owners of apartments (flats), directly organizes the management of the specific apartment building. Certain problematic situations could be caused by the fact that in Latvia there is no special law for HAs and they operate within the framework of the common Association and Foundation Law

The challenge is - how to build ENCI on a larger scale as a single apartment building. One of the tools could be neighbourhoods. The noted in the Table governmental regulation defines a **neighbourhood** as an inhabited area of a conditional size in towns, villages, and rural areas with its own identity determined by the features of the buildings, the landscape, and the sense of community of the inhabitants.

Affected ENCI types: All types.

Local examples:

Riga city. Riga city Energy Agency sees the energy communities as an important element and actively participates in EU-scale projects promoting them. The importance of 58 neighbourhoods is emphasised by the Strategy of sustainable development of Riga until 2030 (RSDS, 2014). The NGO "Riga neighbourhood alliance" has been established. In addition, the Neighbourhood Residents' Center operates within the structure of the Riga City Council.

Valmiera. In Valmiera municipality, there is currently a debate about what the energy communities are, how they will work, and whether and in what way they would be suitable for the development of the municipality. Also, in the city of Valmiera, neighbourhoods have been established and neighbourhood associations are active. The next year's work plan for the municipality is to promote the development of smart villages in the area.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in Latvia: Until 2021 the term "energy poverty" was not specifically defined in national legislation. The February 2021 Amendments to the Energy Law define that energy poverty means the difficulty of maintaining an adequate temperature in the home but also difficulty to pay for the services provided by energy suppliers or use them due to low-income, high-energy service costs or low energy efficiency of the dwelling. Energy poverty is caused by at least one of the mentioned reasons, not necessarily a combination of them. its turn, in the Energy poverty section of the Energy Law, households in energy poverty are considered only in terms of the Law on Social Services and Social Assistance. The **reduced electricity price to certain vulnerable population groups** is dealt with at the national level. The Electricity Market Law provides the protected users' list - poor or low-income family (person), a large (many children) family, a family with a disabled child up to 18 years ago, and a person with the first group of disabilities.

To compensate for the increase of energy costs in the 2022/2023 heating season, the state aid is provided in two directions – (1) based on the energy carrier price threshold (non-dependent on the income

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of person/household) and (2) for vulnerable groups (see more in factor EC2). According to the national legal provision's municipalities participate in the administration of this support.

The energy poverty issue is also dealt with at the municipal level. A guaranteed minimum income level is a state-level tool that local governments have, if necessary, to ensure for all households. Local governments need to provide, if necessary, the minimum income level for all households, and they can also provide housing benefits. E.g., an apartment allowance is a municipal social allowance that is related to the rental or sharing of the living space and the utilities or the purchase of fuel for partial coverage of these expenses; each municipality independently determines the criteria and support levels. Regarding infrastructure, municipalities renovate social residential houses and social apartment houses owned by them, by applying to national programmes co-financed by EU funds (ERDF).

How the factor influences ENCI: Linkage energy poverty with ENCI is a new issue in Latvia, up to now dealt within (pilot) projects (see factor P5). In planning the energy policy support measures, State administration institutions shall consider the number of households affected by energy poverty and shall determine the priority order in which support measures are implemented in relation to the households affected by energy poverty. The implementation of these provisions is only starting.

Affected ENCI types: Types 1, 5, 7.

Local examples: Poor or low-income people in Latvia can receive housing assistance; the extent, type, and eligibility requirements of this assistance are set by the municipalities. In order to determine an income level that corresponds to the status of a low-income individual, different municipalities apply different criteria.

Riga. The family can apply for a housing allowance to cover rent, management, and other communal payments if after these expenses there is less than €327 for the first or only person or €228 for each subsequent person in the family. A range of criteria is considered in the calculation of the amount of the allowance to be paid and the housing allowance does not necessarily cover the full amount for housing rent and communal services (ld.riga.lv).

Valmiera municipality Also provides housing allowance for low-income households. However here we would like to demonstrate another example. Latvia's Law on Assistance in Solving Apartment Matters, considering the relatively low income of Latvian households, gives the opportunity to the local government to provide support for the performance of energy-efficiency measures in residential buildings. Valmiera municipality uses this opportunity by providing multi-apartment buildings with support such as: for building energy certification (80% of costs no more than €300); for development of a construction project (50% of costs, no more than €1,500); implementation of energy efficiency measures (50% of eligible costs, no more than €22,000) (Valmiera County Council, 2021).

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L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (incl. rights for active participation of customers in the electricity markets)

How is this factor manifested in Latvia: Electricity Market Law step-by-step introduces provisions promoting electricity self-production. From January 1, 2014, an electricity net account metering system for households' micro-generators is provided. Since February 15, 2020, the feed-in-tariff component is not more applied to the electricity exchanged within this system. Households will be able to enter the net accounting system (accounting in kWh) until December 31, 2023. In its turn, Amendments, July 14, 2022, provide also the electricity net billing system between the active customer and electricity trader. The new system has been planned to start on January 1, 2023, however, governmental regulation detailing its provisions is still under elaboration. The participants of the net billing system will be active customers, particularly legal persons, the households can join as well. A new net billing system also provides the electricity generated at one active customer's facility might be consumed in other facilities controlled by the same active customer (grid services payment to be paid).

Jointly acting active customers can share the produced electricity and sell the surplus to the trader. Active customers can join the energy community as well. Energy communities are legally entitled to **produce**, **consume/share**, **store,** and **sell** renewable energy. They are also legally entitled to provide flexibility services, electric vehicle charging services, energy efficiency as well as other services. The participants of the energy community retain all the rights and obligations of energy final customers and active customers. The state administrative authorities, when planning new policy measures, ensure that individual and jointly acting renewable self-consumers, and energy communities may participate in state support schemes with equal rights along with other market participants.

How the factor influences ENCI: General rights for energy communities are in place, however, they should be further detailed by governmental regulations. Particularly important is the adoption of governmental regulation on electricity sharing, and future grid service tariffs, these issues relate also to jointly acting active customers. Also, the net account metering and net billing systems might limit the interest of individual households to participate in the collective RES-electricity production schemes.

Affected ENCI types: Types 1, 2, 7.

L4. Bureaucracy and red tape

How is this factor manifested in Latvia: No barriers to the installation of solar PV microgenerators in single-family buildings. There is the simplified, fully digital process of applying for a microgenerator connection to the grid.

As the governmental follow-up regulations for energy communities are not yet adopted, it cannot be evaluated this factor regarding the establishment, registration and operation of energy communities.

How the factor influences ENCI: For the connection of the facilities up to 11.1 kW (called microgenerators), there are no special restrictions. It is also proved by the 2022 boom of solar PV microgenerators in Latvia.

Affected ENCI types: Types 1, 2, 7.

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L6. Support schemes for renewable energy sources (Legal regulation of various support scheme)

How is this factor manifested in Latvia: The FIT scheme in Latvia had been introduced in 1996, the formulas changed several times. In 2011 -2012 Latvian government cancelled the entering of new entrants in both the RES-electricity and RES-CHP FIT schemes and currently the controlled closure of the FIT scheme is ongoing. Neither feed-in premiums nor competitive bidding/auctions are currently applied in Latvia. The FIT component in the end-user bill is not included starting from September 2022 and is compensated from the state budget.

On the other hand, there are currently ongoing two-state support programmes – (1) the national EAAI financed programme and (2) State Energy Efficiency Fund financed programme - for RES-heat (biomass technologies, heat pumps, solar heat panels) and RES-electricity technologies in single-family, two-apartment and twin buildings. The first programme is available for all households, the second one is focused on families with a child. Regarding multi-apartment buildings, Latvia's Recovery and Resilience Plan (RRP) measure (ongoing, 2022-2026) as well as Latvia's Cohesion Policy Programme's for 2021-2027 programming period measure (will start after RRP) include also the support for RES technologies.

How the factor influences ENCI: Until now there is no influence on collective electricity self-production. In its turn, the financial support programmes for single-family buildings (individual households) are well effective as demonstrated by the boom of solar PV technologies. The impact of RRP on RES technologies is hard to evaluate as the program opened just now (December 2022).

Affected ENCI types: Types 1, 2, 7.

Local examples: See factor S5.

Summary table

	Factors	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition				X		
	Multi-level energy governance structure of a country					X	
	Political support for ENCI (mechanisms, networks, etc.)					X	
	Political/democratic culture and traditions					X	
	Inclusion and empowerment policies				X		
	Geo-political challenges (war in Ukraine, energy supply…)					X	

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ECONOMIC	General economic situation / Inflation rate & purchasing power		X				
	Energy prices					X	
	Energy market				X		
	Energy taxation, state aid, fuel subsidies				X		
	Financing and investment opportunities						X
	Green industry development and green job creation					X	
SOCIAL	Level of income / wealth disparity and energy poverty						
	Energy literacy, awareness and skills					X	
	Citizen engagement and passivity in society				X		
	Trust in institutions and collective endeavours			X			
	Willingness to invest in the energy transition				X		
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES						X
	Decentralised energy system and storage			X			
	Digitalisation of the energy system					X	
	Energy efficient buildings					X	
	Smart mobility and green mobility						
ENVIRONMENTAL	Climate vulnerability					X	
	Availability of resources						X
	Pollution					X	
	Conflicts and opportunities about land use for renewable energy					X	
	Biodiversity protection issues connected to renewable installation					X	
LEGAL	Legal framings of ENCI forms					X	
	Legal measures dedicated to vulnerable consumers, energy poverty, inclusion				X		
	Rights and duties of consumers, prosumers on the energy market					X	
	Bureaucracy and red tape					X	
	Support schemes for renewable energy sources			X			
	Total factors per level of barrier/support	**0**	**1**	**3**	**7**	**16**	**3**

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Conclusion

The overall evaluation of the ENCI situation in the country:

The political framework can be seen as a moderately supportive factor for ENCI. While political objectives and goals for the energy transition emphasize the importance of promoting civic participation and involving citizens in the energy transition process, they lack clear targets. For instance, there is no clear definition of the specific number of energy communities that should be established. To make progress toward the energy transition goals, it would be desirable to have stronger and more explicit political support for the development of energy communities. This support could include clear numerical goals and guidelines for the establishment of such communities, which would make it easier for citizens to get involved and contribute to the energy transition. To actively reduce energy consumption and promote energy self-production, various policy instruments, initiatives, and support mechanisms are being created and implemented for final consumers. These efforts aim to enhance their quality of life by increasing the effectiveness of energy use. Specific instruments can help vulnerable households escape energy poverty and mitigate current challenges related to increasing energy costs for households in general.

The impact of economic factors on ENCI can be evaluated in two ways. On one hand, current challenges related to energy costs have led to a significant increase in interest in energy-efficiency improvements and renewable energy self-production in housing and other sectors. On the other hand, increasing construction costs for energy-efficient renovations have slowed down interest in these activities. There are now technologies available for energy self-production, with solar photovoltaic (PV) technologies being particularly interesting. From the perspective of energy communities, a digital tool should be developed to facilitate effective energy sharing.

According to a 2021 survey conducted by the European Investment Bank, Latvia has one of the lowest levels of climate change awareness in Europe, with results below the EU average in approximately 80% of cases. In Latvia, energy efficiency and the use of RES are viewed primarily in terms of their economic benefits, as well as their contribution to energy security. The results of a survey published in February 2023 show that 57% of respondents consider costs the most important factor when choosing electricity. Meanwhile, nearly 39% of respondents mentioned energy independence, marking the fastest rise in importance. The environmental aspect, however, experienced the biggest decline, with only 27% of respondents recognising it as important (down from 43% in 2020). It's worth noting that environmental issues are more important to young people but less relevant among seniors. The acceptance of RES at the local level is crucial. If a decision were made to build a new electricity production plant in a respondent's municipality, two-thirds of respondents would prefer obtaining solar energy, while almost half would prefer wind energy. Therefore, the development of “fair” large wind power parks is essential, and we hope that the new wind park compensatory payments introduced in the local government budget from 2023 will truly encourage support for the installation of RES in local municipalities.

Developing more collective forms of renewable energy self-production is an essential issue. Currently, state aid for multi-apartment buildings focuses on improving energy efficiency, while single-family buildings are encouraged to pursue renewable energy self-production, particularly using solar photovoltaics. As a result, cooperation among apartment owners usually takes place within the framework of a single building, aimed at improving its energy efficiency. However, renewable energy communities are

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still in their infancy and require further development. The government needs to quickly adopt follow-up regulations and establish detailed enabling frameworks for these communities. This will help accelerate the growth and development of renewable energy communities and ensure that collective self-production of renewable energy becomes more widely accessible and feasible.

Social movements in the form of NGOs in Latvia are well established but only a very small part of them is engaged in the energy and climate debate. However, they certainly play a crucial role in driving the adoption of renewable energy technologies, advocating for policies that support clean energy, and raising awareness of the urgent need for change. By raising awareness, mobilising communities, and advocating for change, these movements help shift the energy system towards greater sustainability and fairness. Transparency in decision-making and participation has been an important element for many of those movements encouraging citizens to have a say in decisions related to energy production and consumption. This includes not only the right to access energy but also the right to participate in shaping energy policies and systems.

What are the major barriers and opportunities to the emergence and/or development of ENCI in the country?

The greatest threat to ENCI development in Latvia is currently seen regarding the "General economic situation / Inflation rate & purchasing power". This situation is affected by the geopolitical situation and the increase in energy prices. But at the same time, the energy sector in Latvia becomes more orientated towards energy security and self-sufficiency. Trust in institutions and collective endeavours can also be evaluated with a negative impact. For already a long time the population mostly had low (less than the average of OECD countries) trust in the government and state institutions. The lack of trust can be explained by several interrelated factors - the individual's personal life experience, the surrounding social environment, interaction with it, and attitude towards political power.

Regarding the prosumerism, on the one hand, there are well-developed procedures to connect individual prosumers to the grid. On the other hand, the power distribution system will be used to share electricity of energy communities/collective self-producers, however, the involvement of DSO to facilitate the sharing procedures is not considered yet. It has to be underlined that energy communities have not the right to create, buy, or lease the power distribution networks and operate them independently.

One of the most positive contributing factors is the economic sub-factor "Financing and investment opportunities". Latvia is actively promoting the transition in the energy sector with the help of different EU funds - EU funds, Resilience and Recovery facility, as well as national EAII instrument. Regarding households there is in place a particular focus (investment co-financing) on energy efficiency in multi-apartment buildings and self-production in single-family buildings, however, it still lacks incentives for energy communities. Thus, the legal subfactor "Support schemes for renewable energy sources" can be evaluated with a negative influence as until now there has been no influence on collective electricity self-production. The subfactor "Availability of technologies for the decarbonisation of the energy sector and renewable energy" is also one of the most positively influencing subfactors. The total capacity of solar PV micro-generators reached 94 MW at the end of 2022. At the end of 2022, the solar PV micro-generators had been installed in around 3.7% of the total number of single-family buildings. The development of solar PV serves as a strong foundation for the development of ENCI when combined with the goals of the EU Solar

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Strategy. The environmental subfactor “Availability of resources “also ranked high, since Latvia is rich in natural resources regarding energy production - the potential for forestry and forestry processing industry leftovers to be used in the production of thermal energy for district heating, commercial buildings, and individual or communal heating. Solid biomass is a fuel that ENCI can use for the heating industry. Forest land is decided also as one of the options for new wind parks siting.

There is an opportunity provided by a particular electricity retail trader to choose to use only green electricity, but it would also be required to properly tell the consumer about the fairness of this energy, particularly regarding the relationships between wind farms and nearby villages. Fair wind energy is particularly important, as new large-scale onshore wind parks are planned. From 2023 newly installed onshore wind parks will pay to the local community the compensatory payment, however, since it is a new instrument, its impact on building local community acceptance cannot be assessed at the moment.

An outlook of the possible developments and transformation of the national ENCI ecosystem:

As of January 1, 2023, the function of energy-climate policy development and implementation has been transferred to the competence of the Ministry of Climate and Energy. The specific climate and energy focus of the newly created ministry may also be beneficial for ENCI: even though currently no information directly related to ENCI, this can be an opportunity to improve ENCI's framework conditions in the country. Also In 2023, the National Energy and Climate Plan will be updated, and new actions have to be included to meet the targets of the EU “Fit for 55 packages”, so there is a possibility that it will focus more on ENCI. In the context of EU-level priorities, an important role in Latvia's Recovery and Resilience Plan is dedicated also to climate change. The Plan provides for climate and environment-related investments to be concentrated in a separate component in order to more effectively ensure the investment threshold of 37% for climate goals set in the EU regulation. This could serve as an additional tool to promote energy citizenship, but everything depends on how the government plans to implement this. Another instrument, particularly for the promotion of collective ENCI forms might be the Modernisation Fund, particular programmes of which are under elaboration now.

The recent geopolitical situation and the high prices of energy resources have promoted high interest in installing solar PV panels for self-consumption. Both conditions are a new motivation to act and decide, this has also promoted discussions in society about the current situation in the energy sector. The motivation of customers in favour of using solar energy can be divided into two blocks: commercial viability and the green course, while currently, an important argument are the consequences related to the ongoing war in Ukraine. Businesses are looking for ways to streamline operations and production to reduce their costs. Solar PV panels are one of the types that might be implemented. This could be Latvia's opportunity because the relatively small territory and economy allow the country to be flexible and relatively quickly improve the national energy system in order to learn new technologies and significantly reduce dependence on gas or energy imports from third (non-EU) countries and to promote green energy transition also supporting citizens. It can be hoped that a clear enabling framework will be established to promote the development of renewable energy communities.

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12. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN THE NETHERLANDS

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Introduction

Current focus in national energy policy: The Climate Agreement by the Dutch government (2019) and the 2022 'Draft Climate Policy Programme' guide the country's targets for 2030 and 2050. The 2021 Coalition Agreement raised the level of Dutch ambition to be in alignment with recent European ambitions. By 2030, the country aims for a 55% reduction in greenhouse gas (GHG) emissions. This is considered to be a significant challenge, given the fact that 2021 emissions did not meet the Urgenda target (25% reduction in GHG emissions by 2020 compared to 1990) (Netherlands Environmental Assessment Agency [PBL], 2022, p. 7). The Climate and Environment Outlook (KEV) 2022, projects a 39-50% emission reduction 1990-2030 under enacted and planned policies (PBL, 2022). The KEV also states that "indicative emission targets sectors will require substantial policy effort in each sector and together are not sufficient to achieve 55% emission reduction with certainty" (p. 9) and "important part of climate plans are still insufficiently developed".

The progress of the Netherlands (quoted as NL in the rest of the document) in meeting their targets has been affected by rising turmoil, uncertainty and scarcity in global energy markets (partly due to Russia's invasion of Ukraine). This caused sharp rises in fuel prices, growing energy poverty, and doubts over the security of Europe's natural gas supply (PBL, 2022). The built environment in NL is highly dependent on natural gas, putting many households at risk of being unable to pay their energy bills. Economic growth has been hampered by rising inflation and a reduction in purchasing power exacerbates issues related to energy poverty and income inequality. These factors have a short- and long-term effect on the energy market in NL and therefore the national energy policy, targets, energy mix and energy governance/ownership are all effected. The Dutch government has responded with short-term measures such as a cap on electricity and gas prices in 2022, however, longer-term measures are uncertain (PBL, 2022).

Current energy mix and goals: In 2021, approximately 45% of energy consumption in NL came from the source of oil, 37% from gas, 7% from coal, 5% from wind, 3% from solar (Ritchie et al., 2022). The energy mix of NL faces uncertainty due to restrictions in infrastructure (limited capacity of the electricity grid), labour market tightness and scarcity in raw materials. Moreover, nature related permits and nitrogen-related issues present a block to ENCI development in NL (construction projects that emit nitrogen being delayed but a construction exemption is being tested). Accordingly, the aim for renewable energy (RE) generated on land by 2030, is 35 Terawatt hours (PBL, 2022). While renewable electricity share has been rising increasingly fast, there are significant challenges being faced, such as issues in connecting offshore wind energy to the electricity grid. Current targets in Effort Sharing Regulation (emissions outside ETS sectors e.g., waste disposal) are within reach, but new EU proposals means additional tasks for NL. In terms of the heat transition, growth in renewable heat is considered to be insufficient to meet the national climate targets (PBL, 2022).

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Energy governance/ownership: In NL, generation and retail of electricity was liberalised in 1998 (CBS, 2015). However, transmission and distribution are centralised and operated by the systems operator (TenneT) and utility companies, who have a monopoly position in the energy market (CBS, 2015). These actors are regulated by the Authority for Consumers and Markets, in order to ensure consumer / business rights are protected (CBS, 2015). The Dutch Climate Agreement (2019) sets out a non-legally binding aim of 50% local ownership of renewable energy on land by 2030. Unprecedentedly high natural gas prices in 2022 and 2023 create an opportunity for a change in the energy governance/ownership structure of NL. Behavioural changes (e.g., more economical domestic heating) are resulting from the high energy prices. Overall, reduced energy demand for fossil fuels in response to high prices creates an opportunity to develop new energy sources in NL, thus supporting ENCI emergence.

The role of citizens in relation to energy use: The policy and legal environment in NL is supportive for the participation of citizens in energy communities. While the Dutch government states that there are no significant barriers to participation, issues do exist (such as professionalization, energy sharing, supply, and cooperation with the Distribution System Operator) which are not adequately acknowledged in legislation/practice and act as regulatory or practical burdens for ENCI. Despite this, the funding instruments and support schemes for energy communities and households appear to be favourable and significantly well-developed (RESCoop.eu, n.d.). Energy consumption and saving is an important part of the energy transition in NL. The current targets in this regard are not being met, according to the KEV (2022). Significant energy savings are needed to be in line with the European Energy Efficiency Directive (EED).

Local examples: The municipalities of Weert and Horst aan de Maas were selected as sub-national examples in this PESTLE analysis. This is due to the existence of active ENCI forms in these municipalities and their representativeness of the rest of the country. These municipalities provide an accurate insight into the overall nature of ENCI in NL. In Weert, Weert Energy is a local energy cooperative which has been included as a case study in the EnergyPROSPECTS research for NL, and Reindonk Energy in Horst aan de Maas has also been included as a local energy cooperative.

Political factors

P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)

How is this factor manifested in the Netherlands: The government's central goal with the National Climate Agreement is to reduce greenhouse gas (GHG) emissions in NL by 49% compared to 1990 levels. At a European level, the government is advocating a 55% reduction of GHG emissions by 2030. This Climate Agreement contains a package of measures which has the broadest possible base of societal support, and the active support of as many contributing parties as possible. Through a broad stakeholder dialogue – including e.g., stakeholders from industry, NGOs, energy communities, and municipalities- a 'Climate Agreement' was agreed in 2019 describing both government measures to achieve the GHG targets as well as commitments by the involved stakeholders.

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By 2030 the share of renewable energy (RE) is targeted at 27%, with the objective of more offshore wind and increased measures towards energy saving and making heat generation more sustainable. Energy savings by 2030 based on primary energy consumption should be 1950 PJ (excluding use for non-energy purposes) and a final energy consumption of 1837 PJ by 2030 (Dutch government, 2019). The long-term objective to 2050 is to reduce GHG-emissions by 95% in the Netherlands. Electricity generation in 2050 must be supplied 100% by renewable sources. Compared to other EU countries, NL produced the highest quantity (14%) of energy from solar power in 2022 (Ember, 2023).

How the factor influences ENCI: This factor is an opportunity which supports the emergence and development of ENCI in NL. For example, the goal of having 100% of electricity generation in 2050 supplied by renewable sources is enabling for ENCI because it means that the Dutch government will be supportive of actions toward RE generation in the current context. The government recognises the role that citizens and collectives play in reaching the country's targets for the energy transition.

Affected ENCI types: This factor particularly affects ENCI types which are engaged in RE generation because they impact the country's ability to meet its climate targets. For example, the change-making energy citizen (Type 2) will be affected by this factor in such a way that their conscious energy choices should be supported if they are helping the country to achieve its political objectives and targets for the energy transition.

Local examples: Targets for the energy transition manifest on a sub-national level through the National 'Regional Energy Strategy' Programme (RES). The country has been divided into 30 energy regions assigned with the task of implementing their own RES, in order to achieve the measures set out in the Climate Agreement. Part of the RES involves creating a schedule for the implementation of RE projects and local, provincial and waterboard councils ultimately determine the RES of each region (Regionale-Energiestrategie, n.d.). Weert and Horst aan de Maas are part of the 'North and Middle Limburg' RES. An example target of this region's RES is to generate 1,200 GWh of renewable energy from solar and wind projects by 2030.

P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)

How is this factor manifested in the Netherlands: The transition toward a carbon-free electricity system involves many different stakeholder groups in NL. Participation is seen as crucial to maintain and improve social support. The transition is a collective task and challenge to be taken up by citizens, businesses, public authorities, civic organisations and the world of knowledge and science. Collaboration with neighbouring countries is also crucial in this regard. Overall, governance of the energy transition in NL features negotiation democracy patterns in the form of policy coordination, expert involvement and consensus building. The Dutch government negotiates energy policy with other stakeholders and interest groups such as trade unions, energy suppliers and environmental organisations. Additionally, new forms of citizen participation are a core element of energy governance in NL (PBL, 2022).

How the factor influences ENCI: The energy governance structure in NL is aimed at achieving consensus within policy and society. The decentralised unitary state and parliamentary representative democracy

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are features of Dutch politics which are enabling for ENCI because a high degree of freedom is granted to ENCI actors to participate in the system.

Affected ENCI types: The energy governance structure affects all ten ENCI types. For example, frontrunner Type 2 ENCI (the change-making citizen) is enabled by the governance structure of NL because the democratic characteristics give the actors the ability to engage with the energy system according to their own preferences and opinions.

Local examples: In the municipality of Horst aan de Maas, citizens have the ability to participate in RE projects in four different ways, which are laid out in the Dutch Climate Agreement (2019). These are: co-ownership (local residents co-own via an association / cooperative), financial participation (via shares, certificates, or bonds), environmental fund (proceeds partially benefit local societal goals) and local residents scheme (immediate residents receive benefit e.g., via green electricity discounts) (Klimaatakkoord, 2019). This shows how a decentralised format is promoted on a municipal level in the Dutch energy transition.

P3. Political support for ENCI (mechanisms, networks, etc.)

How is this factor manifested in the Netherlands: Participation in energy plans: Citizens are given the opportunity to participate in their region's energy plans through the national RES programmes. The Dutch Climate Agreement (Dutch Government, 2019) describes the participation frameworks in RE generation (p. 222 and 226). It is then at the discretion of municipalities to design participation in local policy. They do not have a legal obligation to organise participation. The government website 'Energie Participatie' (www.energieparticipatie.nl) provides citizens with information and resources to help them in participating in the energy transition.

There are existing codes of conduct (e.g., for on-shore wind), legislation and frameworks on participation which guide the process. For example, there are legally prescribed procedures for obtaining opinions of scientific research and interest groups. The bill "Strengthening participation at decentralised level for advice to the Council of State" is an important legal framework in this area. It enshrines the Right to Challenge in law, part of which gives actors the ability to request to take over a municipal task if they believe they can do it better or cheaper (VNG, n.d.).

In terms of participation in the project phase of RE, the Climate Agreement (2019) states that the process is the responsibility of the project initiator to organise, and this is then checked by the competent authority.

How the factor influences ENCI: The Dutch Climate Agreement (2019) states its target for 50% local-ownership in RE generation. Agreements about the participation process are beneficial for ENCI, however, it must be acknowledged that they are not necessarily enshrined in local/regional/municipal policy or regulations. Hence, participation varies on a regional level, and this is captured in municipalities' different 'assessment frameworks' for RE generation. This shows that while there is a public / political support for ENCI through the guidelines on participation, it varies at a great extent on the local-level.

Affected ENCI types: This factor affects both individual ENCI and collective ENCI types. For example, Type

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2 (the change-making energy citizen) is affected by the extent to which their opinion is taken into account in local energy plans. Moreover, Type 2 ENCI relies on an environment which enables a “bottom-up” approach in the adoption of alternative practices, and the freedom to distance themselves from the citizen-as-consumer structure. This is determined by the political support in their relevant region/locality.

Local examples: In the development of the RES 1.0 for the North Holland region, citizens had the chance to respond to the draft RES in regional and local meetings. These opinions were included in the elaboration ‘route’ to the RES 1.0. In the future, citizens will be able to participate in the selection of search areas for large-scale RE (potential sites for RE generation infrastructure) (https://energieregionhn.nl/reacties-concept-res).

P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)

How is this factor manifested in the Netherlands: NL is a parliamentary democracy. The Dutch government system is a “Trias Politica” with three branches: executive, legislative, and judicial. No arm of the government is more powerful than another, and this has positive implications on the democratic culture of the country, ensuring a high level of rights and freedom is protected for citizens (Government of the Netherlands, n.d.).

The government supports the democratic culture of citizenship in NL through various measures, forums, and organisations (https://www.government.nl/topics/active-citizens/citizen-participation). For example, Movisie is a national knowledge institute which promotes self-reliance among citizens (https://www.movisie.nl/) and ProDemos is an organisation which promotes democracy and the rule of Law (https://prodemos.nl/english/).

See factor P3 for more information on participative governance in the energy system.

How the factor influences ENCI: The Dutch “Trias Politica” shows how the freedom of citizens can be protected from the power of the State. The political and democratic culture of the country has an enabling effect on the emergence and development of ENCI.

Affected ENCI types: This factor affects all ENCI types. Most affected may be, for example, the social movement ENCI types. Type 10 ENCI (protesting against the energy system) is affected by the extent to which there is a democratic culture which is facilitative of protesting demonstrations. For example, local public campaigns which make political claims against the energy system depend on the prevalent ideals and culture of citizenship to make them legitimate.

Local examples: In The Hague, guided tours of the Dutch House of Representatives are offered in order to teach people about the political structure of NL. ProDemos is active throughout the country, collaborating with municipal authorities to deliver educational activities on the topic of Dutch politics. To assist with democratic voting, StemWijzer is a tool available for citizens to determine which political party most aligns with their personal views (https://www.votematch.net/). There is also a website which provides accessible information on Dutch election bills (http://www.verkiezingsaffiches.nl/).

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P5. Inclusion and empowerment policies

How is this factor manifested in the Netherlands: NL has enacted policies aimed at the assistance of economically vulnerable groups which help them engage in the energy transition. For instance, in response to rising energy prices in NL, the Dutch government enacted certain measures to assist citizens. Specifically, "low-income households can get an extra one-off energy allowance of about €1,300, and residents can receive help and advice on how to save energy" (https://www.government.nl/topics/energy-crisis). The Domestic Energy Poverty Index Scores (2022) shows that energy poverty is relatively low in NL compared to European countries such as Italy, Portugal, Bulgaria, and Hungary (https://eepi.zone-c.eu/eepi.html#scores).

How the factor influences ENCI: Inclusion and empowerment policies in NL are enabling for ENCI. Net metering laws are stimulating for private ENCI and the planned phase-out of this support scheme was moved from 2023 to 2025. For example, Type 2 ENCI actors who have solar PV on their household's roof benefit from the net metering scheme of the government. Through this scheme, actors can supply solar energy back into the grid for the same price as electricity purchased. This is an empowering policy for ENCI in NL. However, from 2025, only part of the electricity supplied back may be offset against the amount of electricity consumed. The result of this phase-out may have a hindering effect on private ENCI because of its economic impact on household actors.

Affected ENCI types: This particularly affects private ENCI types (e.g., Type 2 ENCI).

Local examples: Windmill De Coöperwiek in North Limburg is owned by 325 people and the proceeds from the energy generated were used to install fibre optic in the area in order to solve the issue of slow internet connection. This project financially benefits the local residents since 2020 and it is also being investigated whether the proceeds can fund solar panels on rooftops in the area. This shows how the processes around financial participation can have an empowering effect on citizens.

P8. Geo-political challenges (COVID, war in Ukraine, gas and oil supply,...)

How is this factor manifested in the Netherlands: As described in factor P5, the Dutch government has enacted economic support schemes for low-income households and business owners. Causes of the underlying rises in energy prices include, for example, the Russian war against Ukraine and other geopolitical issues which affect gas and oil supply. In addition to economic support schemes, the Dutch government is taking steps in response to energy security issues. The country's oil and gas resources are becoming increasingly scarce and this has been a motivating force behind the upscale in RE alternatives.

How the factor influences ENCI: Geopolitical challenges have created an opportunity for ENCI in NL because of the threats that these challenges create if systems are not changed in response. For example, the war in Ukraine has placed energy security in question and motivated an increased focus on alternatives to oil and gas resources for energy supply.

Affected ENCI types: These challenges affect all types of ENCI, but particularly transformative types. For instance, Type 4 (the energy-related change-maker in organisations) may be particularly impacted by energy security issues. Organisations in energy-related sectors face many threats as a result of geopolitical

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challenges such as the war in Ukraine. These challenges can encourage a switch within the culture of an organisation towards an energy transition-oriented mindset, causing it to evolve according to new geo-political contexts (in terms of new practices, business models, technological innovations, partnerships, etc.).

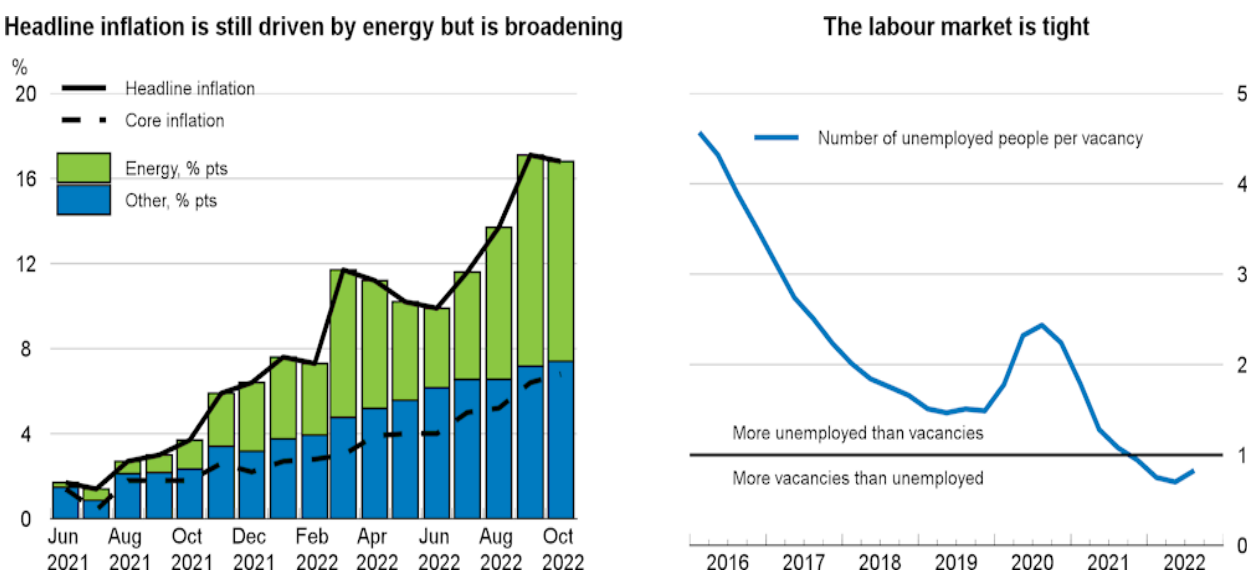
Local examples: The West Brabant energy region created a civic forum which focused on the topic of a feasible and affordable heat supply. This was partly motivated by geopolitical challenges creating uncertainty for energy supply security and affordability. (https://www.energieparticipatie.nl/community/praktijkverhalen/verhalenreeks-voorjaar-2022-burgerpanel-brabant-praat)

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in the Netherlands: A **slowing of economic growth, and inflation growth,** is currently underway in the Netherlands in 2022 and 2023. The 'Economic Outlook 2022' report by the OECD says that in NL, "following a 4.3% expansion in 2022, economic growth is projected to slow to 0.8% in 2023 and 1.1% in 2024. Inflation is expected to moderate to 3.9% by the end of 2024, after peaking at 15.4% in the fourth quarter of 2022." (OECD, 2022, p. 179).

Figure 12.1: Inflation and labour market conditions in NL



Source: OECD Economic Outlook (2022), p. 179.

Private consumption is weakening in the short-term in NL due to rapidly rising living costs, mainly driven by high energy costs (see Figure 12.1). As a result of high living costs, "private consumption is projected to be subdued as disposable income will be eroded by high inflation" (OECD, 2022, p.181).

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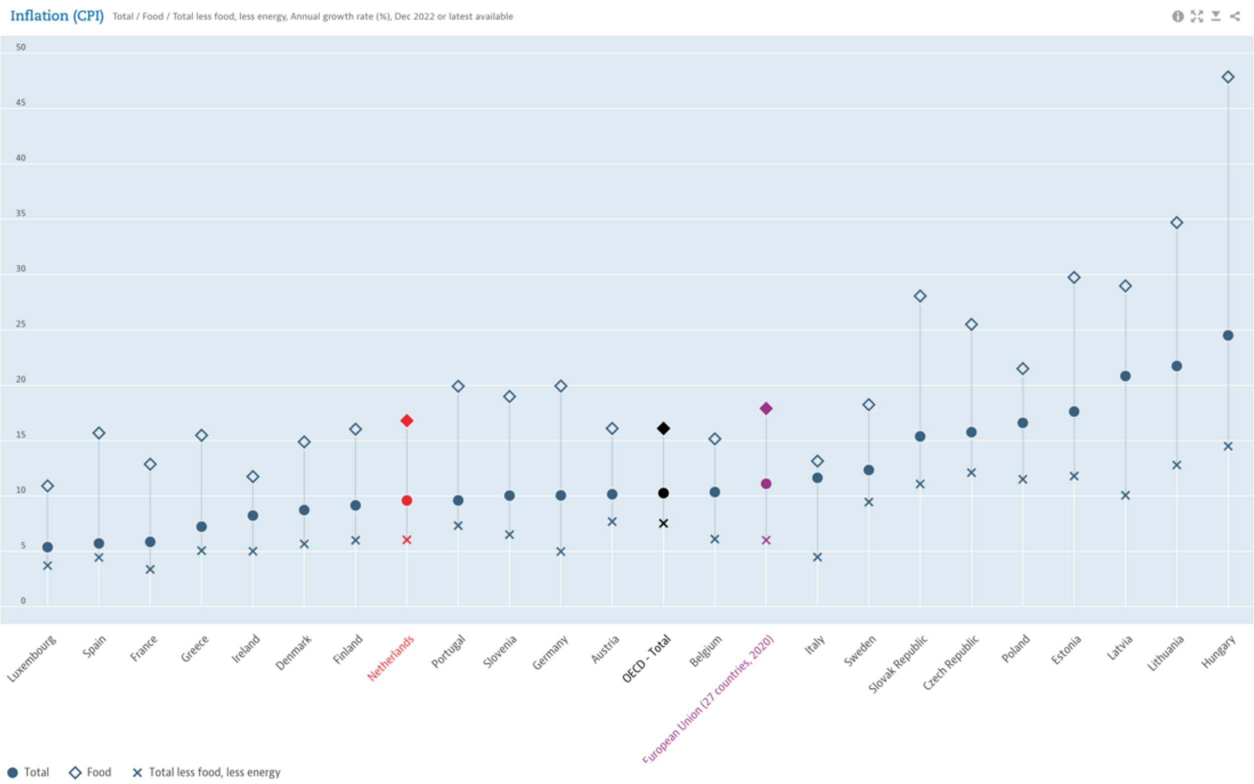
However, private consumption is projected to "gradually strengthen [in the long-term], aided by government support measures and welfare adjustments." (OECD, 2022, p.179). For example, through an "energy price cap to cushion the impact of high energy prices on households" (OECD, 2022, p.179). Overall, data shows a slowing of economic growth, high inflation, reduced private consumption, reduced purchasing power, and households' increasing reliance on government support measures. In comparison to other EU countries (EU27), inflation in NL is below average (see Figure 12.2).

Figure 12.2: Inflation (CPI) in NL compared to EU27 countries (Total / Food / Total less food, Annual growth rate (%), Dec 2022 or latest available)



Source: OECD (2022), Inflation (CPI) (indicator). doi: 10.1787/eee82e6e-en (Accessed on 02 December 2022).

How the factor influences ENCI: There may be a double effect of the general economic situation on ENCI in NL. On the one hand, people have less disposable income to spend due to slowing economic growth and lower purchasing power. This may hinder citizens' ability to invest in projects such as solar PV installation or investing in community renewable energy (RE) infrastructure. On the other hand, people are saving more energy due to rising costs (ENCI enabling), and higher reliance of citizens on government support measures and the energy price cap, might encourage people to take ownership of their energy. For example, by investing in private household renewable energy generation (ENCI enabling). Overall, the general economic situation in the Netherlands creates an opportunity for the government to initiate the energy transition in a way which is economically fair and equitable. According to the OECD, "the [Dutch] government should continue to tackle structural challenges, prioritising an acceleration of the green

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transition to ensure energy security and reduce fossil fuel dependence" (OECD 2022, p179).

Affected ENCI types: This factor may particularly affect type 2 and type 8 because these types capture individual actors who are influenced by their material and immaterial resources for participating/acting. For example, the type 2 private-transformational actor may be affected negatively by rising inflation and reduced disposable income at the moment, causing them to lack the financial means necessary to make initial investments in domestic RE installation. On the other hand, economic uncertainty and rising prices might encourage actors to make changes in energy-related behaviours that could manifest as private ENCI.

Local examples: Due to rising energy costs and high inflation, the municipality of Weert is implementing a campaign 'You are not alone' to offer support to residents. Part of this includes informing people about resources such as the temporary financial support scheme for people who can't afford to pay their energy bills. There is also the 'Warm Wonen Winkel' which is aimed at helping people to save more energy with the help of energy coaches. This initiative shows how rising inflation, energy costs and reduced purchasing power can have an enabling impact on ENCI by encouraging people to save more energy in their homes through innovative methods (https://www.weert.nl/jestaaternietalleenvoor).

EC2. Energy prices (incl. relative cost of renewables and fossil fuels)

How is this factor manifested in the Netherlands: Electricity prices overall have been relatively low in NL. This is evident from the statistical graph by Eurostat (see Figure 12.3) which shows that among EU countries, "the lowest electricity prices were registered in the Netherlands (€0.0595 per kWh), Hungary (€0.0948 per kWh) and Bulgaria (€0.1093 per kWh). Households in the Netherlands had to pay 76.4% less than the EU average. This difference is mainly driven by subsidies and allowances given to household consumers in the Netherlands" (Eurostat, 2022). However, this data is based on the first half of 2022, and significant increases have occurred since then.

In terms of natural gas specifically, prices are relatively high in NL. Statistics from Eurostat (2022) show that "for household consumers in the EU, natural gas prices in the first half of 2022 were highest in Sweden, Denmark and the Netherlands" (see Figure 12.4).

Dutch citizens have some protection from rising energy prices. According to the OECD (2022), in NL, "direct dependence on Russian gas is limited, with only 3-4% of energy consumption was imported from Russia in recent years". Secondly, "gas storage levels of over 90% and a 25% reduction of gas consumption in the first half of 2022 significantly mitigate the risk of gas shortages" (p.179). However, NL is a net importer of gas, making it vulnerable to rising global energy prices. This explains the need for an energy price cap and other measures that the Dutch government has used to protect households and SMEs from rising energy prices. Nevertheless, the geopolitical context introduces risks and uncertainty for energy prices in NL.

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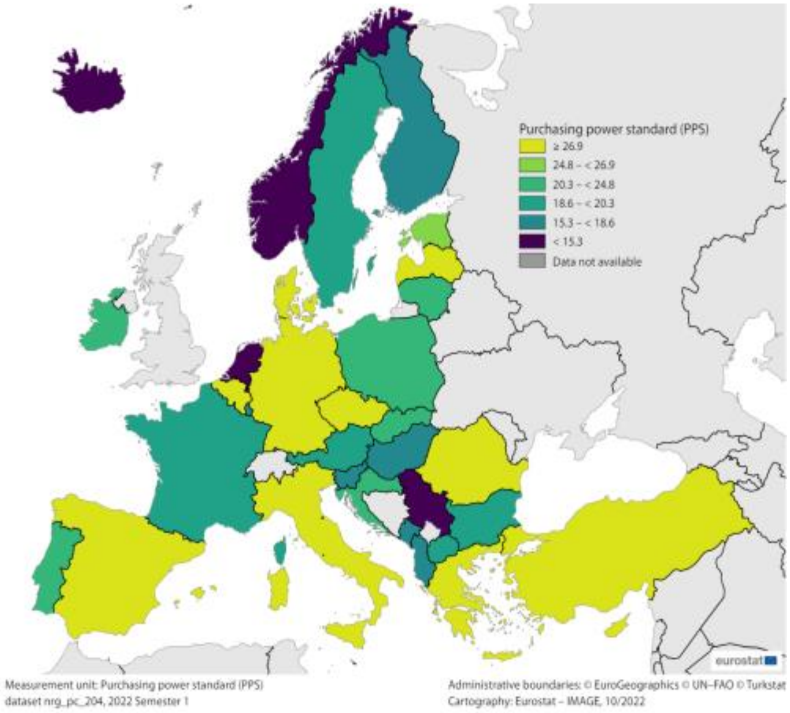
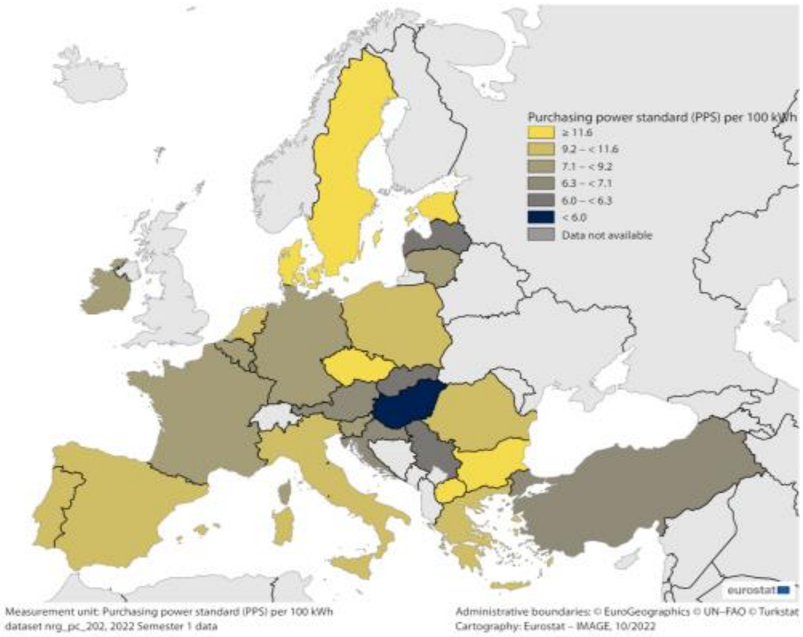
Figure 12.3: Electricity prices for household consumers, first half of 2022 (Purchasing Power Standard (PPS) per 100kWh)



Source: Eurostat (2022), Electricity price statistics (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_price_statistics#Electricity_prices_for_household_consumers)

Figure 12.4: Natural gas prices for household consumers, first half of 2022 (Purchasing Power Standard (PPS) per 100kWh)



Source: Eurostat (2022), Natural gas price statistics, (*https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Natural_gas_price_statistics#Natural_gas_prices_for_household_consumers*)

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How the factor influences ENCI: High natural gas prices and future uncertainty enables ENCI where actors are driven to take ownership of their energy sources for economic reasons (i.e., to save money). Government measures to protect citizens against rising prices may also be beneficial because they give actors more time to take the steps necessary to manage their energy sources, and more financial resources available to do so. On the other hand, rising energy prices proliferate socio-economic inequality which may have a hindering effect on ENCI because lower income citizens are under more pressure and have less time/resources to participate in energy initiatives.

On a broad scale, rising gas prices and reduced security of energy sources in NL reinforce the need for ENCI thus favourably altering the societal view of ENCI and potentially igniting social movements which are in alignment with ENCI.

Affected ENCI types: This factor impacts all ENCI types, particularly transformative types who wish to alter the energy system. The importance of this factor is in part due to the dominance of neoliberal economics in European energy markets. The Clean Energy Package 2019 features a strong neoliberal energy market. A heterodox approach based on collectivism would mean that energy prices would impact ENCI actors less, because in such an approach, energy is seen as a social necessity/right and just and equitable access for all is prioritised. However, since the market (and regulation) drives the energy transition currently, ENCI is vulnerable to energy prices (see EnergyPROSPECTS D2.1 Section 3.1).

Local examples: The municipality of Horst aan de Maas, offers assistance for residents who are struggling to pay their energy bills (see https://www.horstaandemaas.nl/geld-voor-energie). For example, lower income citizens can apply for energy allowance (called Energietoeslag). Moreover, there is also the Sustainable Construction Office in the municipality, which helps residents in making their home more energy efficient and therefore save on their energy bills.

EC3. Energy market (degree of liberalisation, existing decentralisation/centralisation of the market)

How is this factor manifested in the Netherlands: According to the Dutch Environmental Assessment Agency (PBL), “the Dutch electricity market is highly integrated into the European market” (PBL, 2022, p. 47). There are ongoing efforts in Europe to make a single, integrated, internal energy market. The organisation of energy production in the EU is centralised in the form of Big Energy, and decentralised in some small extent (EnergyPROSPECTS D2.1 p39). Efforts to integrate energy markets in the EU (increasing international interconnections and large industry-based power plants) is in tension with the rise of small-scale decentralised producers (Bosman, 2022). The result of the rising disruption and tension from new players in the market (households and tech-giants such as Google) puts into question whether a clear definition of “the market” still exists.

The Emissions Trading System (ETS) is an important aspect of the EU energy market, and according to the PBL’s Climate and Environment Outlook for 2022, it is experiencing a sharp rise in price in anticipation of increasing scarcity of allowances (PBL, 2022). The liberal nature of the energy market allows incumbents to exit fossil fuel energy and switch to alternatives. However, some market players criticise climate policies as market undermining practices which “change the rules during the game” and there is an important

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tension between decarbonisation efforts and efforts for energy security/affordability. Market intervention instruments also play a role. For example, the PBL's Climate and Environment Outlook 2022 describes how the EU decision to stop importing coal from Russia, due to the Russian invasion of Ukraine, strongly impacts the energy market in NL because supply has to be sourced from elsewhere, leading to higher energy prices (PBL, 2022).

In terms of the Dutch retail energy market, a report by the International Energy Agency (IEA, 2020) shows that it is "open and competitive", yet it does have a "high concentration of market share among energy suppliers" and there are still "barriers to the development of innovative energy services" by active consumers and energy communities (IEA, 2020, p.151). In the Dutch National Climate Agreement (2019), the vision for 2050 shows an emphasis on decentralised RE on land and citizens are described as "prosumers". The Agreement emphasises a "decentralised world" and "removing any barriers to the effective functioning of the market, resulting in flexibility becoming available from various sources" (p.167). Moreover, "public authorities will chiefly leave initiatives with regard to sustainable electricity production to the market", in order to make the situation "more [economically] attractive to initiators to set up projects" (p.167).

How the factor influences ENCI: Energy price regulation in NL impacts ENCI because it protects citizens from very high energy prices. This shows that market intervention by the Dutch government can enable ENCI. Overall, a high level of liberalisation (since 2004) in the Dutch energy market is beneficial to ENCI. For example, consumers have more freedom in choosing their suppliers, and in participating in the market through small-scale (local) generation. Moreover, the Dutch Competition Authority ensures that energy suppliers do not get too powerful/large to protect energy consumers.

EU rules state that consumers/citizens have the right to generate, store, consume and sell self-produced electricity to organised markets. However, reform of the energy market (e.g., reform of distribution tariffs, and new market rules for distributed generation and storage) is necessary to facilitate consumers in this way (i.e., type 2 ENCI). Before these reforms effectively occur, ENCI may be limited in this way. In the meantime, before major energy market reforms are completed, NL is adopting an approach of supporting ENCI type 2, for example, by encouraging the use of smart meters in households. These would allow consumers to purchase dynamic time-of-use pricing contracts and therefore act as market parties that can respond to flexible capacity to lower their electricity costs and assist energy system security. However, take-off of smart metering has been relatively slow.

Affected ENCI types: This factor particularly impacts ENCI type 2 and 8, because of whether/how they can engage with the energy system and the influence of government intervention on the market.

For example, energy market design influences the functioning of the energy system because it affects flexibility services for planning/managing the system [integration efforts for carbon neutrality as per the ENTSO-E Vision]. Hence, more liberalisation/decentralisation will positively impact flexibility of the system and support ENCI actors such as type 8 if they attempt to produce/sell energy into the national grid.

The IEA 2020 Energy Policy Review shows how the energy market has been liberalised since 2004, but also includes efforts by government leading to the promotion of active consumership of energy by citizens (especially through smart metering). This specifically affects type 2 ENCI.

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Local examples: In Horst aan de Maas and Weert, 50-100% cooperative ownership by residents is a principle that is central to the exploration of energy landscapes in the municipalities. This is a key aspect of the RES of the North and Middle Limburg region (RESNML, 2021). The RES 1.0. states the importance of giving citizens the opportunity to participate in ownership to reach the aim of at least 50%.

There are also efforts elsewhere in NL to develop a "retail market for the energy consumption management services enabled by smart meters (EVM market)" (IEA, 2020). For example, through energy consumption managers. These tools help encourage ENCI within households by promoting energy saving behaviour. However, the growth of the EVM market has been lacking, due to lack of awareness among consumers.

EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)

How is this factor manifested in the Netherlands: The core aim of Dutch economic policy is to maintain the country's role as an energy hub while transitioning to a carbon-neutral economy by exporting renewable electricity. The Climate Plan, the National Energy and Climate Plan (NECP) and the National Climate Agreement contain the policy and measures to achieve the Dutch climate goals. The NECP is in alignment with the EU Clean Energy Package and the 2019 Climate Agreement (IEA, 2020).

Environmental taxes in NL are based on the "polluter pays" principle (since 1994). The OECD shows that NL is the 3rd highest of OECD countries in terms of energy taxation as a % of GDP (OECD, 2020). This includes taxes on the use of coal and combustion and consumption of natural gas. There are also tax exemptions for fuels used for electricity production (Musch, 2019).

State aid in NL includes a purchasing power package to protect households from cost-of-living increases and fiscal policy support is designed to support vulnerable households with high energy prices (OECD, 2020, p.181). Statistics from Eurostat show that household electricity prices overall are relatively well-buffered in NL compared to EU counterparts, due to municipal subsidies and allowances. An example of a key subsidy for ENCI in NL is the SDE++ Sustainable Energy Transition Incentive Scheme (replaced SDE+ in 2020). It is one of the most important instruments for Dutch climate goals and uses auctions to offer subsidies to RE projects, for example. Other stimulating economic policies include tax deductions for use of energy efficient resources (EIA and MIA), a National Heat Fund, a subsidy scheme for owner associations (SVVE), Green Deals, a Hydrogen Strategy, carbon capture and storage policies, strong off-shore wind policy framework, the RES scheme for onshore RE and heat, and net-metering instruments to increase small scale PV.

How the factor influences ENCI: Strong state aid and subsidy schemes in NL support ENCI. E.g., RES programmes, SDE++, net metering, ban on coal fired generation and others all provide financial assistance or other support for ENCI actors. Moreover, natural gas / fossil fuel taxation stimulates ENCI by encouraging actors to turn to RE sources. In terms of industry-based ENCI, carbon levies are part of Dutch economic policy to reduce emissions and the SDE++ is in place to keep companies competitive internationally.

Affected ENCI types: Economic policy instruments affect all ENCI types. For example, taxation instruments on the use of natural gas encourages type 1 ENCI actors (individuals who try to "do their bit" by changing their individual practices in their household towards more energy efficiency and/or prosuming). Schemes can help these actors in making more sustainable choices, such as the purchase of

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heat pumps. Type 3 and 4 ENCI (organisationally-embedded actors) may also be stimulated by SME support from the SVM scheme.

Local examples: Warm Wonen in Weert is an example of how economic policies affect type 1 and 2 ENCI. It is an energy saving subsidy scheme which stimulates private ENCI actors, for example by making home-insulation upgrades more financially viable. The municipality of Weert also implemented an energy allowance for households to manage rising energy prices, and raised the income limit to 130% in 2022. This is an economic policy step which stimulates ENCI for private households in that municipality.

EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in the Netherlands: The RES programme is a key element of this factor in NL. The RES is focused on the goal of 35 TWh of sustainably generated energy on land by 2030, emphasising a target of 50% ownership by local residents in projects. Roughly 4 TWh of projects have been carried out since December 2021 as part of RES.

SDE project funding: "Funding under SDE++ is awarded via competitive technology neutral auctions, which are open to bids from private companies, institutions and non-profit organisations" (IEA, 2020, p.119). The annual budget for the SDE scheme varies year to year (see Figure 12.5) and has fallen since its peak in 2017/2018. It is estimated that SDE++ support will be around €1 billion per year by 2030. Table 12.1 shows that by 2030, over half of the expected support will fund projects that reduce industrial emissions. Funding is also expected to become more cost effective due to reductions in cost per unit of RE production. Other funding schemes are in effect to support offshore wind development (IEA, 2020, p.120) and the heat transition in the built environment (e.g., The Energy Savings Fund for the Rental Sector (FEH)).

Small-scale PV net metering: NL supports small-scale PV deployment via a net-metering scheme which provides energy credits for excess generation put into the grid at variable retail rates (phasing out in 2025). When PV generation exceeds a consumer's total annual electricity demand, a further value-based price is paid per kWh of PV generation. In addition, residential self-consumption of electricity is exempt from energy taxes and levies.

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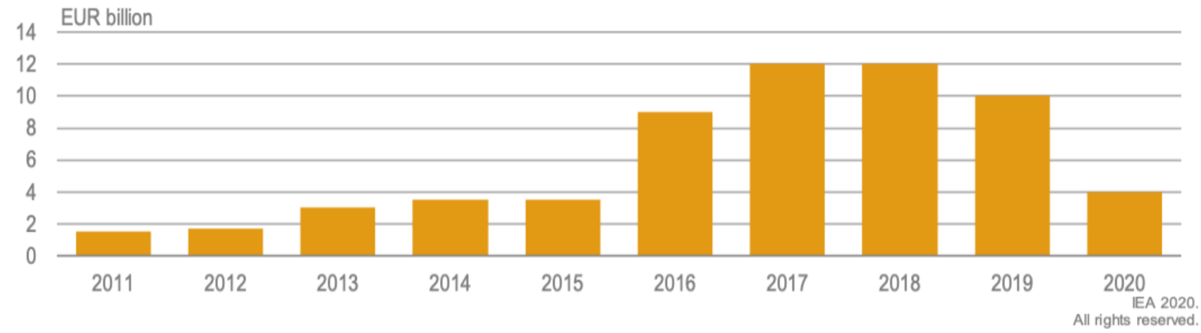
Figure 12.5: Annual budget available through SDE+ auctions (supports renewable electricity, heat and gases), 2011-19



Source: IEA (2020), The Netherlands 2020 – Energy Policy Review (https://iea.blob.core.windows.net/assets/93f03b36-64a9-4366-9d5f-0261d73d68b3/The_Netherlands_2020_Energy_Policy_Review.pdf)

Table 12.1: Estimated annual support from SDE++ by technology in 2030

Renewable electricity	Renewable heat and green gas	Small-scale renewable heat	Advanced biofuels and renewable synthetic fuels	CO_2 reduction in industry*
EUR 200 million	EUR 135 million	EUR 100 million	EUR 200 million**	EUR 550 million

* Excluding renewables.

** EUR 200 million is the total funding available from 2020 to 2030. The Climate Agreement does not estimate how this funding will be spent on an annual basis.

Source: MEACP (2019b), *Climate Agreement*, www.klimaatakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands.

Source: IEA (2020), The Netherlands 2020 – Energy Policy Review (*https://iea.blob.core.windows.net/assets/93f03b36-64a9-4366-9d5f-0261d73d68b3/The_Netherlands_2020_Energy_Policy_Review.pdf*)

How the factor influences ENCI: The RES, SDE++ and other funding programmes are all highly stimulating for ENCI in NL. Certain programmes are targeted toward certain actors. For example, schemes for net-metering in domestic buildings encourages individual-level ENCI. The levelised cost of electricity for small-scale PV is less than the relatively high Dutch electricity prices. Consequently, the Netherlands had one of the highest levels of residential PV deployment in Europe from 2013 to 2018. However, after 2025, it is anticipated that net-metering tariffs will be reduced by 9% per year and end completely in 2031. This might have a negative impact on the private types of ENCI.

Overall, funding programmes are well developed in NL and give ENCI actors less risks, making actions more feasible / within reach and the funding makes ENCI more mainstreamed. However, access is limited to particular privileged groups for certain sectors like off-shore wind, and SDE funding. Therefore, it can be harder for private ENCI to make use of all opportunities, also the reduction of net-metering tariffs for PV is a regression that will further limit private ENCI.

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Affected ENCI types: Types 1 and 2 ENCI benefit from net-metering tariffs for domestic PV, and from Heat Transition Funds. Types 3, 4, 7, 8 benefit from SDE subsidies if they are successful in the auction. Also potentially benefit from Heat Transition Funding and off-shore wind opportunities. Types 5 and 6 not strongly impacted by this factor because their activities are less reliant on investment opportunities. Types 9 and 10 are also not strongly impacted by this factor, except in the way that if funding programmes are weak, types 9 and 10 (social movements) may be triggered to take action to express the need to change the system.

Local examples: In the municipality of Weert, various funding opportunities are provided to assist citizens in the energy transition. However, there are target groups that are left out of financing opportunities because they cannot meet preconditions (e.g., homeowners with outstanding loans). The municipality could set up a fund to remove the financial threshold and enable certain target groups to take energy-saving measures (Weert Municipality, 2020, p. 23).

EC10.Grassroots innovation and 'short circuit' alternative economic activities

How is this factor manifested in the Netherlands: In terms of alternative economics, the Dutch government states an aim of a circular Dutch economy by 2050 and by 2030 having 50% reduction in raw material consumption. One of the 5 transition agendas within this aim focuses on 'Biomass and food', stating that biomass can help reduce carbon emissions, and can be used in energy industries (Government of the Netherlands, n.d.).

On the grassroots, ‘bottom-up’ level, there are important movements taking place which reorientate the understanding of the economy by promoting small-scale forms of economic activities. Ideological-ethical convergence is evident in relation to the normative commitments associated with ENCI and the grassroots-focussed initiatives, such as those in the area of forming a new eco-social contract. For example, this manifests in social movements focused on pension fund divestment (e.g., JIIP) and involvement of youth in the financial sector (https://gofossilfree.org/nl/aandeelhoudersvandetoekomst/).

How the factor influences ENCI: There is a stimulating effect of circular economic aims on ENCI in NL e.g., the transition agenda for biomass stimulates type 3 and 4 ENCI (organisationally embedded actors). The ‘bottom-up’ movement is growing in popularity and acceptance. This has positive and enabling implications on ENCI because it legitimises ENCI forms such as community energy initiatives.

Affected ENCI types: Grassroots innovation and alternative economics have indirect impacts on all ENCI types. However, type 9/10 ENCI (social movements) are particularly relevant to this factor. For example, this type can manifest as grassroots-led moves to divest from fossil fuels, as seen through organisations such as JIIP, which promote the involvement of young people in the pension sector.

Local examples: Circular economy falls within the responsibility of the Ministry of Economic Affairs and Climate Policy (EZK). The Versnellingshuisce and the Servicepunt Circulair help entrepreneurs become more circular in their businesses. An example of a measure used to promote circular economy is the circular chain subsidy (reopening March 2023). The subsidy will help entrepreneurs of Small and Mid-size Enterprises (SMEs) by covering 50% of circular project costs. This may be an enabling force for the emergence of organisationally-embedded ENCI types.

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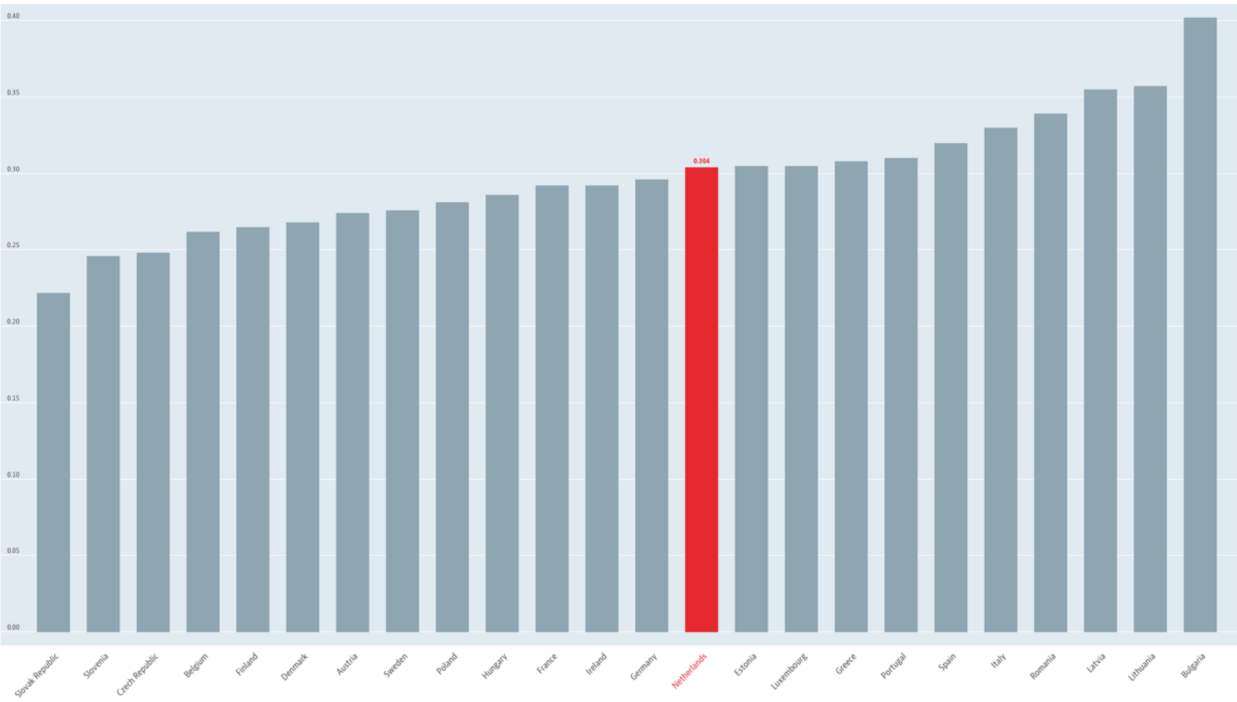
Social factors

S1 Level of income / wealth disparity and energy poverty

How is this factor manifested in the Netherlands: The 'Clean Energy for All Europeans' legislative framework put the structural issue of energy poverty in focus on a European level in 2019 (European Commission, 2019). States such as NL are seeing the issue as more than just a social challenge, adopting measures which go beyond aid for energy bills. Specifically, structural actions to improve energy efficiency of households (e.g., targeted retrofitting programmes) are increasingly seen as necessary measures for tackling energy poverty. The Renovation Wave (EU programme, 2020) and Fit-for-55 (Legislative package by the EC) encourages these measures in Member States through multi-stakeholder involvement (national politics, energy companies, banks and social organisations). The Fit-for-55 package includes the Commissions first, yet incomplete, definition of energy poverty (Article 2(49)) and places systemic discrimination (e.g., race, gender) in the understanding of 'vulnerability'. Accordingly, the Commission has proposed a Social Climate Fund to redistribute funds from the carbon trading scheme (ETS) towards energy efficiency measures for vulnerable households.

The OECD data shows that income inequality is roughly average, and poverty rate is low, in the Netherlands, compared to EU standards (see Figure 12.6).

Figure 12.6: Income inequality of NL compared to European Union countries (Gini coefficient, 0 = complete equality, 1 = complete inequality, 2020 or latest available)



Source: *OECD (2022), Income inequality (indicator). doi: 10.1787/459aa7f1-en*

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Moreover, an economic brief by the European Commission (2020) shows that the "distribution of income among Dutch households is relatively stable and flat by international standards" but "inequalities in net wealth holdings are relatively large" (p. 1) and intergenerational income inequality is a prevalent issue. The Dutch National Climate Agreement (2019) states the ambition for "balanced burden-sharing" in the energy transition, which "must be affordable at an individual level" (p. 225). This motivates the enactment of finance schemes for low-income households in NL (e.g., energy allowances).

The Social and Cultural Planning Office (SCP), using data from the 2019 Energy Transition Survey (Verkenning Energie Transitie – vet'19), showed that citizens have concerns about the impact of climate measures on their cost of living, and "expect the energy transition to lead to a deterioration in their financial position" and almost two-thirds expect "the gap between rich and poor in the Netherlands to widen as a result of the energy transition" (SCP, 2021, p. 8, 9, 10).

How the factor influences ENCI: Current sustainability subsidies and loans are based on an individual contribution, meaning many ENCI actors are hindered and cannot make use of these schemes if they have limited financial capacity. The SCP (2021) report states that "less affluent citizens are often not eligible for grants or loans to make their homes more sustainable, because they do not possess the necessary funds of their own to invest in these improvements". This often leads to a disparity in the effect of rising energy costs, because lower-income households cannot afford better insulation or domestic renewable energy (RE) generation (p. 11). Hence, income inequality in NL may pose a challenge to enhance/stimulate ENCI emergence/development.

This may particularly affect the private ENCI agents who belong to a vulnerable group due to lower-income. Due to investment barriers, citizens may lack the means necessary to implement transformative change in their households (e.g., home insulation upgrades for energy saving purposes).

Affected ENCI types: This is a hindering factor for type 1 and 2 ENCI.

Local examples: The energy cooperative Reindonk Energy, in the municipality of Horst aan de Maas, experiences energy poverty as a challenge which can limit participation (in terms of membership). Actors interviewed from Reindonk Energy argue that people who join their cooperative need to have financial means to co-invest otherwise they cannot participate in their projects (Data/evidence from the Reindonk Energy research case template).

In the Weert Energy Transition Roadmap (2020), the municipality includes fairness as one of their three core values. The municipality aims to address energy poverty by "first improving homes and buildings to reduce energy needs" before switching off natural gas, because this prevents "residents with smaller wallets, from being stuck with high energy bills after the transition" (Weert Municipality, 2020, p. 11)

In another example, in Weert municipality, Weert Energy operate a social project (called Nering Bogel) wherein solar energy is given at a favourable rate to households with an income of up to 130% of the social minimum and living in Weert. This project allows people to benefit from the energy transition without having to actually make an investment themselves (Data/evidence from the Weert Energy research case template).

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S2. Energy literacy, awareness and skills

How is this factor manifested in the Netherlands: OECD data shows that adult education levels in the Netherlands is high compared to OECD averages. For example, 43% of 25–64-year-olds have Tertiary education. Section D4 of the Dutch Climate Agreement (2019) focuses exclusively on the theme of labour market and training in the context of climate change. It emphasises a future-oriented education and labour market policy. A cross-sector task force was set up to implement “Responsive education – tailored and embedded in a strong learning culture” (p. 217). This includes targeted vocational education and updating the primary education curriculum (Curriculum.nu) to prepare future generations for climate change.

Outside of formal education, the Climate Agreement also acknowledges that a lack of knowledge constitutes a major barrier for local initiatives in the energy transition. Centres of Expertise are said to be a potential solution to this barrier by providing local initiators with knowledge resources.

In terms of energy awareness Koirala et al. (2018) conducted a survey of 599 citizens in the Netherlands (in 2015) which revealed that 80% of respondents were aware of and interested in local energy projects. The study concluded that energy-related education and awareness of local energy initiatives (among other factors) were statistically significant predictors of willingness to participate in community energy projects.

How the factor influences ENCI: Research suggests that awareness of local energy initiatives in the Netherlands is high (Koirala et al., 2018). This has positive implications on ENCI emergence since awareness is a factor driving participation in initiatives. While awareness may be relatively high in the Netherlands, there may still be a need for actions which address energy literacy (Proka et al., 2018). The promotion of energy literacy in the Dutch Climate Agreement is an important component for enabling ENCI because a lack of publicly accessible knowledge resources for ENCI actors may hinder their development.

Affected ENCI types: This factor may particularly affect type 2 and type 8 because there is a high amount of knowledge and skills necessary to implement transformative actions or projects around generating one's own renewable energy.

Local examples: The energy cooperative Weert Energy in Weert municipality offers support and advice to guide people through the energy transition (e.g., through energy measures in the home). However, within the cooperative itself, lack of technical skills is a barrier to implementing their future goals. Specifically, there is a need for more technical experts in the cooperative to help with issues relating to infrastructure, transporting energy, and cost management. They will need external scientific/technical support to deploy future goals (Data/evidence from the Weert Energy research case template).

S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)

How is this factor manifested in the Netherlands: A study by Dutch national government in 2019, revealed that 34% of citizens indicated that they were (very) motivated to help mitigate climate change through action within their own living environment. Moreover, 26% indicated that they would be interested in becoming a member of an energy cooperative or community (Motivaction, 2019). In 2021, the Climate and Energy monitor revealed that 15% of respondents participate in an energy

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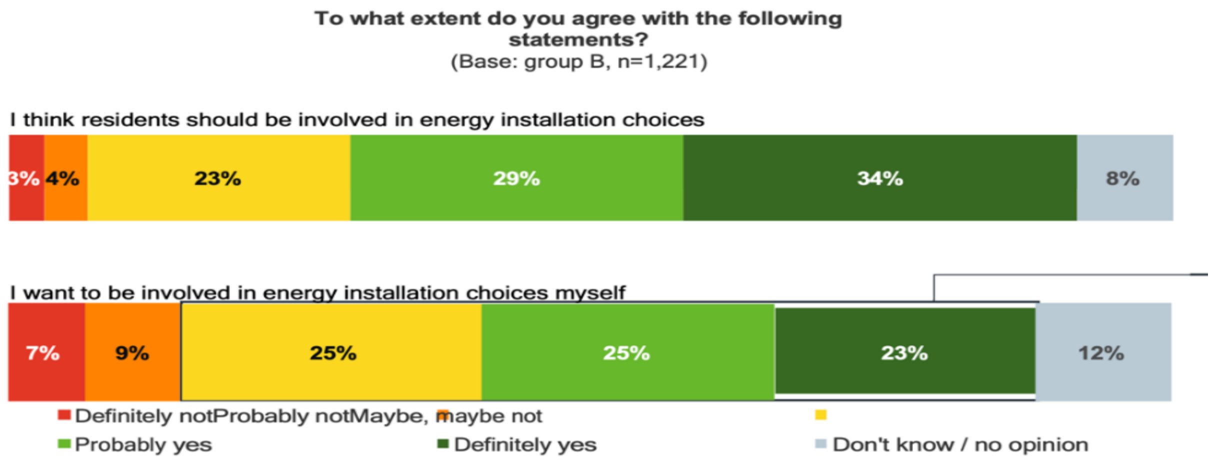
cooperative/initiative and 75% of respondents indicated that they could participate more in an energy coop/initiative. In addition, the survey showed that most people desire to be involved in new energy installation decisions, particularly when it is in their own environment. The monitor states that “Dutch people are aware that they themselves can have a role in combating climate change” but “Responsibility for climate change mitigation is mainly placed on large companies and government” and “Dutch (still) fail to embrace their own role” (p. 13).

In comparison to EU counterparts, NL seems to be performing well in this factor. The Eurobarometer Fairness perceptions data of 2022 shows that in NL, 86% feel *“a personal responsibility to act to limit climate change”* compared to 77% at the EU level average.

Figure 12.7: 2021 Public Climate and Energy Monitor results

At what level(s) would you (perhaps) like to be involved in energy installation choices? *Multiple answers possible*	Group B and might to definitely want to be involved (n=890)
Choices for my immediate living environment (my own neighbourhood)	57%
Choices for my home region (municipality and surrounding municipalities)	44%
Choices for the Netherlands (national policy)	17%
At no level	5%
Other level	1%
Don't know/no opinion	12%



Source: Motivation (2021), Publieksmonitor Klimaat en Energie 2021 (*https://www.rijksoverheid.nl/documenten/rapporten/2021/10/11/publieksmonitor-klimaat-en-energie-2021-motivaction*)

How the factor influences ENCI: ENCI in the Netherlands is impacted by the propensity of citizens to meaningfully engage in the energy transition. The Public Monitors show that there is a high level of awareness among the public in terms of climate change and their role. 3/4 want to be involved (perhaps)

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in choices around new energy installations, and 3/4 state that they could participate more in energy coops/initiatives (Figure 12.7) (Motivaction, 2021).

These motivations should support ENCI in the Netherlands. However, awareness and motivation are not always actualised and this is seen in the fact that only 15% of respondents participate in an energy coop/initiative (Motivaction, 2021). Hence, there are factors which may be limiting the extent to which the public's desires and motivations translate into practice.

Affected ENCI types: Citizen engagement and passivity affects every ENCI type because it is at the core of whether and how an ENCI actor operates. If there is high awareness of the need to act this may or may not translate into action. For example, the finding in the Public Monitor that Dutch people feel that citizens are the least responsible for climate change, indicates a level of passivity in society which may be detrimental to ENCI types 1 and 2 (individual-level).

Local examples: For example, Reindonk energy cooperative, in Horst aan de Maas, focuses on social cohesion in the local area and distributed benefits to RE projects, in order to promote citizen engagement in the cooperative. They open membership to anyone and give everyone the right to think along and decide with them. To them, it is important that control is in the hands of the many, not the few. Moreover, they have agreements with the municipality for employing/contracting with people with disabilities in the solar meadow project (Data/evidence from the Reindonk Energy research case template).

S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in the Netherlands: NL is characterised by a centralised governmental model of decision-making for the majority of RE projects (Breukers and Wolsink, 2007). Trust in responsible stakeholders plays an important role in determining the projects' acceptability (Liu et al., 2019). Dutch culture is often conceptualised as individualistic (Oyserman, 2006), and this might influence trust in institutions because there is a strong value placed on having influence over decision-making in society (Kim and Sherman, 2007; Liu et al., 2019). The Corruptions Perception Index reveals a score of 82/100 and a ranking of 8/180 for the Netherlands. This indicates that the perceived level of public corruption in the Netherlands is quite low based on the score and ranking compared to countries around the world.

The SCP's 2021 Climate Approach report (Klimaataanpak) showed that there is a concern among citizens about the specific form of national efforts to mitigate climate change, because these may impact people financially, and the distribution of costs is perceived as unjust (SCP, 2021, p. 9). This can lead to issues in public support for government measures. There is also a sentiment that large corporations are best-placed to take action on climate change, but currently do too little (SCP, 2021).

The Eurobarometer on Fairness perceptions of the green transition (2022) shows to what extent respondents in NL agree that certain actors are doing enough to ensure a fair green transition. These data show the highest amount of confidence in the regional, city or local public authorities (54% agreed) and the lowest amount of confidence in private companies and businesses (37% agreed). Overall, the data show that roughly half of respondents do not agree that institutional actors are doing enough to ensure that the green transition is fair (Figure 12.8). Moreover, 37% are confident that by 2050, sustainable energy, products and services, will be affordable for everyone (less than the EU average of 46%) (Figure 12.9).

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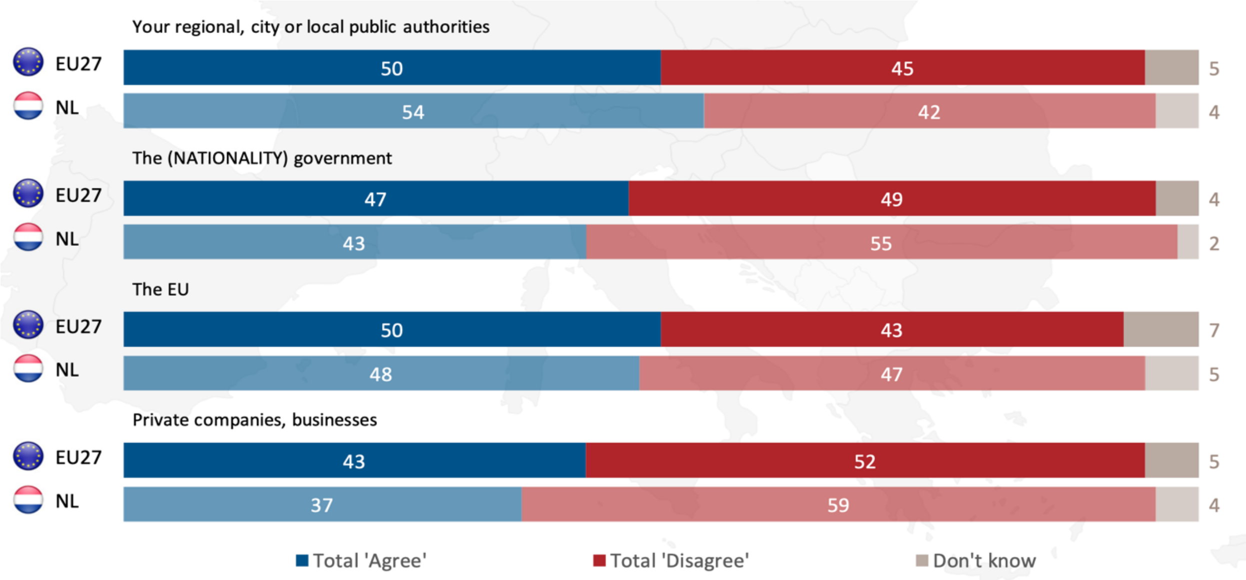
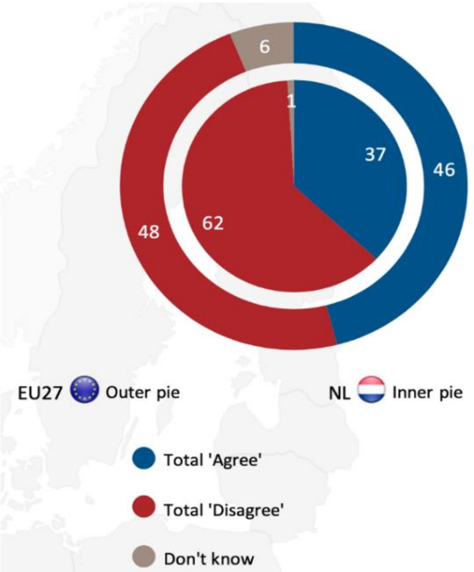
Figure 12.8: Extent to which respondents agree/disagree that certain actors are doing enough to ensure that the green transition is fair (NL compared to EU27)



Source: Eurobarometer (2022), Fairness Perceptions of the green transition (https://europa.eu/eurobarometer/surveys/detail/2672)

Figure 12.9: Extent to which respondents agree/disagree that by 2050 sustainable energy, products and services will be affordable for everyone, including poorer people (%)



Source: Eurobarometer (2022), Fairness Perceptions of the green transition (https://europa.eu/eurobarometer/surveys/detail/2672)

How the factor influences ENCI: Trust plays a key role in ENCI in the Netherlands (Liu et al., 2019). The Dutch survey of Koirala et al., 2018, "exhibits that community trust factor is the most important and statistically significant predictor of willingness to participate" in community energy (p. 39). In addition,

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Hoppe et al. (2015) show that trust-building with citizens by local officials, was a key factor in the success of the energy cooperation Lochem, because the trust citizens have in the “ways local energy initiatives operate and manage things, [] is an essential precondition for [their] development” (p. 1907).

Trust in institutions might have varying effects on ENCI. For example, people that do not think institutional actors are doing enough to ensure that the green transition is fair, may be more motivated to act/participate in the energy transition. The Eurobarometer study showed that 59% of respondents do not think private companies and businesses are doing enough, 55% for national government, 47% for the EU and 42% for regional, city or local public authorities (Figure 12.8). This indicates a high lack of trust in institutions/corporations in the Netherlands. Compared to the EU average, this lack of trust was higher in NL for all actors aside from the ‘regional, city or local public authorities’ group. On the other hand, lack of trust in institutions could potentially hinder ENCI development by leading to a sense of rejection in the public with regard to the green transition.

Affected ENCI types: This affects all ENCI types. For example, a lack of trust in institutions might particularly drive social movement forms of ENCI (types 9 and 10). Moreover, it might encourage the rise of local 'champions' in the energy transition (linked to type 2 ENCI). These are actors who are trusted by the local community and whose involvement in a RE project can be beneficial due to their reputation of commitment to community interests (Beauchampet and Walsh, 2021; Hoppe et al., 2015).

Local examples: Actors at Reindonk Energy, for example, acknowledge the importance of trust and social acceptance of their operating solar-farm. In order to promote trust, they offer members prioritised access to financially participate through the means of a bond loan. They adopt a bottom-up approach in exploration and feasibility studies for renewable energy, in order to foster trust and support (Data/evidence from the Reindonk Energy research case template).

S9.Willingness to invest in energy transition

How is this factor manifested in the Netherlands: The Eurobarometer fairness perceptions survey in 2022 showed that 50% of respondents in NL would reduce their energy use for economic reasons primarily, and 49% would reduce their energy use for environmental reasons primarily. Demographics were an influential factor in this, with the 55+ and female respondents choosing environmental reasoning more and the 25-39 and male respondents choosing economic reasons more. The survey showed that environmental reasoning plays more of a role for reducing energy use in people in NL compared to the EU average. In terms of willingness to invest time in the energy transition, in the Eurobarometer study, 43% of respondents agreed that being in a job that contributes to advancing the green transition is important to them personally. This was less than the EU27 average of 55%.

The survey also revealed that two-thirds (66%) are 'Very' or 'Rather confident' that they could use less energy and 15% were 'Very not confident' for this. These results are more positive in comparison to the EU27 average (QA5.1). Moreover, 86% of respondents agreed that they feel a personal responsibility to act to limit climate change, and 13% disagreed. This ratio was also more positive in comparison to the EU27 average (77% agreed, 21% disagreed) (QA1.1).

Overall, the study shows mixed results in how willing people are to invest in the energy transition in NL. In

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terms of reducing energy use and feeling responsible, Dutch respondents are more willing compared to the EU average, and are more likely doing so for environmental reasons compared to the EU average.

How the factor influences ENCI: ENCI is enabled by both economic and environmental reasoning. The distinction between the two might not be important for this factor. What is relevant, is the high amount of confidence among respondents' (two-thirds) that they could use less energy. This is a finding from the Eurobarometer which could be an enabling factor for ENCI in NL. Moreover, the high level of responsibility respondents feel could also be an enabling factor. All of these results indicate a high level of willingness among Dutch citizens to invest in the energy transition.

Affected ENCI types: This factor primarily affects type 2 because of the personal nature of willingness, consciousness and determination, which may influence how actors on the private level are operating.

Local examples: The province of Limburg offers a sustainability loan 'Sustainable Home' which can help residents of municipalities such as Weert. This contributes to the aims of Weert's energy transition roadmap by helping homeowners participate in the Warm Living in Weert project. For example, the loan can assist with upgrading of home insulation. Willingness to invest may be helped through accessibility of loans such as this.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)

How is this factor manifested in the Netherlands: According to TNO (the Netherlands Organisation for Applied Scientific Research), efforts are being made to achieve the whole value chain for solar and wind within Europe. The availability of materials for renewable energy infrastructure is a key challenge for the energy transition in NL. The Climate and Energy Outlook (KEV, 2022) states that “Increasingly, materials and components needed for grid extensions (cables, transformers, meters, and so on) are poorly available”. This has negative consequences on the expansion of the electricity grid to enable for renewable energy, causing a delaying effect on the energy transition (PBL, 2022, p. 117). Similarly, the high costs of renewable energy technologies, such as wind turbines, is a challenge in NL.

Overall, solar and wind energy are 'proven technologies' for the Dutch energy transition, and are the “only reliable and affordable renewable energy sources that are widely deployed” (Weert Municipality, 2020, p. 18). Ongoing innovation is making these technologies more efficient and new technologies are expected to be available in the future. Solar panels and wind turbines are seen as an interim solution until better ones with less spatial impact become available in the long-term (Weert Municipality, 2020).

In terms of renewable hydrogen, the Climate Fund budget promotes green hydrogen deployment in industry and refining (PBL, 2022). However, hydrogen is seen to play a more important role in future visions, beyond 2030, but the exact details of future policies and pathways for hydrogen, have not been specified due to significant uncertainties.

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How the factor influences ENCI: The emergence and development of ENCI in NL is limited by infrastructural bottlenecks, such as scarcity in materials and components for grid extensions [p117, PBL, 2022]. ENCI actors are limited by the significant investments necessary to purchase and install renewable energy (RE) infrastructure, such as wind turbines. Even though wind turbines and solar panels are an available and relatively affordable technology, their spatial impact acts as a barrier for ENCI actors in the Netherlands. For example, ENCI actors rely on municipal policies that will make space for solar meadows in their region, and on national and provincial policy rules in order to make wind turbines a profitable initiative (TNO, 2022).

Affected ENCI types: This may particularly affect transformative type ENCI. For example, type 2 (the change-making private actor) may be hindered by unavailability of affordable solar PV for their rooftop. Similarly type 8 ENCI actors (hybrid and citizen-based and transformative) are affected by the availability of RE technologies. In terms of efforts to expand green hydrogen in NL, this is targeted at large emitters (industry and refinement), meaning it may only affect organisationally-embedded transformational ENCI (Type 4).

Local examples: In Horst aan de Maas, for example, grid capacity is a key technological barrier for ENCI actors, such as the energy cooperative Reindonk Energy. The electricity grid has limited capacity and the expansion of ENCI is heavily reliant on whether the municipality and grid operators can develop it further. Furthermore, Reindonk Energy described the barrier of high costs of RE technology in setting up a ""sustainable wind farm of three wind turbines costing a total of €18 million", which is not feasible for volunteers (Data/evidence from the Reindonk Energy Research Case Template). This is also experienced by the cooperative, Weert Energy, making new solar parks an unviable business case for them.

In the energy transition roadmap of Weert municipality, there is emphasis on the importance of current innovations (e.g., hydrogen, geothermal, aquathermy etc.) that will deliver reliable and accessible technologies in the future (Weert Municipality, 2020, p. 15).

T2. Decentralised energy system and storage

How is this factor manifested in the Netherlands: According to the KEV, there is uncertainty to what extent the current electricity system can provide the flexibility and storage necessary for the energy transition, and what policies are needed (PBL, 2022, p. 83). This is important particularly in light of bottleneck issues in the grid caused by distribution and transmission network constraints (PBL, 2022, p. 114). Transition scarcity is an issue in the electricity grid whereby there is no more capacity for transmissions at high-voltage substations. However, small-scale projects and rooftop solar are not limited by this and can still be connected as normal (RESNML, 2021).

In light of the above, KEV (2022) and other municipal energy transition roadmaps (e.g., Weert energy transition roadmap) acknowledge the potential role of hydrogen in solving such grid issues. For example, conversion of electricity to hydrogen may support transport and storage in the electricity system.

How the factor influences ENCI: Issues in grid access have a hindering effect on ENCI in the Netherlands. Network transmission constraints motivate ENCI actors to look to batteries as a solution. While this may be a successful option in some cases, battery usage entails risks associated with reliance on scarce raw

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materials and the potential of high costs when scarcity increases.

Grid constraints encourage governments to stimulate private rooftop solar (small-scale generation) which does not rely on the electricity grid, and hence does not contribute to infrastructural issues in the grid [p11 in RES-Noord-en-midden-1.0]

Affected ENCI types: Transmission scarcity does not impact end-consumers of renewable energy, only producers. Hence, this would primarily impact type 8 (transformative, hybrid and citizen-based ENCI), in respect of community energy production. Type 2 (private households) may be positively affected by issues in grid transmission because the government encourages small-scale rooftop solar generation as it does not contribute to bottle-necks.

Local examples: In the municipality of Weert, the Weert Energy cooperative is affected by the energy distribution network and energy storage issues (among other similar cooperatives). Actors interviewed from the cooperative find that connecting solar parks to the grid is becoming increasingly difficult for these reasons and increasing solar PV in the area is leading to high peaks in the distribution grids. In light of this issue, the cooperative collaborates with other partners to develop energy storage solutions with the aid of the Top Sector Energy Subsidy from the Ministry of Economic Affairs. This is reliant on the decreasing costs of batteries (Data/evidence from the Weert Energy Case Research Template). The neighbourhood battery of Weert Energy is an innovative example of a potential backup solution to issues in the distribution grid. Energy storage in the form of a battery can be used as a way to prevent grid bottlenecks and therefore need for grid expansion is reduced. However, the use and benefits of the battery has faced considerable barriers and challenges mainly due to the required law amendments and the expensive price of such technologies.

T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility)

How is this factor manifested in the Netherlands: Grid operation is a key issue for NL in the energy transition. KEV 2022 demonstrated the issues that grids will face in meeting increases in energy production and consumption. For example, capacity issues will arise due to bottlenecks (congestion) in the system and shortages of technically skilled staff and materials for grid operators (PBL, 2022, p. 113). Challenges with grid capacity and increasing reliance on solar/wind encourage the Dutch government to focus on improving the flexibility of the system. This is achieved through digitalisation of the system, such as in the form of international connections, electrolysers, batteries, and price-responsive cogeneration production (PBL, 2022, p. 115).

An example of an innovative project in the digitalisation of the Dutch energy system is the Sustainable Self-supporting Urban Smart Grid (SSUSG). This is a highly innovative and unique EU project which uses hydratable salt in a combined salt and heat battery in order to provide an energy-supplying system at the neighbourhood level for the generation, storage and distribution of both heat and electricity. The independent Dutch research organisation, TNO, is prototyping a home heat battery as part of the SSUSG project. This project is the first of its kind in Europe and allows energy to be generated at the district level, stored, and then returned to the district level. Existing neighbourhood batteries for electricity storage are limited by issues of scarce (expensive) raw materials such as lithium, which is difficult to recycle.

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Other advancements in digitalisation of the energy system in the Netherlands include Interflex (a flexibility market for Smart Grids in Eindhoven, which uses protocols for communicating flexibility offers and requests, as well as devices in the low-voltage grid, ICT infrastructure with the right interfaces, and technologies for forecasting congestion). Another key example is CityZen, an EU project-based initiative focusing on clean, new urban energy in Amsterdam and Grenoble. They are successfully implementing smart grid projects, such as Virtual Power Plant, which allows for district level storage and trading of solar energy on the electricity market and End to End smartification which gives real-time insight into the power grid, allowing them to resolve disruptions and determine where and when to invest in the electricity grid.

How the factor influences ENCI: Issues in grid capacity have hindering effects on ENCI in the Netherlands. This is because electricity grid bottlenecks will put a limit on renewable energy generation by ENCI actors (PBL, 2022, p. 114). However, the steps which are being taken to digitalise the Dutch energy system will have an enabling impact on ENCI emergence. For example, the SSUSG project, if successful and scaled-up, will enhance the sustainability, affordability and efficiency of current options in energy distribution and storage. Therefore, making it easier for ENCI actors at the district level to produce and consume renewable energy. The battery being prototyped in this project will relieve the pressure on heat and electricity networks by allowing for energy storage on the district level. Since the device is still being developed it has not yet had a significant impact on ENCI. Similarly, the Interflex project has not yet been scaled up so as of yet only impacts ENCI in Eindhoven. CityZen's smart grid projects also impact ENCI only on a small scale, in Amsterdam, for example through better grid management.

There are innovative companies providing smart grid solutions in the Netherlands. For example, the energy storage solutions of SmartGrid provide the entire process from design to delivery for its customers. This technology enables ENCI by providing benefits such as communication and data exchange, and avoiding net congestion.

Affected ENCI types: This factor mostly affects type 2 and 8, or any ENCI actor which is engaged in the production or consumption of renewable energy. For example, energy system digitalisation particularly impacts type 2, the private household who is producing their own solar energy. The use of smart grids and energy storage solutions can allow this actor to manage their energy production and consumption most sustainably and efficiently. Digitalisation also may enable them to sell their energy into the grid.

Local examples: Most of the innovative projects on the digitalisation of the Dutch energy system are being piloted in specific sub-regions or districts. For example, the SSUSG project is being piloted in Almkerk and Breda in NL. The ambition for the project is to scale it to local SMEs in inner cities in South Holland. If this is achieved this might benefit the municipalities of Weert and Horst aan de Maas.

In Weert, the pilot neighbourhood project called 'COOP-STORE' is an example of a project on energy system digitalisation. Weert Energy realised a 1.5 MWp solar park with a battery of 612 kWh. The neighbourhood battery is intended to relieve pressure on the local grid, allows for energy trading and frequency regulation on the national high-voltage grid, and stimulates 'local consumption' by supplying the stored solar power to the connected households at night. However, the interview with Weert Energy representative revealed that the battery is "far too small" for storing energy and delivering it at night and "it could hardly be made profitable despite a high subsidy". It is now "used by Tennet for peak enforcement for which [they] receive an appropriate fee" (Data/evidence from the Weert Energy Case Research

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Template). Despite the challenges, this project rewards the cooperative with experience and knowledge, and they acknowledge the long-term iterative process involved in innovations such as this. The challenges have led them to consider other alternatives such as hydrogen storage.

5.4 Energy efficient buildings

How is this factor manifested in the Netherlands: On an EU level, the total building stock is responsible for roughly 40% of EU's energy consumption and 36% of GHGEs. Three-quarters of this total building stock is energy inefficient and on average, less than 1% of the national housing stock is renovated yearly (Cornelis, 2022). Energy efficiency measures are needed to reduce energy demand.

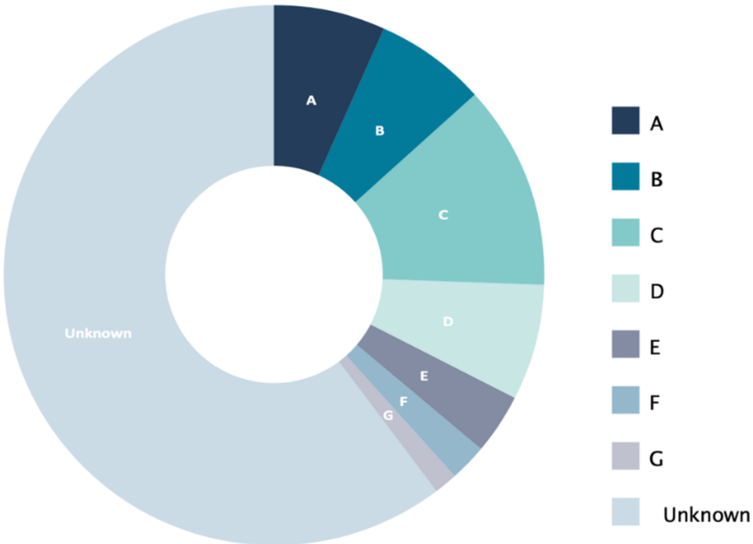
The Dutch National Climate Agreement (2019) states that the country is “on the cusp of a sustainable transformation of the built environment and of the adaptation of the 7 million homes and 1 million buildings, many of which are moderately well insulated and virtually all of which are heated by natural gas, into well insulated homes and buildings that are heated using renewable heating and which use or even generate clean electricity” (p. 16). As part of RES, the 30 energy regions under the Dutch Climate Agreement will focus on energy saving. This entails improving the energy efficiency of the built environment in these regions. There is also the option of connecting houses to collective heat sources, such as from aquathermal, geothermal, or residual heat systems. However, it is a significantly time-consuming and costly project to complete, hence, individual house heat solutions may be more viable.

Energy consumption in households is declining steadily in the Netherlands. This is in-part due to upgrades in energy efficiency of the buildings, and replacement of appliances for more efficient alternatives [p143, PBL, 2022]. New policies make it mandatory to have an energy label in selling and renting houses and the building code has meant that new builds in NL have better insulation and efficiency. Public, social and commercial property also contribute to the energy consumption of the built environment. However, despite advancements in energy efficient buildings, the KEV 2022 states that “Energy saving targets under the European Energy Efficiency Directive (EED) are not being met” (PBL, 2022, p. 86).

How the factor influences ENCI: Energy labelling is important for ENCI actors because it provides them with the knowledge they need to take action in improving the efficiency of buildings. However, most houses have unknown energy labels (Figure 12.10) and this might hinder ENCI because that information is useful for building retrofits and actions relating to sustainable heat solutions. On the positive, Dutch policy on new-builds is beneficial for ENCI because it ensures high levels of insulation and efficiency. A domestic dwelling which already has a high energy label allows the private individual to focus on other aspects of energy citizenship such as energy generation via rooftop solar. This is because the energy efficiency of buildings constitutes the first step before implementing other actions in energy citizenship.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101022492.

Figure 12.10: Energy labels homes North and Central Limburg



Source: RESNM (2021) North and Central Limburg Regional Energy Strategy (https://www.resnml.nl/media/2021-07/RES-Noord--en-midden---1.0-Def.(1).pdf)

Affected ENCI types: This factor particularly affects type 2, the private household ENCI actor. This is because living in a very inefficient building may first necessitate significant investment in energy efficiency upgrades, before the individual can take action aligned with renewable energy production/consumption.

Local examples: For example, in the 'Noord en Midden RES 1.0', there is an emphasis on the use of LED lighting, better insulation to reduce the gas consumption of buildings, and the installation of heat pumps [p11 in RES-Noord-en-midden-1.0.pdf]. Table 12.2 shows the energy consumption of the built environment in 2017 in the Noord-en-Midden region. This shows that domestic dwellings account for the largest portion of energy use (63%). Figure 12.10 shows the 2018 energy ratings of dwellings in the Noord-en-Midden region. This reveals that the energy label is unknown for the majority of houses. However, energy labels have improved in response to new policies for selling houses.

Together with the Weert municipality, Weert Energy has been implementing a project on the efficiency of the built environment namely the 'Warm Wonen in Weert' [Warm Living in Weert] project. As part of this, the cooperative's energy coaches conduct heat scans of homes and deliver energy reports based on these. Residents receive a Personal Energy Plan which demonstrates to them the measures they can take to make their home more energy efficient. The ambition is to expand this project to the region of Limburg (Warm Wonen in Weert, n.d.).

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Table 12.2: Energy consumption and CO2 emissions by target group

Target	Energy consumption		CO_2 emissions	
	TJ	%	Ktonne	%
Housing	13.629	63%	951	57%
Public and social property	2.589	12%	215	13%
Commercial property	5.394	25%	493	30%
Total	**21.612**	**100%**	**1659**	**100%**

Source: RESNM (2021) North and Central Limburg Regional Energy Strategy (https://www.resnml.nl/media/2021-07/RES-Noord--en-midden---1.0-Def.(1).pdf)

T6. Energy labelling

How is this factor manifested in the Netherlands: In the National Climate Agreement, the Dutch government states that "It is vital that harmonised carbon labelling systems be created to facilitate the creation of potential international markets for low-carbon products and services." and "the Integral Knowledge and Innovation Agenda (IKIA) explicitly provides flexibility for research and implementation with regard to determining the carbon footprint of products and services. Development of a digital accounting system for carbon footprints in the supply chain (e.g., using blockchains) is part of this agenda." (p. 119).

How the factor influences ENCI: The IKIA enables ENCI by giving actors the ability to take more ownership over their personal carbon footprint through the products that they purchase. Hence, this factor does not have an immediate and direct impact on ENCI, but more of an indirect effect through consumer-ship.

Affected ENCI types: This may particularly affect ENCI types 1 and 2 because private actors have control over their individual purchasing behaviours and can manage their own carbon footprint with the help of carbon labelling.

Local examples: The Knowledge and Innovation Agenda of the Netherlands captures the mission to make products and services climate neutral through achieving emission-free mobility in the goods sector (MMIP 10). The D+ Reporting provides insights into the ongoing developments for MMIP 10. As part of this mission, cross-sector alliances have been formed. One example is the collaboration between The Ministry of Infrastructure and Water Management (IenW) and Delft University of Technology (TU Delft) to form the 'Delta Institute'. This collaboration led to the 2021 launch of the Electrical Sustainable Power Lab (ESP Lab) which is focusing on themes including e-mobility and electrification of the transport sector.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101022492.

Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in the Netherlands: Climate vulnerability in NL is seen in the risks of sea level rise (Rijkswaterstaat, n.d.). According to the Netherlands Environmental Assessment Agency (PBL), 59% of the Dutch land surface is susceptible to flooding. These risks are counteracted by the use of water pumps and dykes as part of expert water management in NL.

Additionally, the country is vulnerable to rising temperatures. A 2020 report by the Dutch government stated that the Netherlands has experienced an annual average temperature rise of 2.1 degrees Celsius between 1907-2019, which is more than the global average of 1.0 degree Celsius. The faster warming of the Netherlands is "most likely caused by the fact that land masses warm up more than the oceans. Furthermore, the Netherlands faces rising temperatures of the North Sea water, creating risks for ecosystems and industry" (CLO, 2020).

In addition, NL is vulnerable to changes in rainfall patterns. Intense rain showers are increasing in frequency, thus putting the country at risk of flooding (as seen in Limburg in 2021). Flooding increases the risk of coastal erosion and overflowing of canals and waterways. Other extreme weather patterns which the Netherlands is vulnerable to are storms, and heat waves. These events put biodiversity at risk and cost the country in rebuilding infrastructure.

How the factor influences ENCI: Extreme weather can (indirectly) influence ENCI because it can damage RE infrastructure. For example, the risk of storms and flooding might hinder the development of community-owned solar parks if they are vulnerable to being damaged. In addition, adverse weather may disrupt RE generation, thus creating a need for other sources to cover demand in these times. These challenges call for systems integrations which can delay the development of ENCI (Dutch government, 2019).

On the other hand, increased vulnerability to climate events may motivate ENCI to emerge. For example, heat waves can be a tangible and urgent call to action for people because of their large impact on daily lives. Hence, ENCI can manifest as an attempt to counteract climate vulnerability.

Affected ENCI types: This factor affects all ENCI actors in some way. The transformational side of the typology may be particularly motivated by climate vulnerability. For example, type 10 ENCI (social movements) may be stimulated by the immediate vulnerability caused by heat waves in NL. On the other hand, certain private actors may be hindered by extreme weather (e.g., physically vulnerable or elderly groups).

Local examples: The municipality of Weert has an interactive climate impact atlas which shows the local effects of climate change, such as rainfall and water droughts. The atlas demonstrates the urgency of the energy transition in the area by concretising their climate vulnerability. It can be used as a tool by ENCI actors because it shows the areas in which action is needed most, and where measures are possible.

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EN2. Availability of resources (geological challenges, geographical opportunities and limitations)

How is this factor manifested in the Netherlands: On a European level, overdependence on Russian hydrocarbons has created energy security issues since 2021, reinforcing the need for structural measures which target affordability and demand reduction. One of the most important natural resources in the Netherlands is natural gas. In 2015, it was estimated that the country had approximately one-quarter of the natural gas reserves in the EU. However, the Dutch natural gas market is undergoing significant changes and the government has announced plans to close their most important gas field (in Groningen), due to earthquakes and carbon footprint (PBL, 2021). Currently, the gas field is being kept open as a 'back-up' due to "uncertain geopolitical developments" (Dutch government, 2022). Concerns over gas supply security led to the 'Gas Protection and Recovery Plan' and the lifting of restrictions on coal-fired power stations for 2022-24, allowing them to operate at full capacity to reduce reliance on gas for generating electricity. Nitrogen plants (e.g., in Zuidbroek) are also being increased as part of the transition away from natural gas in NL.

In 2021, 36.33% of energy consumed in the Netherlands came from gas, while 43.55% came from oil (Our World in Data, 2022). Exploitation of natural gas and oil reserves in NL (since the 1950s and 60s) has made significant contributions to the Dutch treasury and economic growth. However, these resources are expected to run out within a few decades. Natural gas reserves are less than 20% of the original amount. Even though NL is drastically reducing domestic production, the consumption of natural gas is reducing at a slower pace and the country became a net importer in 2018 (PBL, 2021, p. 15). This dependency increases the risk of supply security and affordability issues. Hence, renewable alternatives to meet the demand for gas is a key challenge, but green gas supply is not expected to be significant up to 2030 in NL (i.e., from biogas or hydrogen production).

Geographical opportunities/limitations: In NL, the North Sea and abundance of flat arable land create opportunities for wind and solar parks. The North Sea is beneficial for wind energy due to its relatively shallow waters, favourable wind climate and close proximity to ports and energy consumers. There is an expected large-scale roll-out of offshore wind in the coming decades (Dutch government, 2019). On the other hand, use of solar resources is limited by the unpredictable and unreliable sunshine / climate, and issues in connection of solar panels to the regional electricity grids (PBL, 2021, p. 12). Similarly, the roll-out of heat networks in the built environment and development of green gas production is said to be slow (PBL, 2021, p. 12). Alternatives to biomass such as geothermal heating and thermal energy from water are still expensive and smaller in scale in NL.

How the factor influences ENCI: Dependence on natural gas can influence ENCI mainly because of its central role in the Dutch energy system and the economy. However, the expected closing of Groningen Gas Field, and depletion of gas and oil resources, represents an opportunity for ENCI because the government is driven to stimulate development of other renewable energy sources (e.g., the PAW programme; Natural Gas Free NL). Moreover, increasing natural gas scarcity can increase the energy prices (e.g., gas price more than doubled between 2020 and 2021, see Table 12.3), enabling ENCI emergence by encouraging people to switch to more affordable RE alternatives (PBL, 2021, p. 11).

Geographical factors are both favourable and unfavourable for ENCI. For example, ENCI focussing on wind

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energy is enabled by the abundance of flat land, the favourable wind climate and the relatively shallow waters of the North Sea. However, unreliable sunshine places a limiting factor on the efficiency of solar thus hindering ENCI in this area.

Table 12.3: Economic growth and energy prices, NL

	2005	2020	2021*	2030	Low prices 2030	High prices 2030	Tyre width 2030
GDP2 (index 2021=100)	81	95	100	116			107 - 129
Oil price3 (US$ per barrel)[4]	72	45	71	117	89	136	
Gas price3 (euro per ^{m3})[4]		0,13	0,31	0,37	0,21	0,45	
Coal price3 (euro per ton)[4]	71	58	94	81	60	120	
Wholesale price electric-tricity (euro per MWh)[4]	56	33	103	73	50	93	
CO_2 price (euro per tonne)[4]		26	53	110	87	149	

[1)] Historical data prices taken from CBS: https://www.cbs.nl/nl-nl/maat- work/2022/13/market-prices-energy-2000-2021. CBS does not have historical gas prices for 2005.

[2)] Projections: *CPB-Central Economic Plan 2022* (CEP) (CPB 2022a)[1] , *CPB-Actualisation Medium-Term Outlook to 2030* (CPB 2022b).[2]

[3)] Projections: *Recommended parameters for reporting on GHG projections in 2023* (EC 2022).[3]

[4)] Constant prices 2021.

* Preliminary data.

Source: PBL (2022) Climate and Energy Outlook (https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022)

Affected ENCI types: Resource availability (oil, natural gas) has a particularly direct impact on Dutch national government and (non-)governmental organisations involved in the energy sector. In another way, resource availability also directly impacts citizen-based and hybrid ENCI (types 7 and 8). For example, the availability of flat land resources affects their ability to construct wind and solar parks. Resource availability may also affect ENCI types in a more indirect way, through energy prices. For example, citizen-based and hybrid (type 8), private (type 2) and organisationally-embedded ENCI (type 4) actors may be stimulated to act in a transformational way in response to unaffordable natural gas prices. Table 12.4 shows the increasing share of RE (%) since 2005. ENCI is enabled by the targets set for RE in 2030.

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Table 12.4: Renewable energy and energy conservation, NL

	2005	2020	2021*	2030	Bandwidth 2030
Renewable energy (peta-joules)	57	223	241 - 269	577	506 - 608
Gross final energy consumption (petajoules)	2.301	1.944	2.010	1.878	1.626 - 2.103
Share of renewable energy1,2 (per cent)	2,5	11,5	12,0 - 13,4	31	27 - 33
Share of renewable energy including statistical transfer3 (per cent)		14			
(Targets) share re-renewable energy (per cent)		14		27	
Energy saving EU Article 7 cumulative (petajoules)[4]					721-939
EU target Article 7 cumulative (petajoules)				924	
Primary energy consumption EU Arti-kel 3 (petajoule)				2.219 - 2.261	2.061 - 2.416
EU target Article 3 primary (peta-joules)				1.950	
Final energy consumption EU Arti-kel 3 (petajoule)				1.850	1.729 - 1.974
EU target Article 3 final (peta-joules)				1.837	

1) Excluding statistical transfer of 49 petajoules.
2) Due to uncertainty about biomass sustainability criteria, there is a bandwidth for 2021. The projections assume that this uncertainty no longer exists.
3) Due to the failure to meet the renewable energy target in 2020, the Netherlands agreed a statistical transfer of 49 petajoules with Denmark for 2020.
4) Energy savings as per Article 7 refers to cumulative savings over the years 2021-2030.
* Preliminary data.

Source: PBL (2022) Climate and Energy Outlook (*https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022*)

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Local examples:

Due to issues related to natural gas (rising prices, CO2 emissions, increasing scarcity of reserves, earthquakes, risks of dependence on imports) municipalities, such as Weert have produced roadmaps to transition away from gas to a more sustainable energy system using more RE (see Image).

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in the Netherlands: Compared to 1990 levels, total GHG emissions in NL in 2021, were 24% lower (Table 12.5). Future phase-out of coal-fired power plants, and new policies (e.g., SDE++ and national CO2 taxation January 2021) should have positive implications for GHG emission reductions. Table 12.6 shows the breakdown of emissions by sector. After the ETS (EU Emission Trading System) and ESD/ESR (Effort Sharing Decision and Effort Sharing Regulation) sectors (small industry including waste treatment, built environment, mobility and agriculture), Industry was the sector with the largest emissions in 2021.

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Table 12.5: Total greenhouse gas (GHG) emissions in NL

	1990	2020	2021*	Estimate 2030	Band width Estimat e 2030	Bandwidth estimate inclu- sive part of estimated policies, 2030
Total (megatonnes of CO_2 equivalents)	227	170	172	122 - 128	114 - 139	108 - 133
Total carbon dioxide (CO_2) (megatonnes of CO_2 equivalents)	168	142	145	98 - 104	91 - 115	
Total other greenhouse gases (megatonnes of CO_2 equivalents)	59	27	27	24	22 - 24	
Reduction of greenhouse gas emissions relative to 1990 (per cent)	0	25	24	44 - 46	39 - 50	41 - 52
Target reduction greenhouse gas emissions4 (pro- cent)					55	55

Source: PBL (2022) Climate and Energy Outlook (*https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022*)

Table 12.6: GHG emissions by sector in megaton CO2 equivalents, in NL

	2021*	Estimat e 2030	Tyre width estimat e 2030	Bandwidth estimate inclu- sive part gea- graded policy with in- estimate4, 2030	Indica- tive residual emission s 2030
Total4	172,2	122 - 128	114 - 139	108 - 133	94,9 - 113,5
Electricity5,6	32,7	8 - 13	7 - 21	10 - 25	6,1 - 20,5
Industry7,8	53,2	41	32 - 47	28 - 43	34,4 - 35,3
Built environment8	24,5	18	15 - 21	13 - 19	10,0 - 11,2
Mobility9	30,5	28	26 - 31	25 - 30	23,7 - 24,9
Agriculture (including glass horticulture)8,10	27,1	23	21 - 24	21 - 24	18,9
Land use8	4,3	3,7	3,0 - 4,2	1,8 - 3,1	1,8 - 2,7
ETS sectors	74,1	40 - 45	33 - 55		
ESD/ESR sectors	93,8	78,6	74 - 83		
Cumulative ESA sectors 2021-2030		865			
36% EU target cumulative ESA sectors		903			
48% proposed target cumulative ESA sectors		839			

Source: PBL (2022) Climate and Energy Outlook (*https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022*)

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Despite improvements since 1980, there are still negative health effects from the current air quality. The transport sector is a large contributor to air pollution in NL. "In comparison to other sectors, the transport sector is falling short in reducing emissions" (PBL, 2022). According to PBL (2021) the indicative residual emissions for the built environment, agriculture and mobility and transport, ""will probably not be achieved"" (p15). The transport sector also contributes to noise pollution in NL. This is part of the motivation behind the zero-emission zones for urban logistics which have been implemented since 2021 (PBL, 2021).

In terms of water pollution, NL faces many water quality issues due to being a downstream country with intensive agriculture and livestock farming. Water pollution mostly consists of nitrogen and phosphorus leaching from agricultural processes. Since the 1990s, policy responses for farming and urban wastewater, substantially lowered nutrient concentrations of Dutch waters. However, evidence shows that progress has slowed since 2009 (Wiering et al., 2020, p. 9).

Waste management in the Netherlands includes many activities and methods of disposal, such as incineration and landfilling. The PBL and TNO are currently exploring ways to decarbonise the incineration processes (e.g., carbon capture and utilisation (CCU), carbon capture and storage (CCS) and municipal solid waste gasification).

How the factor influences ENCI: Pollution resulting from fossil fuel energy production and consumption in the Netherlands can support the emergence of ENCI, because the country must meet emission targets laid out in the Paris Agreement and Dutch Climate Agreement and stimulating ENCI helps to meet those targets. In order to combat pollution, the Dutch government has policies and support schemes which promote ENCI actors.

Dutch emissions improved in 2020 compared to 1990 levels, partly due to changes in the energy sector (as well as due to COVID-19). For example, the closure of the Riverstone coal fired power-plant may have stimulated ENCI through initiating greater RE generation (PBL, 2021, p. 11).

On the other hand, the visual and waste pollution from RE infrastructure (e.g., wind turbines) may illicit resistance from certain citizens ('Not In My Back Yard' or NIMBY). This may act as a barrier to ENCI emergence.

Affected ENCI types: Pollution-levels might particularly impact government-based ENCI forms because of the responsibility of the Dutch government to stay within country-wide pollution limits. Moreover, ENCI actors such as citizens do not have control over issues such as industrial waste management.

Local examples: Noise and visual pollution play a role in sustainable energy generation in Horst aan de Maas, for example. The Framework for Generation of Sustainable Electricity (KODE) describes how there will be disadvantages if renewable energy projects are to be implemented in two selected exploration areas. According to the municipality "the experience of the environment changes and there is potential nuisance, through noise for example". Due to this issue, they engage with residents and landowners through public consultations (KODE, 2020).

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EN4. Conflicts and opportunities about land use connected to renewable energy

How is this factor manifested in the Netherlands: The Environment and Planning Act describes the assignment of functions to locations, meaning certain areas are designated with specific functions (e.g., protection or utilisation) and construction regulations and guidelines are designed accordingly. This impacts whether and how a certain area of land can be used for RE generation. In NL, discretion is given to municipalities in this regard, because they can choose active/passive land policies, as long as they are in line with policy documents such as the Environmental (Activities) Decree, and the National Strategy on Spatial Planning and the Environment.

About one-third of the total area of NL is arable land. This provides the country with valuable opportunities in the agricultural sector. Forests cover about 11% of the total area of the Netherlands (World Bank, 2015). One-third of this is privately-owned, and another third is owned by national government. The timber industry is valued in the Netherlands. Part of the reason for the Dutch government's ambition to increase forest cover by 25% over the next 30 years, was to increase timber production, in addition to the aim of reducing the Dutch carbon footprint.

How the factor influences ENCI: In the Netherlands, "every square metre already has one or more designated uses" hence "this space is not automatically available" for RE (Dutch Climate Agreement, p. 229). As a result, spatial planning is a key issue for the Dutch energy transition (section D6 in the Climate Agreement). The National Climate Agreement states a 35TWh ambition for production of electricity from renewable energy on land by 2030 (Section C5.5). Section C5.9 states that the upscaling of renewable energy on land will constitute a major spatial planning challenge. Hence, RE generation is expected to take place in the built environment and in rural areas, as well as in existing infrastructure and on inland waters (p. 204).

Affected ENCI types: This factor may particularly affect ENCI forms which engage in RE generation. For example, the lack of available land in NL for RE generation encourages the 'change-making ENCI' (type 2) because domestic RE generation via solar PV on rooftops is seen as a solution to the lack of land for solar farms.

Local examples: Selecting appropriate areas of exploration for RE has been one of the focus areas in the municipality Horst aan de Maas. According to their Framework for Generation of Sustainable Electricity (KODE), the municipality has identified two (exploitation appropriate) areas based on landscape analysis. In identifying these exploration areas, the municipality must acknowledge the trade-offs in land use and the fact that RE developments will affect the perception of the area.

EN7. Impact of the use of existing non-renewable resources on the system

How is this factor manifested in the Netherlands: The KEV 2022 states the need for flexibility in energy demand and the use of batteries and good network connections (within and between countries) to provide the required flexibility. Figure 12.11 below shows that the annual average price of oil is rising and expected to remain high relative to prices since 2000.

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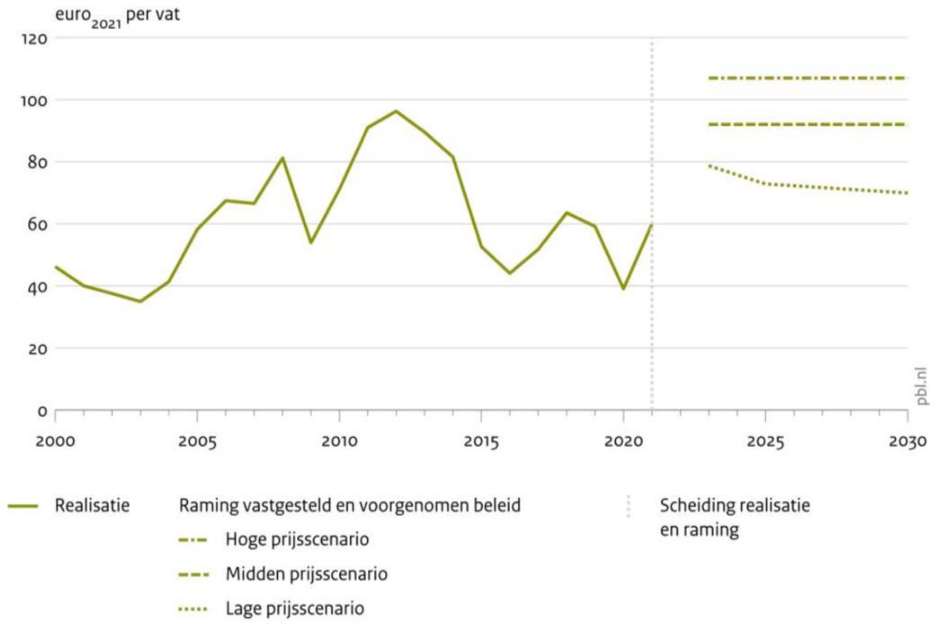
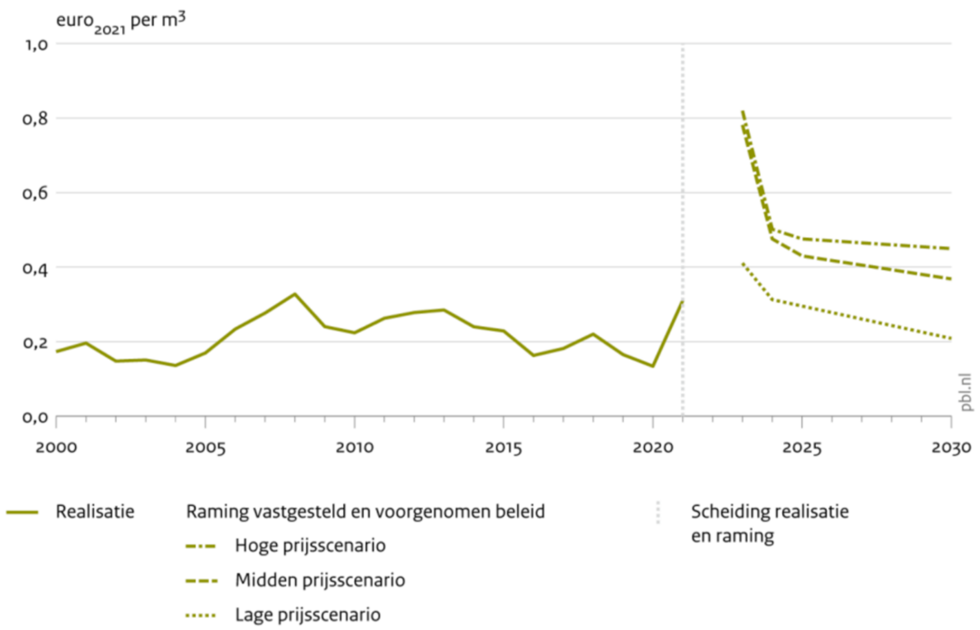
Figure 12.11: Annual average price of oil



Source: PBL (2022) Climate and Energy Outlook (https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022)

Figure 12.12 shows that the price of natural gas is also unprecedentedly high.

Figure 12.12: Annual average wholesale price of natural gas



Source: PBL (2022) Climate and Energy Outlook (https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022)

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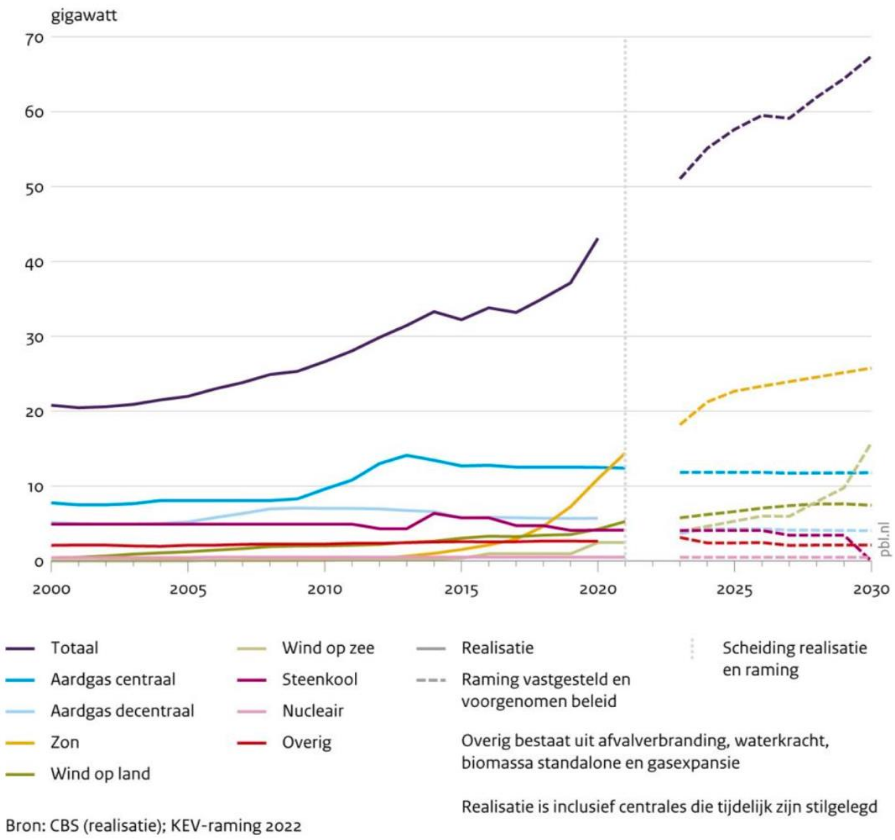
Natural gas consumption is projected to decrease by a smaller amount than production, making the Netherlands a net importer of natural gas (see also factor EN2). There is an ongoing debate around the feasibility of the transition away from natural gas in NL. Efforts to meet energy demands with renewables creates opportunity for ENCI emergence. Figure 12.13 below shows that installed electrical power from solar resources has overtaken that of centralised natural gas resources.

Figure 12.13: Installed electrical power, NL



Source: PBL (2022) Climate and Energy Outlook (*https://www.pbl.nl/publicaties/klimaat-en-energieverkenning-2022*)

How the factor influences ENCI: Increasing scarcity of natural gas and oil is a motivating factor for ENCI (PBL, 2022). Tightening of the EU Emissions Trading System (ETS) and the revision of the Energy Taxation Directive (ETD) leads to higher costs for use of polluting fuels thus increasing CO2 prices acting as a motivation for large industry to turn to RE. Since electricity demand by industry partly responds to electricity prices, rising prices may encourage organisationally-embedded ENCI.

Affected ENCI types: The issue of inflexibility constitutes a major barrier for ENCI in wind and solar electricity production. ENCI development will depend on various factors relating to battery capacity, flexibility in electric car charging, electrolysers and the ability to export surpluses abroad or import in case of shortages. Without these developments, bottlenecks in domestic high-voltage networks will hamper the development of ENCI types, such as energy cooperatives (type 8).

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Local examples: The high amount of installed offshore wind power capacity expected for 2030 (16-21 gigawatts) provides an opportunity for hydrogen production in industry based on the coast, because transmission capacity will not be sufficient to transport additional electricity inland (PBL, 2022, p. 116). Hence, hydrogen storage has been suggested as a potential solution to facilitate the connection of offshore wind to the national electricity grid.

Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in the Netherlands: According to RESCOOP.eu 'Transposition Tracker', the transposition of the EU provisions relating to renewable energy communities (REC's) and citizen energy communities (CEC's) into the Netherlands' national legislation is graded as 'average progress'. The Netherlands opted to combine the two legal forms of energy communities distinguished in the EU Directives (energy communities for citizens and renewable energy communities) into one (Diestelmeier, 2021). The newly adopted Dutch Energy Law 2022 transposes both REC and CEC definitions. Citizen participation is not ensured in the national legislation. And there is no specific designated authority to oversee compliance with the Energy Community definitions.

The Dutch Climate Agreement of 2019 wants 50% of the land-based production of wind and solar energy to be in the hands of local community organisations. This will help to secure fair distribution of the economic benefits and is hoped to reduce negative side-effects for local communities (in the form of visual intrusion and noise). The new subsidy scheme (since 2023, January 1) for cooperative energy generation in NL (SCE) facilitates this. However, the 50% ownership level is a goal and not a legal requirement.

Provisions on Net-metering provide a legal framing for private household ENCI. Net-metering acknowledges citizen prosumership in the energy system by providing financial benefits for households feeding RE into the grid.

Different legal forms are available for self-generating renewable energy for own use and selling part of it. The most used one is the cooperation form. Subsidy schemes come with certain requirements. Solar PV panels are widely used by households. In the Netherlands, 2 million roofs are equipped with solar panels (1 in 4). Renewable energy generation by individuals and collectives has been actively supported by subsidy schemes. The lower costs of solar panels have led the government to announce the elimination of the feed-in tariff system (saldering) from 2025 onwards for new solar panels. The national government of the Netherlands wants 50% of local renewable energy projects to be locally owned. This is not a legal requirement and something which is difficult to enforce. The percentage of locally owned renewable energy generation went up for solar PV but dropped for wind power. In 2021, the shares of collectively owned solar and wind power amounted to 22.9% and 32.2%. The share for solar went up but for wind it fell from 53.4% in 2019 to 32.9 in 2020 and 32.2% in 2019 (because of the diffusion of big privately-owned windfarms).

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How the factor influences ENCI: Overall, increasing recognition of ENCI in political discourse is beneficial for ENCI emergence and development. Forms such as private prosumers and energy cooperatives are increasingly legitimised as actors in the energy transition. However, the planned phase out of the net-metering scheme may have a hindering effect on private ENCI and may represent a regression in the legal framings around prosumership in NL.

Affected ENCI types: Particularly types 2 and 8 - when they engage in renewable energy generation, the legal framings of ENCI have implications on their success. For example, the goal of 50% community ownership of RE is favourable for type 8 ENCI. Moreover, net metering and subsidy schemes for private solar PV installation have given an acknowledgement of the role of citizens as consumers of energy in the energy transition and has also simplified the process for these ENCI actors

Local examples: The RES documents are legal requirements of the 30 energy regions in the Netherlands, according to the Dutch Climate Act (2019). For example, in RES Nord-en-Midden 1.0, citizens are recognised as one of the key stakeholders, and " local participation is a basic requirement in any new development" of large-scale RE generation projects.

The value of the involvement of well-informed citizens in the Dutch energy transition, is evident from the launch of the online learning environment, Energie Participatie.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion

How is this factor manifested in the Netherlands: Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion, have been enacted in NL particularly in recent years. The Netherlands has implemented a series of measures to compensate households for the higher energy costs during the Ukraine war. The average compensation per household in 2022 amounts to €545 for a household with average energy use. Low-income households received €1,300 extra.

How the factor influences ENCI: Support for energy costs for low-income and vulnerable people will continue. For medium and high-income earners, the compensation will be reduced, for public budget reasons and for stimulating people to take energy efficiency action. Energy efficiency is receiving more attention by house-owners and social housing associations. The state created a €150-million programme for municipalities to help citizens reduce their energy use.

Affected ENCI types: Particularly type 1 and 2, individual actors who are in lower-income groups are most in need of legal measures to assist energy poverty, for example.

Local examples: The RES 1.0 of North and Middle Limburg indicates that this region holds affordability for everyone as one of their three pillars of social sustainability. The strategy states that a link with the social domain of municipalities is key for identifying individuals in energy poverty. This shows that legal responsibility does not lie on a regional level for this matter.

Social inclusion in the energy transition is demonstrated within the province of Gelderland, with the Gelders Burgerberaad. There, citizen consultations have been held (panel of 3,300 citizens and civic forum of 150 citizens in 2022) to provide input in the devising of a Climate Plan in 2023.

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L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (incl. rights for active participation of customers in the electricity markets)

How is this factor manifested in the Netherlands: Responsibility for renewable energy generation has been devolved to regions via the National 'Regionale Energie Strategie' programme. Consultants played a big role in the identification of suited areas for renewable energy production. Municipalities are strongly in favour of energy cooperatives, for meeting the regional renewable energy targets and for circumventing citizen opposition. Energy democracy is not a big concern for the government as such.

Net metering legislation provide rights for prosumers in interaction with the energy market (however, it will be phased out from 2025 onwards). The regulation on net metering 'salderingsregeling' ensures that power companies deduct all the power that a household feeds back into the grid, from the amount that they consume. This means households only pay for the balance. This regulation makes solar PV an attractive investment for householders. However, the government will phase out the regulation due to financial gains that they are not reaping from electricity taxation. The percentage of energy subject to net metering will be reducing annually until it is 0%. Prosumers will still benefit from feeding energy into the grid, however, the compensation will not be the same price level as the electricity they consume. The 'reasonable compensation' will be set as a minimum price for households and it is planned to be no less than 80% of the basic cost of electricity.

How the factor influences ENCI: The Energie Participatie website provides useful resources for households to discover the ways in which they can participate in the energy transition.

In principle, every citizen has a right to self-generate electricity and to exercise voice. An online platform (Energie Participatie) has been created for citizens interested in information about the energy transition. The website also contains stories about experiences of real energy citizens.

The phasing out of net-metering regulations may have implications on ENCI. Forecast calculations show that increasing self-consumption will lead to greater monetary gains from investment in domestic solar PV. Hence, phase out of net-metering may induce changes in ENCI behaviours in households by encouraging people to use appliances most when the sun is shining. Smart energy managers are available to automate optimal self-consumption for this reason.

The overall assessment by REScoop of the enabling frameworks for Energy communities in the Netherlands is 'good practice'. They say that "In general, the environment for participation in energy communities in the Netherlands is supportive. " This is partly due to the "Removal of unjustified regulatory & administrative barriers" and "Non-discriminatory treatment as market participant".

Affected ENCI types: Particularly types which are engaged in RE generation because they are in interaction with the energy market, and regulations impact their abilities.

Local examples: In the province Gelderland, a citizen panel involving 3000 citizens (burgerberaad) has been established and a citizen forum is being set up. Energy cooperatives are well-organised and have a cooperative relationship with local government. They participate in decision making over the energy transition. Energy communities and individuals who want to sell self-generated electricity via the grid need

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a connection to do so, but the network company responsible for providing such connections (Enexis) is unable to meet all demands. This constitutes a bottleneck.

L4. Bureaucracy and red tape

How is this factor manifested in the Netherlands: For memorial buildings a permit is required for putting a solar panel on the roof. For other roofs no permit is required. Wind farms with more than three wind turbines require a land-use permit with a light environmental assessment. Wind farms with more than 20 turbines require a full permit with environmental assessment (milieu-effectrapportage). Solar farms require a permit called omgevingsvergunning. For getting the permit the land-use purpose should fit with the officially indicated purpose (bestemming) of the land. If the land is designated as a building site for houses or has been assigned positive landscape value it is very difficult to use the land for solar PV generation. Neighbours should be consulted, in order to avoid opposition from them.

Despite the existence of some bureaucratic red tape, NL is a leader in the installation of solar PV (after Australia). 35% of all owner-occupied households have solar PV, and 16% of social rental homes.

According to RESCOOP, in terms of the removal of unjustified regulatory & administrative barriers: “The Energy Act contains a provision that allows an energy community producing electricity or gas to supply without a licence if: over the period of a year, the energy community does not supply more electricity or gas than it imports into the system on an annual basis; is supplied to end customers with a small connection who are members or shareholders of the energy community; and the energy community does not have more members or individual shareholders than a number to be determined by ministerial regulation. The Regulator is charged with developing further regulations to operationalise this rule. However, details are still pending” (https://www.rescoop.eu/policy/netherlands).

How the factor influences ENCI: According to Warbroek et al. (2019), local low-carbon energy initiatives (LLCEIs) are highly dependent on government, and especially on local government. The study found that local governments were largely unsupportive. For larger projects, local governments often demand a convincing business case, which LLCEIs and the partners find difficult to deliver.

Affected ENCI types: Affects ENCI types which must operate according to bureaucratic rules and red tape regulations. For example, collective, transformative types which initiate locally-owned RE generation.

L7. Information and empowerment of citizens to become active consumers on the energy market

How is this factor manifested in the Netherlands: To help citizens and energy cooperative to invest in renewable energy special platforms have been established. Such platforms also offer an opportunity for citizens to exercise voice.

An example of empowerment is the creation of the ‘Participation Coalition’, in which the following NGOs collaborate: 1) Natuur en Milieufederaties, 2) HIER, 3) LSA Bewoners, 4) Energie Samen and 5) Stichting Buurkracht. The national government cooperates with the Participation Coalition and local governments cooperate with local organisations. Even commercial legal advisors are active on that front. For instance,

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Dirkzwager legal and tax advisors produced a detailed manual guiding the financial and legal aspects in relation to cooperative energy projects. This Collaboration between Ministries and the Participation Coalition may have an empowering effect on active involvement of citizens in the energy transition.

How the factor influences ENCI: The information sources on setting up cooperative energy projects and manifold opportunities for citizens and energy cooperatives to exercise voice empower citizens to do something. Because of this, we are seeing so many energy initiatives in the Netherlands. One in four houses has a solar roof, which is the highest in the world. The number of energy communities increased from 34 in 2015, to 212 in 2020 and 623 in 2022. In total 97,000 people are involved in energy communities. Consultation of neighbours is a requirement for obtaining a permit from municipalities for land-use for big energy generating projects (Diestelmeier, 2021).

This factor affects ENCI forms engaged in generating ENCI (e.g., type 2 and 8). Citizen empowerment is also achieved through schemes to protect households against rising energy prices. For example, small consumers are protected with a price ceiling for energy prices in 2023. This may have an empowering effect on type 1 and 2 ENCI because it supports citizens in a financial way, giving them more resources to invest in the energy transition.

Affected ENCI types: Types 1, 2, 8

Local examples: Virtual Power Plants (VPP) are a potential solution to help regulate the power supply in the electricity system. “A VPP is a smart ICT platform which aggregates distributed energy resources such as privately-owned solar panels, enabling them to interact with the large distribution network as a single entity. A VPP can, for example, schedule energy consumption by charging electric vehicles when energy production is at its highest. Alternatively, VPPs can enable access to distributed renewable energy generated by the aggregated individual prosumers when the system is in need of additional electricity. Although promising, VPPs have not yet become a game changer in the fair energy transition. As VPPs are mainly developed to fit to the needs of incumbent actors, they do not often match the needs and demands of local energy communities” (TU/e, n.d.).

The cVPP (community VPP) initiative is focused on the empowerment of people in the village of Loenen to become independent from energy suppliers (Loenen Energie, n.d.). Revenues from the initiative will also go towards social projects in the village. The cVPP model is being scaled up currently alongside new legislation and policy which enables prosumership.

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Summary table

	Factors	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition						X
	Multi-level energy governance structure of a country						X
	Political support for ENCI (mechanisms, networks, etc.)					X	
	Political/democratic culture and traditions					X	
	Inclusion and empowerment policies					X	
	Geo-political challenges (war in Ukraine, energy supply…)	X					
ECONOMIC	General economic situation / Inflation rate & purchasing power	X					
	Energy prices				X		
	Energy market				X		
	Energy taxation, state aid, fuel subsidies					X	
	Financing and investment opportunities				X		
	Grassroots innovation and 'short circuit' alternative economic activities				X		
SOCIAL	Level of income / wealth disparity and energy poverty	X					
	Energy literacy, awareness and skills			X			
	Citizen engagement and passivity in society				X		
	Trust in institutions and collective endeavours				X		
	Willingness to invest in the energy transition			X			
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES		X				
	Decentralised energy system and storage		X				
	Digitalisation of the energy system				X		
	Energy efficient buildings			X			
	Energy Labelling				X		

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ENVIRONMENTAL	Climate vulnerability				X		
	Availability of resources						X
	Pollution				X		
	Conflicts and opportunities about land use for renewable energy			X			
	Impact of existing non-renewable resources			X			
LEGAL	Legal framings of ENCI forms				X		
	Legal measures dedicated to vulnerable consumers, energy poverty, inclusion					X	
	Rights and duties of consumers, prosumers on the energy market					X	
	Bureaucracy and red tape			X			
	Information and empowerment of citizens to become active consumers					X	
	Total factors per level of barrier/support	**3**	**2**	**6**	**11**	**7**	**3**

Conclusion

There are some key major barriers to ENCI in NL. First, the current general economic situation (high income inequality, low purchasing power) and high energy prices have an inhibiting effect on ENCI because of a scarcity in economic resources to be invested in the energy transition. For example, low-income and vulnerable households may be left with a lack of time / money to invest in retrofitting or domestic solar PV.

In addition to energy poverty, technological factors are currently a key barrier for ENCI in NL in a number of ways. For example, the technical energy system faces challenges in terms of grid capacity bottlenecks, and lack of certain raw materials for battery technologies. Moreover, technologies can be expensive (e.g., electrical storage technology). The structure of the electrical grid constitutes a challenge for decentralisation and energy generation by energy cooperatives and similar ENCI actors.

Similarly, there are also barriers to ENCI caused by a lack of efficiency in the built environment. Poor insulation and other factors make it sub-optimal to invest in RE generation before retrofitting takes place. However, retrofitting can lead to other potential problems, such as a 'Renoviction Wave'. Another key factor in NL is the lack of available land for RE generation, and a high reliance on the natural gas network.

On the other hand, there are major opportunities for ENCI in NL. These are mostly around the advanced support scheme structure of the country. Schemes such as SDE++, ISDE, SCE, have been and will be supportive for ENCI emergence. Moreover, the political acknowledgement of the need for multi-level governance is beneficial for ENCI and this is seen in the progression of the RES programme in each municipality. State aid for high energy prices also has a beneficial effect on ENCI in that it helps citizens financially. However, it may also have a counteracting effect by sustaining continued use of non-renewables. There is also a culture of citizen engagement in NL and this is seen in the high number of

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energy cooperatives and other non-energy related grassroots initiatives (e.g., food banks).

Finally, the increasing scarcity of non-renewables (gas and oil) presents an opportunity for ENCI emergence in NL, because the government acknowledges energy insecurity as a key issue which can be partly solved by stimulating energy communities and prosumership. Accordingly, key advancements have been made in the legal system in NL to legitimise ENCI and give rights to actors such as energy cooperatives and households in the generation of RE.

Overall, the ENCI situation in NL is above average compared to international counterparts, yet there are still many challenges to overcome if the country is to attain its ambitious climate targets for 2030, 2050 and beyond.

The outlook for the future of the national ENCI ecosystem in NL can be projected as positive, given the commitments that the government has made to further developing support structures for citizens in the energy transition and the legitimacy that citizen-based and hybrid ENCI forms have in the country. Future geopolitical challenges do place major uncertainty on the future outlook of the energy transition and potential pathways could have different outcomes for ENCI. For instance, increasing scarcity in oil and gas resources could have hugely positive implications on the need for developing and facilitating ENCI in the country. On the other hand, geopolitical conflicts and mass migration may place pressure on Dutch resources and cause funding for ENCI actors to be scarcer.

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13. PESTEL ANALYSIS OF ENERGY CITIZENSHIP IN SPAIN

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Introduction

Spain is a country in south-western Europe with great geographical, climatological, and technological potential, as well as political, economic, and social interest for the development of different forms of ENCI. The population is around 47 million which covers the majority of Iberian Peninsula including Balearic Islands, Canary Islands and autonomous cities, Ceuta, and Melilla in North Africa. Considering its size and geography the climate varies significantly across the regions. Accordingly, Spain consists of 17 autonomous regions which have their own parliament; therefore, it could be considered fairly decentralised country. Specifically, each autonomous region is in charge of the energy sector in a way that the local governments can authorise certain power plants and energy networks, also, providing financial and political mechanisms following the national energy strategy which might create relevant political, economic and infrastructural conditions for the development of different ENCI types.

According to the National Statistics Office (INE), in 2021 the Spanish economy has grown by 5.5% in comparison with 2020, whereas the COVID-19 pandemic has strongly affected the economic activity. Although the prime minister Pedro Sánchez and the Cabinet of Ministres took economic measures to tackle it, it was inevitable to observe a slowdown in the economic development since the services sector and tourism industry are the backbone of the economy and were hit hard by the COVID-19 lockdown measures. In the post-pandemic era, the country was back on the recovery track; however, the Russian invasion of Ukraine has challenged the global economy, including Spain, with the substantial increases in energy prices, inflation rate, and reductions in purchasing power. In fact, the main source of the energy supply in Spain are fossil fuels (68% of the total final consumption is provided by the fossil fuel resources). The majority domestic energy production comes from nuclear energy, bioenergy and waste, as well as other renewable energy sources (substantially, from wind and solar), while fossil fuel-based energy supply strongly depends on the imports from other countries like Algeria and the U.S (IEA, 2021).

Accordingly, the Spanish government has devised various national policy mechanisms to recover the Spanish economy and to boost the resilience through reducing the dependency on natural resources, especially energy dependency. The national energy policy is currently focused on the **Strategic Energy and Climate Framework**, which was approved by the Council of Ministers at the beginning of 2019. The main purpose is to achieve the essential goal of decarbonising the Spanish economy by giving a regulatory and legal framework to all the measures underway. This is intended to provide certainty of investments and committing the country and its citizens to the development of the territories that may be affected by the energy transition process. As it can be seen in Figure 13.1, the Strategic Framework is based on three key elements:

- **The Climate Change and Energy Transition Act** (*Act 7/2021 on Climate Change and Energy Transition)*: a regulatory and institutional framework aimed at reinforcing and anchoring in legislation

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the government's commitment to renewable energies, energy efficiency and the reduction of GHG emissions. This is the first time that Spain has had a regulation with the status of an act that sets targets for reducing GHG emissions and the penetration of renewable energies.

- **The National Integrated Energy and Climate Plan 2021-2030 (PNIEC)**: a strategic document that defines the objectives for reducing GHG by 23% compared to 1990, the penetration of renewable energies and energy efficiency. This effort is consistent with an increase in ambition at European level by 2030, as well as with the Paris Agreement (Resolution of 25 March 2021).
- **The Just Transition Strategy (JTS)**: an instrument for the identification and adoption of measures that guarantee workers and territories affected by the transition to a low-carbon economy fair and supportive treatment. The aim is to avoid negative impacts on employment and depopulation.

Figure 13.1: Key elements of the Energy and Climate Strategic Framework

Additionally, Spain has developed a package of medium and long-term structural measures. Firstly, the **Long-Term Decarbonisation Strategy (ELP)** aims to reduce GHG emissions by 90% compared to 1990 by 2050 at the latest, following the PNIEC proposal, and explores technological vectors (e.g. renewable gases), which will be necessary for the decarbonisation of sectors that are difficult to electrify. Secondly, the **National Energy Poverty Strategy** sets out a diagnosis of the Spanish situation and the lines of action and objectives to reduce this social problem that affects more than 3.5 million people and to guarantee the effective exercise of this right to energy for all citizens. Thirdly, the **Recovery, Transformation and Resilience Plan (PRTR)** aims to counteract the impact of the pandemic on investment and economic activity by using *EU Next Generation* financing instruments. Likewise, the **+SE Plan** (**More Energy Security Plan**) aim is to provide more security in terms of energy prices for households and the Spanish economy, and to contribute to increasing the EU's security of supply. Finally, there are the **strategic projects for economic recovery and transformation (PERTE),** with a high capacity for economic growth, employment, and competitiveness of the Spanish economy.

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The most prominent ENCI initiatives in Spain are ***collective, citizen-based and hybrid***. Within these, the Autonomous Communities from which the most representative examples can be drawn are *Catalonia*, the *Basque Country* and, to a lesser extent, *Galicia*. This is because these are Spanish regions with outstanding economic, industrial, technological, and social development, together with infrastructures suitable for the development of green technologies. Catalonia stands out for the importance given to electricity production (especially thermal and nuclear) and for its strong cooperative work, as does the Basque Country. The latter is also strongly rooted in the rural environment and has a remarkable cultural and historical value and rich landscape, as is also the case with Galicia, which links these two autonomous communities with a strong promotion of sustainable environmental development initiatives at local level and public-private co-responsibility.

Political factors

P1. Key political objectives, targets, and goals for the energy transition

How is this factor manifested in Spain: For the first time in history, the Spanish government has established the *Ministry for Ecological Transition and Demographic Challenge* (MITECO) in 2018 to reach the climate neutrality objectives in 2050. The government devised the PRTR supported by the *EU Next Generation* funds to rebuild post-COVID-19 Spain through several reforms and investments, specifically aiming at more sustainable and just future (EU Commission, 2021; MITECO, 2021d). The plan is based on four transversal pillars to support the transformation of the Spanish economy which are completely in line with the EU 2030 agenda and UN SDG: *ecological transition*, *digital transformation*, *gender equality* and *social and territorial cohesion*. These pillars will form a basis for the structural reforms and investment to recover the growth, promote businesses and accelerate the employment generation. The plan is carried out through 10 key policies including the decarbonisation of the energy sector through promoting renewable energy use, smart grids, and electricity infrastructure to overcome the intermittency issue. Furthermore, to mainstream the fossil fuel alternatives a roadmap for renewable hydrogen and its integration to the industry has been proposed. In fact, various PERTE have been developed to boost the clean energy transition under the recovery plan framework. For instance, the PNIEC 2021-2030 aims to reduce GHG emission by 23% compared to 1990 following the ambitious EU 2030 targets and Paris Agreement objectives (Sor man et al., 2020); and the ELP aims to mitigate emissions within the carbon intensive sectors such as transportation and certain industrial sectors through fostering the use of alternative fuels and renewable energy sources including the advanced technologies (MITECO, 2021d).

How the factor influences ENCI: Institutionalisation of climate policies and establishing long-term policy objectives are considered main factors to facilitate the sustainability transitions (Duarte et al., 2018). For instance, PRTR devises *Regulatory Framework to Promote Renewable Energy*, N*ational Self-Consumption Strategy and Development of Energy Communities* as policy essential objectives which aim to encourage the citizen participation to the energy system and eliminate barriers to boost the renewable energy deployment within the national energy system. This creates favourable ground both for prosumers (**Type 2**) and Energy Communities aiming radical changes in energy system to mitigate the impacts of Climate Change (**Type 8**; Wahlund & Palm, 2022). In the same vein, it promotes limited citizen participation – either

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individually in public energy discussions (**Type 5**) or joining green energy projects through financial investments (**Type 7).** Finally, the adequate policy framework may lead private companies, public entities, and universities to change the energy-related norms in which individuals may adopt these new practices (**Type 3**) or even push the organisation they work at to adopt green energy practices (bottom-up approach; **Type 4**).

Affected ENCI types: Types 2, 3, 4, 5, 7 and 8.

Local example: Next Generation Galicia: Strategy for the Galician transformation (Xunta de Galicia, 2021). Following the PRTR, the autonomous Galician government has developed a local transformation plan Next Generation, to build a more resilient, sustainable, and just future for post-COVID-19 through innovation, also providing education and training for the local people. Identifying priority areas, €20,000 million have been invested for the 355 projects which ensures the transformation of Galician economy. The aim is to increase the energy efficiency within the public institutions, proliferation of renewable energy sources, tackling energy poverty, establishing living labs for the renewable energy use, mainstreaming smart mobility systems, fostering the use of alternative fuels and digitalisation of electricity infrastructure including smart electricity systems.

P2. Multi-level energy governance structure of a country

How is this factor manifested in Spain: The Spanish governance system is quite decentralised, so that it collaborates with the regional governments (17 autonomous regions and two autonomous cities) **to implement the key national energy and climate policies**. For instance, in energy sector, the regional governments are responsible for authorising power plants and energy networks. In fact, local governments and municipalities can work directly with the end users to foster the changes in energy consumption and transport. However, this could lead to differences in policies and approaches between the regions (IEA, 2021).

The **Spanish energy market, specifically the electricity** (i.e. Act 54/1997 of the Electric Market) **and natural gas market** (i.e. Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC) **have been liberalised** which broke up the monopoly model and created a competitive market for electricity and natural gas. In fact, the Spanish and Portuguese governments established a cooperation for electricity and natural gas market which integrated Spanish and Portuguese energy markets. Accordingly, in 2007 Iberian Electricity Market (MIBEL) was launched and in 2015 the Iberian Gas Market (MIBGAS) was established to regulate the economic activities and operations in a more transparent way. In the same vein, the market regulations for the renewable energy in Spain allow the self- and collective consumption. Particularly, the national government devises a remuneration framework to promote the renewable energy facilities and renewable energy use through regulating long-term price stability and competitive bidding processes for the renewable electricity including the installed power (e.g., Royal Decree-Act 23/2020 approving energy and other measures for economic recovery). This decentralised structure would promote the renewable energy transition since local governments would create relevant political background both for individual and collective consumption.

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How the factor influences ENCI: For instance, autonomous governments may provide grants for self-sufficiency i.e., prosumers (**type 2**) or even to organisation such as SMEs to change their norms for energy consumption (**type 3**). Moreover, the collective action may embrace a more pragmatic approach not considering energy justice but doing their part for the renewable energy transitions (**type 7**), and social innovations may come forefront to ensure radical changes in energy system, including environmental and energy justice concerns (**type 8**).

Affected ENCI types: Types 2, 3, 7 and 8.

Local example: Catalan National Deal for energy transitions – Catalan Energy Institute (ICAEN, 2017). The National Deal for Energy Transition has as one of its objectives to improve the energy governance for the sake of clean energy use. On the one hand, the public institutions ensure the competitive markets for renewable energy, on the other hand, the municipalities will be the key actors to develop for the decentralisation of energy system, specifically to collaborate with citizens and economic actors. This new energy model also will attempt to distinguish the rural and urban areas to develop adequate strategies and action plans in regards with the context. In fact, the rural areas could be the centre for the sustainable energy system in regards with their great potential for the renewable energy production.

P3. Political support for ENCI

How is this factor manifested in Spain: To boost the use of renewable energy the Spanish government has been devising various **policy initiatives for self-consumption** and **collective consumption** following the several EU initiatives such as EU Circular Economy Action Plan, EU Green Deal and Clean Energy Transition program. For instance, following the PNIEC 2021-2030 the MITECO has devised a roadmap for self-consumption to identify the challenges and opportunities, also suggesting measures for mainstreaming self-consumption in Spain. In addition, to boost the alternative fuels and eliminate the dependence on fossil fuels the MITECO has suggested *Hydrogen Roadmap*: *a commitment to renewable hydrogen* and *Biogas Roadmap*. Likewise, **the government aims to support the technological advances and innovation** to ensure the use of renewable energy sources through *Strategy on Offshore Renewable Energy* (e.g., Energy Storage Strategy aims to overcome the storage issues of the renewable energy; MITECO, 2021d).

The PNIEC also aims at the transition to a more sustainable and connected mobility system through a specific plan, PERTE, for the electric and connected vehicle development. It ensures to mitigate the fossil fuel dependence in mobility sector and reduce related GHG emissions, and to convert Spain to a hub for the electric mobility. For this purpose, an *Alliance for Electric and Connected Mobility* will be established including various economic and social actors such as the autonomous governments, representatives from the automotive sector, trade unions and ministries (MITECO, 2021d). Finally, the NGOs like Greenpeace Spain raise awareness toward the self-consumption both for the individual consumers and SMEs through providing information on the policy frameworks and local supports.

How the factor influences ENCI: This factor provides a great opportunity for ENCIs since it devises necessary measures for the energy transition. It also provides various roadmaps and incentives to install

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renewable energy infrastructure at individual homes (**type 2**), to create local energy communities with a joint public-community ownership (**type 7**) or even form local energy cooperatives owned by citizens for a more equitable renewable energy system (**type 8**). Political mechanisms also create a great opportunity for collective actors to promote socio-technical change toward a more renewable energy system by increasing citizens' awareness toward a more renewable energy system (**type 9**). Furthermore, promoting the use of alternative materials such as biogas or hydrogen within the industries would allow business organisations to introduce clean energy practices (**type 4**).

Affected ENCI types: Types 2, 4, 7, 8 and 9.

Local example: The Energy Strategy of the Basque Country 2030 (3E2030) (Basque Government, 2016). The Basque Country Energy Strategy identifies the Basque Government's main policy objectives and actions regarding the energy policy for the period 2016-2030. It aims to achieve competitive and low-carbon energy system, also ensuring the energy security (e.g., availability of energy sources). The main leverage points for the policy action are stated as improving competitiveness and energy sustainability within the industry, phase out the oil dependency in the transport sector, reduce energy consumption and promote the use of RES within the buildings and houses, promote efficient energy management in public sector, promote the renewable energy production, promote research and development activities for innovative energy efficient technologies and contribute the climate change mitigation by 2030. They would create adequate policy framework and mechanism to accelerate the transition to a clean energy system and boost the efficient energy management practices within the Basque country by 2030.

P4. Political/democratic culture and traditions

How is this factor manifested in Spain: The MITECO assigned an organisational body, the Institute for the Diversification and Saving of Energy (IDAE), to promote the energy efficiency, renewable energy, and low carbon technologies through integrating various social and economic actors (i.e., citizens, communities, business organisations and public institutions) to the energy governance. The IDAE reported that the Energy Communities provide a great opportunity for the cooperation between citizens, NGOs, business organisations and public institutions to the energy governance process. On the other hand, Greenpeace Spain and Fundación Fiare (ethical banking cooperative) introduced the very first Citizen Map initiative which provides a list of renewable, ethical, and alternative energy providers throughout Spain to inspire citizens to use renewable energy (Greenpeace, 2019). Similarly, think tanks and renewable energy cooperatives integrate different parties to facilitate the energy transition. On the one hand, Fundación Renovables (*Renewables Foundation*) cooperates with citizens, municipalities (e.g., Valencia, Madrid) and businesses to increase the awareness on energy issue and supports clean energy strategy development; on the other hand, the Union for Renewable Energy Cooperatives offers renewable electricity to citizens and organisations by training and empowering citizens in energy efficiency and responsible consumption and allowing them to participate in the decision-making processes within the cooperatives.

How the factor influences ENCI: The political and democratic culture in Spain allows a fruitful background for an active collective action to ensure the cooperation between citizen and local entities (**type 9**) or even more radical social movements for changing the current energy system through eliminating the dependence on fossil fuel (**type 10**). The democratic culture in Spain would allow citizens

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to actively participate to decision-making process for the energy policymaking process to ensure the energy democracy and tackle the climate change (**type 6**). Also, there is an adequate democratic ground for active citizen participation to the energy cooperative to make a significant change in energy consumption (**type 8**). Hence, we can conclude that the political, democratic, and social culture creates a great opportunity for certain types of ENCIs.

Affected ENCI types: Types 6, 8, 9 and 10.

Local example: Local Energy Community Lasierra (Álava): A pioneer initiative in the Basque Country in collaboration with local bodies and entities. The Mendi Haran Consortium, the Lasierra Administrative Board, neighbours and the Azala space for cultural creation and tourist accommodation, with the advice and technical support of the Union for Renewable Energy Cooperatives, are the promoters of a Local Energy Community (LEC) following the characteristics established by the European Directive on the promotion of the use of energy from renewable sources. The launch of this LEC means strengthening the empowerment of this institution - which is the closest to its inhabitants - by managing, like the communal ones, a new natural resource that benefits the neighbours, saves costs for all, and contributes in a practical way to environmental care.

P5. Inclusion and empowerment policies

How is this factor manifested in Spain: Following the objectives of the EU Green Deal for inclusive and just sustainability transitions including the energy, **the Spanish government devised a National Energy Poverty Strategy** 2019-2024 (MITECO, 2019). This strategy devises necessary actions and measures based on four pillars: *improving the knowledge on energy poverty*; *improving the response toward the energy poverty situations*; *developing a structural change to mitigate energy poverty;* and *developing measures to protect consumers and social awareness*. Based on these pillars, **the strategy offers economic measures such as creating new social vouchers**, **analysing the energy costs** in a more detailed way based on the climate conditions of the region and **promoting public housing**, and subsidising energy expenses specifically for the vulnerable groups within the society. **Technical measures are also considered to empower citizens** (e.g., energy rehabilitation, replacing household appliances with more efficient ones). Educating the society on energy poverty issue and providing information on this topic through communication channels are considered as important measures. For instance, creating an online platform where citizens can find a guide for a more efficient energy consumption could be an important measure. Furthermore, developing a protocol to detect the energy poverty cases by healthcare professionals is also considered as an important measure to eliminate it. Last but not least, inclusive norms and regulations for the most vulnerable ones would be an effective measure (MITECO, 2019).

How the factor influences ENCI: The development of energy poverty plan in Spain creates a great opportunity for individual and collective actions to ensure the energy justice among all parts of the society since it develops necessary political, economic, and social measures to empower the most vulnerable groups within the society. Accordingly, the energy cooperatives which are concerned with energy accessibility issue would take advantage from the empowerment policies (**type 8**), as well as collective actors would be able to deliver these policies to enhance the acceptance of these policies and ensure the energy accessibility by the citizens (**type 9**).

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Affected ENCI types: Types 8 and 9.

Local example: The Alliance Against Energy Poverty (APE)-Catalonia. Social movement, founded in 2014, to ensure the universal access to energy and water resources, putting pressure on public institutions and energy suppliers. In 2012, more than 1.4 million families suffered from power and water cuts in Barcelona, in fact, many families were forced to decide between paying the mortgage, energy and water or feeding their kids. In 2015, APE's initiative together with other organisations facilitated the introduction of the Act 24/2015, which has reduced the power cuts in Catalonia significantly. The act allows debt cancellation by big energy companies and services regulations for vulnerable families in Catalonia.

P8. Geo-political challenges (COVID, war in Ukraine, gas, and oil supply)

How is this factor manifested in Spain: The geo-political challenges refer to threat and escalation of crisis between states and political actors (e.g., war, terrorism, etc.) that challenge the peaceful course of international relations, as well as cause political and economic repercussions throughout the world (Caldara & Iacoviello, 2022; Cevik & Ninomiya, 2022). Over the past decade, the energy sector has attempted for a structural shift by phasing out fossil fuels to mitigate the climate change; however, the Russian invasion of Ukraine on February 24, 2022, has led to one of the worst global energy crises on the European continent, including Spain, causing high and volatile fossil fuel prices and energy security issues (Cevik & Ninomiya, 2022; IEA, 2022). **This war raised the gas and oil prices which hold the highest share among the imports of Spain**. Since natural gas is the main source for the Spanish electricity production – together with nuclear power – the rise in natural gas prices increased the electricity prices (Carreras, 2022; Cevik & Ninomiya, 2022; Wang et al., 2022). In addition, **the diplomatic dispute over the status of Western Sahara has been escalating since 2020 between Algeria and Morocco which generates economic and political challenge for Spain** due to the Spanish strong economic ties with Algeria (it is one of the main natural gas suppliers of Spain accounting for almost 39% of the net imports in 2019; IEA, 2021) and to the Morocco's crucial role in border security for Spain, also for EU, by preventing irregular departures. Recently, Spain publicly recognised Morocco's plan for the region autonomy which provoked Algeria to recall its ambassador for consultations and review the gas prices, even threating Spain to cut off gas supplies (Dworkin, 2022). Eventually, Algeria and Spain maintained their bilateral trade and revised the gas prices for 2022 and agreed with periodic price revision by the next year (Fariza, 2022; Reuters, 2022).

To ensure the energy security and meet the current increasing energy demand, governments and intergovernmental organisations have taken various actions. The EU Commission has devised the **REPowerEU Plan** to tackle with energy market disruption, to end the dependence on Russian fossil fuels and accelerate the clean energy transition including strategies such as **EU Solar Strategy** initiative to double solar photovoltaic capacity by 2025 and install 600GW by 2030, or **Solar Rooftop** initiative to make legally obligatory to install the solar panels on new public, commercial and residential buildings (European Commission, 2022; IEA, 2022). Although the proliferation of renewable energy facilitates the decarbonisation of the economy, it causes supply and demand imbalances due to the intermittent and volatile energy production. In fact, some countries have regressed to use of coal to meet the increasing energy demand both at household and industrial level (Cevik & Ninomiya, 2022; IEA, 2022; Zakeri et al., 2022).

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How the factor influences ENCI: The geo-political crisis triggered by Russia-Ukraine war could generate an opportunity for the active citizen participation in the energy transition with the adequate policy enforcement (e.g., the PRTR to ensure the resilience of energy system; Zakeri et al., 2022). Also, it could lead to individual actions, e.g., households could adopt energy saving practices such as financial savings or participating in societal energy discussions without aiming at a substantial change in the current energy system (**type 1-3-5**). Similarly, collective pragmatic actions could be taken such as joining green energy projects or facilitating energy transitions through alignment activities (**type 7-9**). The global shocks also promote the prosumers (**Type 2**) and taking active role in decision making process for the energy transition (**Type 6**).

Affected ENCI types: Types 1, 2, 3, 5, 6, 7 and 9.

Local example: The Ekiola Initiative (Basque Country). It is an initiative emerging from the public-private collaboration between the Basque Energy Agency (EVE) and KREAN engineering consultancy from the Mondragon Corporation. It aims to promote the energy transition in the Basque Country by ensuring the active citizen participation and creating cooperative Energy Communities. In 2021 a cooperative project which focuses on the direct consumer participation as well as promoting the self-supply and self-consumption produced by the PVs was started. It will allow the intervention from various local actors such as municipalities, local governments, and agencies. The partners from the Leintz Bailara cooperative collaborating with the Ekindar de Azpeitia cooperative will be the pioneers to manage their own energy.

Economic factors

EC1. General economic situation / Inflation rate and purchasing power

How is this factor manifested in Spain: According to the recent report from the Spanish National Statistical Institute (INE), **the inflation rate in Spain has been increasing since the very beginning of 2022**, i.e., in July has reached a peak with 10.8%, mainly because of the significant increases in food and energy prices. However, in November the inflation rate has reduced to 6.8% since the fuel prices, specifically the electricity prices, have been reduced significantly (INE, 2022, see Figure 13.2).

Regarding the purchasing power parity (PPP), which refers GDP per capita, we can distinguish two periods in Figure 13.2: (1) after the recession until the COVID-19 outbreak (2008-2020), with a reduction in PPP until 2014 and a slight increase until 2020; and (2) after the COVID-19 outbreak in which, although it negatively affected the Spanish economy, the decrease subsided (Eurostat, 2022c) and, in fact, the national statistical office reported that the economy grew by 5.5% in 2021 compared to the previous year. In the third quarter the unemployment rate has increased by 12.7% while in the second it increased by 12.5%. The wage rate increased by 3.3% between the third quarter of 2021 and the same quarter of 2022 (Organisation for Economic Cooperation and Development, OECD, 2022).

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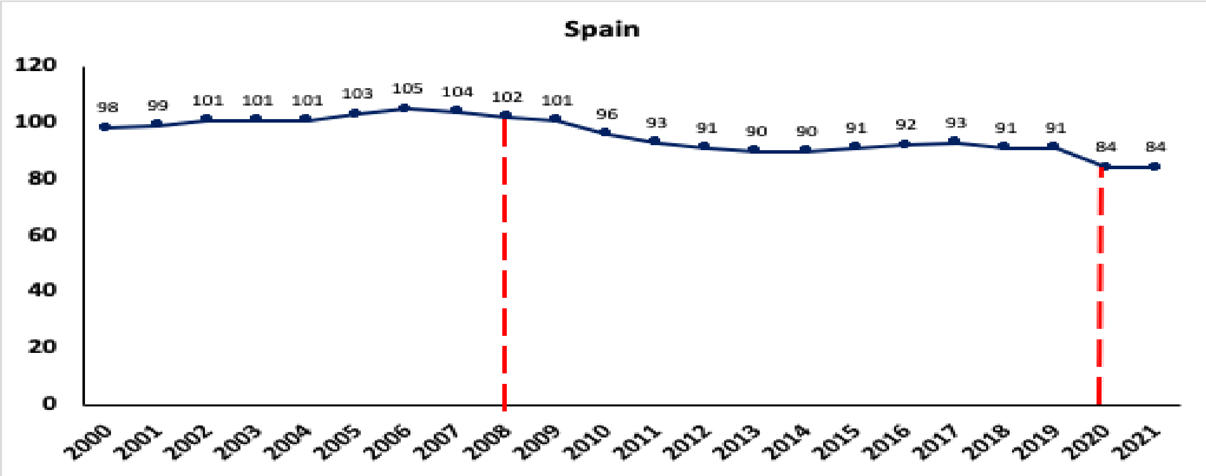
Figure 13.2: Annual purchasing power adjusted GDP per capita [SDG_10_10] in Spain.



Note**:** The values are offered as an index calculated in relation to the EU average set to equal 100, namely EU27-2020 = 100. If the index of a country is higher than 100, this country's level of GDP per capita is higher than the EU average and vice versa.

Source**:** Eurostat (2022c).

How the factor influences ENCI: Kungl & Geels (2018) highlighted that increasing pressures from the socio-economic environment could be a significant driving factor for structural changes in which **type 6** forms could be involved. Currently, the economic situation in Spain (i.e., reducing PPP and increasing prices of basic goods including the energy prices) might create an opportunity for the development of individual ENCIs types (e.g. **type 1,** since people can be more willing to make changes that result in individual savings). However, the abrupt introduction of these changes could give rise to forms of passive consumption of energy and there are no deeper transformations (**Type 2**)**.** It is also necessary to consider the potential threat that the energy transition can have for energy security within the country, specifically in vulnerable communities (which can have a negative impact on ENCI **types 5, 6, 8, 9 and 10**). Moreover, there is a paradigm shift in the economic theory and policy in a way that the alternative economic models are based on diverse social, political and environmental values rather than strong emphasis on economic growth e.g., beyond GDP (García Vaquero et al., 2021; Stiglitz et al., 2018). Accordingly, this paradigm shift would influence specifically **type 3 and 4** introducing trends such as the circular economy, an ecological business culture, green marketing and responsible purchasing, the creation of green jobs, among others (Gaertner Aranda, 2020).

Affected ENCI types: All types.

Local example: Economic Situation in Galicia. Since 2015, the GDP per capita in Galicia converges to the national average by 1.3 percentage points, i.e. in 2019 the convergence rate reaches 90.3%, which is the highest value observed in the Spanish history. Regarding the exports, in 2019 Galicia exported to the EU as well as to rest of the world exceeded €22 billion. Accordingly, the share of exports in GDP is reported as 34.6%. GDP has been growing more than exports since 2017 which refers that the share of exports has been reduced in GDP.

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EC2. Energy prices

How is this factor manifested in Spain: In 2021, **the natural gas prices increased by 361% compared to 2020**. In fact, in December 2021 it hit the highest price in the Spanish organised market history, and it remained high until the end of year (€183/MWh) (National Commission for the Markets and Competition, CNMC, 2022). In the very beginning of 2022, the Russian invasion of Ukraine has triggered energy crisis and the prices of natural gas has exceed those of 2021. Considering that natural gas is the main source for the electricity production – besides nuclear power – these increases are reflected to the electricity prices (Wang et al., 2022). Before the energy crisis in 2022, Spain has already held higher electricity prices for household consumption compared to its neighbours since 2016. For instance, in 2019 the electricity price was at €2,728.05/MWh in Spain while in Portugal it was at €2,295.66/MWh. This price differences have been reducing due to the penetration of low-cost renewables. This trend is expected to continue over the upcoming years to bring Spain's electricity prices below its counterparts (IEA, 2021).

How the factor influences ENCI: However, the installation of renewable energy infrastructure in households could be costly and the return on investment takes longer (**types 1 and 2**). In contrast, transition to renewables could reduce electricity prices, and create opportunities to phase out fossil fuels by introducing renewable energy sources. Higher energy prices for both gas and electricity could lead citizens to become more self-sufficient, energy efficient and climate neutral. It could therefore create a great opportunity for individual forms of ENCI in households (**types 1 and 2**) and in the workplace (**types 3 and 4**).

Affected ENCI types: Types 1, 2, 3 and 4.

Local example: The Galician Energy Institute – Incentivising the renewable energy. The local Galician Energy Institute (INEGA) has allocated significant budget (around €80 million) to ensure the energy security at homes and businesses because of the significant increases in energy prices. The main objective of this budget is to promote the energy efficiency within the buildings (both homes and offices) by supporting the energy renovations. In addition, the budget will support the renewable energy installations, specifically, the self-consumption, energy storage and thermal installations will be promoted in homes, companies, and public offices with aid for €20.8 million.

EC3. Energy market

How is this factor manifested in Spain: The **Spanish electricity market has been through a deep transformation since 1998.** Until then the market structure was organised as a vertically integrated monopoly with various Spanish regions. On the one hand, the introduction of *Act 54/1997, of 27 November, on the Electricity Sector, prompted a liberalisation of the electricity market* by opening the networks to the third parties, establishing an organised market for energy trading and mitigating the public intervention to the management of system; on the other hand, the *Act 24/2013, of 26 December, on the Electricity Sector* promotes effective competition through introducing increased competition of supplier companies, improved consumer access to information and making the supplier switch processes easier (IEA, 2021; MITECO, 2022b). Similarly, over the past years the liberalisation of the Spanish gas market has

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been accelerated. Specifically, beginning from 2015 MIBGAS gas hub (integrating Spanish and Portuguese Gas Market) is responsible for the efficient management of the gas market in terms of proper operation and the economic management of the services. To reduce entry barriers to the domestic gas market and enhance shipper flexibility, a Spanish gas exchange market was developed in 2015 to trade natural gas and LNG (IEA, 2021; MIBGAS).

How the factor influences ENCI: Although the Spanish energy market is decentralised, the State authorizes only five-big energy companies for the energy business management (Iberdrola, Endesa, Naturgy, Fenosa, and Repsol) and thereby creating a state supported industrial oligarchy (Wang et al., 2022), that reduce the potential impact of more transformative forms of ENCI (**Type 8**). The decentralisation of energy systems and supporting the smaller scale production schemes are projected as future solutions, e.g., solar PV, onshore wind, biomass (Otto et al., 2020; Sorman et al., 2020) under collective initiatives that can be considered ENCI **type 7 and 8**. The Spanish energy market follows the model of a state-supported industrial oligarchy that could create pressure on small-scale renewable energy suppliers. To tackle with the energy lobbies and reduce the strong dependence on fossil fuels, small enterprises, in particular renewable energy cooperatives which incorporates ENCI **type 7 and 8,** can play an important role to promote the energy transitions through producing renewable energy. Furthermore, many of these organisations organise movements against the energy oligopolies to accelerate the clean and just energy transition (**Type 9-10**) (Balanyá & Sabido, 2017).

Affected ENCI types: Types 7, 8, 9 and 10.

Local example: Nexus Energia. Due to the liberalisation of the energy sector in Spain, a dozen distributors from all over Spain got together to create a marketing company that is committed to teaching its customers how to save by using energy more efficiently and by promoting renewables. This 100% green retailer is the result of the merger of Esfera Luz and FC Energía (Catalonia, Barcelona), to join forces towards a sustainable and fair energy transition. They represent a key player in the energy market, leading the energy transition towards the use of green energy and self-consumption in Spain to optimise its energy efficiency and representing renewable energy plants in the market.

EC4. Economic policy instruments

How is this factor manifested in Spain: The value-added tax is the main component of the Spanish energy taxation system. A 21% tax is levied on the energy products consumption, including special taxes on hydrocarbons, coal, and electricity. These taxes are assigned to the local autonomous governments and can be used to fund renewable energy support programmes. The government also offers a positive taxation system for the clean energy (e.g. tax benefit for the electric vehicle purchase, tax rebates for the buildings with solar facilities and special tax exemption on electricity produced from renewable energy) (Wang et al., 2022; IEA 2021).

The Spanish energy taxation system is based on **top-down approach** including 17 autonomous communities that participate in the decision-making process. The state subsidy scheme introduced with *Act 54/1997* includes two key measures to promote renewable energy use: (1) Feed-in-tariffs (FIT) i.e., state subsidy taxation pattern in which the payment level is fixed, independent from the market price for a

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certain period of time and (2) feed-in-premium (FIP) i.e., a premium payment above the electricity market price; a maximum and minimum price control. The FIT and FIP aimed at supporting small scale producers through providing investment security to the renewable energy investments by eliminating the market fluctuations, however it could distort the market and increase the electricity prices and burden the energy consumers (Wang et al., 2022). Following the EU Green Deal objectives, the Spanish government still provides energy subsidies to ensure the energy security to the most vulnerable ones within the society (e.g., due to the significant price increases for gas natural, VAT on the natural gas supplies will be reduced by 5% by the end of 2022). On the one hand, the government has introduced tax reduction for the sustainable alternatives of the fossil fuel such as wood pellets including a state aid for the installation of biomass boilers and stoves at homes and businesses. On the other hand, to facilitate the energy transition it provides financial support to the self-consumption, energy rehabilitations and electric mobility through the EU Next Generation funds. On top of that, the government will devise tax incentives for the adoption of renewable energy solutions to phase out the fossil fuels (MITECO, 2022b).

How the factor influences ENCI: The introduction of governmental subsidies and positive environmental taxation system for the renewable energy sources could create an opportunity for the ENCIs, specifically to the small-scale producers (**types 3-4**) and individual consumers (**type 1**), or even prosumers (**type 2**) at the individual level, or in cooperative citizen-based initiatives (**type 7**). However, state interventions could create a risk for market failure such as distortion of electricity markets and higher prices for electricity consumers due the erroneous management of the resources. Hence, it could hinder the renewable energy subsidies and incentives, hindering the emergence of the aforementioned ENCI types.

Affected ENCI types: Types 1, 2, 3, 4 and 7.

Local example: Positive taxation for clean energy user: Basque country, Catalonia, and Galicia. The energy taxation system is centred on a value-added tax (a rate of 21% for energy products) and additional special taxes on hydrocarbons, coal and electricity. The special tax on electricity is transferred to the regions and can be applied to fund renewable energy support programmes. In addition, the regulatory powers of the Autonomous Communities allow them to apply taxes that impact energy policy (IEA, 2021); e.g. the Basque Country has an Economic Agreement that gives competence to the Foral Treasuries to regulate their own taxes. In the case of Catalonia, only 1.5% of the amounts paid in the tax period for the rehabilitation of the home are recognised. The maximum deduction base will be €9,040 per year. The Autonomous Community of Galicia recognizes a deduction in the full regional income tax for taxpayers with habitual residence in Galicia, for investment in facilities whose purpose is to improve energy efficiency in residential buildings or single-family homes, of 15% of the amounts invested, with a limit of €9,000.

EC5. Financing and investment opportunities contributing to a more sustainable energy system

How is this factor manifested in Spain: There are several financing opportunities in Spain to support the renewable energy transitions through public regulations – specifically, the installation of solar PV energy. Over the past decades the public spending for energy R&D activities has been increasing however Spain has one of the lowest shares of GDP among other OECD countries. Indeed, **Spain allocated €103.2 million budget from the public spending for the energy related R&D activities** in 2018 which showed 32%

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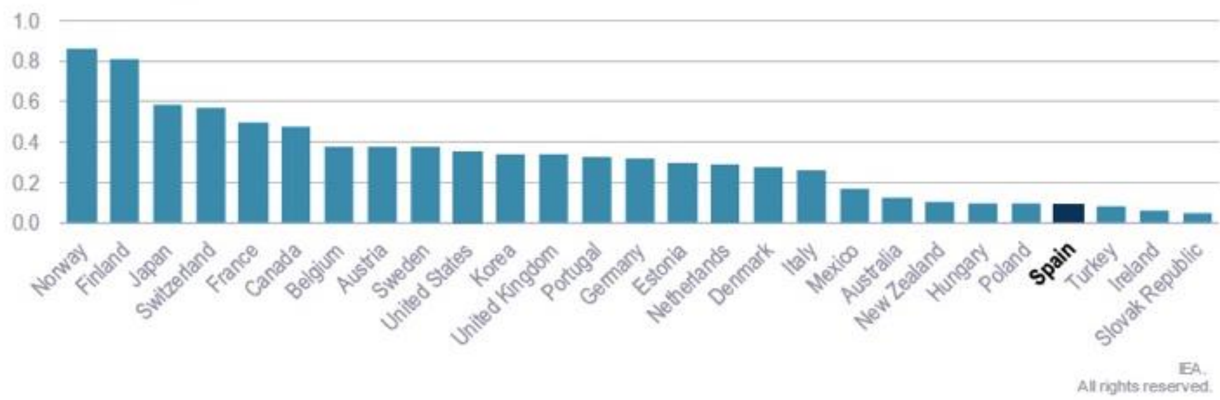
increase compared to previous year – and among other key thematic areas, the renewable energy expenditure held almost 63% of this very energy related R&D budget e.g. 50% of the renewable energy expenses were allocated to wind energy while 26% was allocated for solar power (see in Figure 13.3) (IEA, 2021).

Figure 13.3: Energy R&D spending per thousand units of GDP among OECD member countries.



Source**:** IEA, 2021.

Besides the public spending possibilities, there are other alternative financing sources for renewable energy installations which are quite significant for self-consumption e.g. trade credits and bank loans (Scarpellini et al., 2021). However, it is worth mentioning that the small producers including the self-consumption have experienced several barriers (e.g., during2015-2018 “Sun Tax” challenged the small producers), with the EU climate neutrality objective Spain has provided various economic programs **to facilitate the renewable energy transition including the self-consumption** (Scarpellini et al., 2021). The IDAE – a public entity of the MITECO – proposes various financial supports and grants in collaboration with the EU regional development funding program (FEDER) to deliver the EU clean energy objectives. Financial Aid for Renewable Energy Investment (Thermal and Electric plants) is one of those state funding programs which aims to boost the renewable energy infrastructures at the national level, specifically, the Energy Communities and neighbourhoods in the just transition areas. Similarly, another funding program supports the self-consumption through “Grants for Investments in Singular Local Clean Energy Projects in Municipalities with Demographic Challenges”, whose aim is to support renewable energy transition and inclusive transition by not leaving vulnerable people behind.

How the factor influences ENCI: The financial support by public (e.g. governmental funding programs, subsidies, etc.) and financial institutions (e.g. bank loans and trade credits) facilitates the adoption of renewable energy practices including the prosumers such as installing PVs at home since it allows individuals to cope with the higher investment costs and low return on investment of the renewable energy installations. Financing and investment opportunities provided by the EU and national funding programmes would create a great opportunity for the ENCIs including **types 1 and 2** (household level), **types 3 and 4** (workplace), or even **types 7 and 8** (initiatives founded by EU and national funding).

Affected ENCI types: Types 1, 2, 3, 4, 7 and 8.

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Local example: Investing in Renewable Energy Projects and Technologies (The Galician Government). In 2021, Galicia holds one of the highest figures for the energy production based on the renewable energy sources after the autonomous region Castilla y León (Red Electrica, 2022). The source of this major renewable energy production is the financial support provided by the autonomous Galician Government to the PV energy projects (Xunta de Galicia, 2021).

EC8. Green industry development and green job creation

How is this factor manifested in Spain: Both EU-level and national policy initiatives, such as EU Green Deal, PNEC 2021-2030 and ELP 2050, aim at climate neutral Europe and Spain by 2050 (European Commission, 2019; MITECO, 2021c). To reach it and tackle with the negative impacts of climate change, there is a need to shift from current fossil fuel dependent economy, as well as linear (*take-make-waste*) business models toward more circular economy (CE) business models such as collaborative consumption models, sharing, services and social economy based on renewable energy (MITECO, 2020a; Kirchherr et al., 2017; Ghisellini, et al., 2015). The **Spanish Circular Economy Strategy 2030** and the **Action Plan for the Circular Economy 2021-2030 (PAEC)** promote the new alternative production and consumption models to achieve resource efficient, decarbonised, and competitive economy through devising several guidelines for key action fields such as sustainable consumption, waste management, research, and development, as well as employment for CE (MITECO, 2020b; MITECO, 2021c). The job opportunities in the renewable energy sector are quite diverse. The number of job creation per MW in the solar energy sector is significant, even though it is mostly linked to installation. Wind power generates fewer jobs per MW, but it generates more industrial employment in Spain. Biomass would create opportunities for rural employment, based on sustainability principles, and may be complementary for the agricultural income, hence conservation of farms might be more attractive which could tackle with the rural depopulation (MITECO, 2020a).

How the factor influences ENCI: Introducing strategies to ensure the transition toward the CE is closely linked with the shift from fossil fuel to renewable energy sources which supports more efficient and distributed energy production based on renewables such as prosumers (**type 2**; Gimeno et al., 2020). In fact, the trend towards a green economy implies a change in the current paradigm of the economic model (García Vaquero et al., 2021), and linked to **types 3 and 4** (e.g., CE, business culture based on an ecological philosophy, use of green infrastructures and create green jobs) (Gaertner Aranda, 2020). An example can be seen in the *Emplea Verde Program* for promoting and improving employment, entrepreneurship, and the environment.

Affected ENCI types: Types 2, 3 and 4.

Local example: Xe-Mente Innovación (Emplea Verde Program, La Guardia, Galicia, Spain). This project responds to a problem: the lack of training for people with disabilities and their difficulties of socio-labour insertion, the scarcity of specialised training offer for this group (especially in green employment), the reduced possibilities of finding employment in rural territories and the few inclusive training initiatives. Through this training offer, not only are people trained in an open and inclusive teaching-learning environment, but it also empowers people as co-trainers and generates new innovative green professional profiles demanded by companies, which will create inclusive green jobs.

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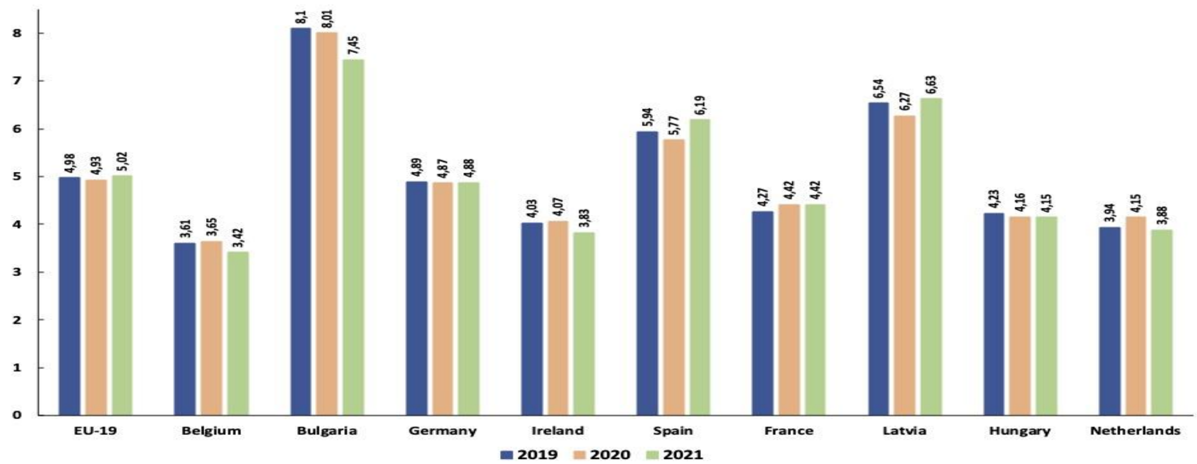
Social factors

S1. Level of income / wealth disparity and energy poverty

How is this factor manifested in Spain: Based on the most recent data from Eurostat published in December 2022 (Eurostat, 2022b), the **inequality in income distribution** in Spain has experienced very few variations in recent years. Spain is among the most unequal countries in Europe – it ranks 25th out of 28 European countries, only above Latvia, Romania, and Bulgaria (see Figure 13.4). The income disparity is steadily increasing. The 20% of the population with the highest equalised disposable income in Spain received 6.19 times more income than the 20% with the lowest level of equalised disposable income.

Figure 13.4: Income distribution between 2019-2021 in the Eurozone and project partner countries.



Note**:** Own elaboration based on Eurostat Income Distribution data. EU-19 refers to average income distribution of 19 EU countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Greece, Slovenia, Cyprus, Malta, Slovakia, Estonia, Latvia, and Lithuania).

Eurostat (2022a) also provides information on **price level indices for investment** (PLIs) in different European countries (see Figure 13.5). Spain closed 2021 15% below the EU average, which places it as a country that is at an intermediate point in the price level for investment, together with Italy, and slightly above another nearby country such as Portugal (18%). This information is drawn from the results of two price surveys conducted in 2021 under the Eurostat-OECD Purchasing Power Parities (PPP) Programme, covering construction (residential buildings, non-residential buildings, and civil engineering works) and machinery, equipment, and other products.

Energy poverty situations in Spain (in which a household's basic energy supply needs cannot be met because of an insufficient level of income and may be aggravated by energy inefficient dwelling) are measured according to the official indicators of the **European Monitoring Centre on Energy Poverty** (EPOV). In Spain these indicators are obtained from data from the Living Conditions Survey (LCS) and the Household Budget Survey (HBS), compiled by the National Statistics (HBS) produced by the National Statistics Institute (INE, 2021). The final report of the LCS 2021 pointed out an increase in the percentage of population in risk of poverty or in social exclusion in Spain from 27.0% in 2020 to 27.8% in 2021, as well

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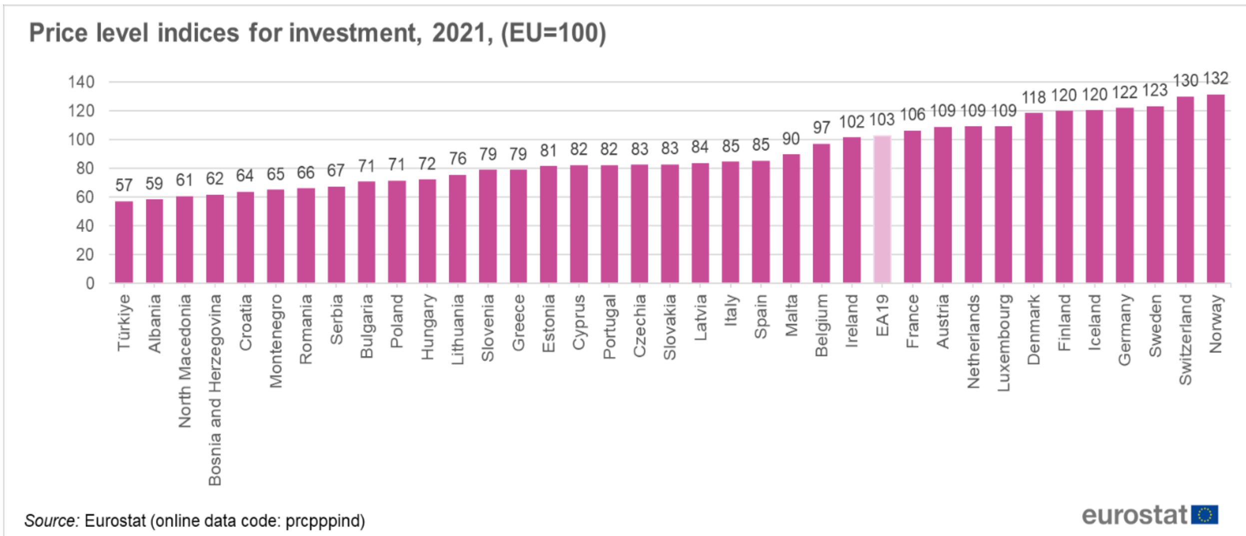
as a decrease in the population that was in a situation of severe material and social deprivation, from 8.5% in 2020 to 8.3% in 2021 (INE, 2021). Data from the last ten years indicate an increase in all these indicators, showing that between 3.5 and 8.1 million people are living in energy poverty in Spain (MINECO, 2021). The most recent data point to some improvement; that is, the hidden energy poverty is decreasing compared to 2020; the disproportionate expenditure and overdue payment of housing bills are slightly down compared to the previous year.

Figure 13.5: Price level indices for investment, in 2021 in the Eurozone.



How the factor influences ENCI: In short, the level of income and wealth distribution in Spain, as well as the capacity to invest, is in an intermediate position compared to other European countries, in addition to the measures that the government is adopting to alleviate energy poverty. The promotion of these measures is seen as an **incentive for citizens to get involved in the introduction of ENCI actions** (specially, **Type 1 and 2**) and reflect a path of recovery against the large negative impact that the COVID-19 pandemic had on the 2020 indicators. The Ideara report (2021) highlights that among the **groups with more economic difficulties**, there is less support for measures such as the promotion of renewable energies, the creation of low emission zones, the limitation of the consumption of foreign products or the elimination of the use of coal, recognising that they are more threatened than those who suffer less economic difficulties: the greater the difficulty in making ends meet, the greater the perceived threat of climate change to their health, their food, their physical integrity and their economy. In response to this, the **European Funds' subsidies for energy-efficient renovations** (e.g. thermal insulation renovations or installation of solar panels) enable groups that meet economic and social vulnerability criteria to receive aid of up to 100% of the cost of the energy renovation work. In addition to this, there are social movements that function as pressure groups in the face of the inactivity of the public administration about the situation of certain groups (**Type 9**).

Affected ENCI types: Types 1, 2 and 9.

Local example: Aliança contra la Pobresa Energètica (APE), Catalonia. This organisation fights to guarantee universal access to basic water and energy services, putting pressure on the government to

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guarantee these rights, and on the large utilities to assume their responsibility in this scourge. It was established locally in Barcelona and had a quick spread throughout the Spanish territory, thanks to its strong message through press conferences and other public statements to the media. Many towns and villages became interested and began to look for ways to work along the lines of APE in their locality. This led APE Barcelona to become APE Cat, as coordinator of the movement's growth process in Catalonia.

S2. Energy literacy, awareness, and skills

How is this factor manifested in Spain: According to the Ideara (2021) report, the Spanish population has insufficient knowledge about the causes of climate change and a lack of consensus on what science reveals regarding the energy issues. For instance, while more than 60% of people know Greta Thunberg (whom they mostly relate to environmental issues or climate change), less than 50% have heard of the Paris Agreement, and of these only two out of three people are able to relate it to environmental issues. The degree of Spanish people's knowledge of climate change is significantly associated with variables such as age and level of education: the younger the age and the higher the level of education, the higher the percentage of people who know about the Paris Agreement and agree with what it proposes. To deal with the lack of knowledge, information, and training on energy issues, the Spanish Government, thought the Ministry of Ecologic Transition and Demographic Challenge (MITECO) and the Ministry of Education and Professional Training, has approved in 2021 an **Environmental Education for Sustainability Action Plan (PAEAS)** for the period 2021-2025 (MITECO, 2022a). It contains six operational categories, 20 specific objectives and 61 actions related to environmental education in Spain, and it is introduced within the framework of actions planned for the **Glasgow Work Programme on Action for Climate Empowerment (AEC).** The introduction of training and information measures can favour **the approach to ENCI initiatives that can be promoted by public and private institutions**.

How the factor influences ENCI: The focal point of Spanish actions is information, awareness-raising, education, training, and public participation shared by public and private institutions: Central Government, governments of the Autonomous Communities, municipalities, non-governmental organisations, the media, and companies. Derived from this general framework, the different regional and local administrations draw up climate action plans or environmental education instruments, which incorporate commitments in terms of climate education, training, participation, or awareness-raising.

- ***Access to information***: the Spanish Government maintains various channels to facilitate access to information and the informed participation of Spanish society in responses to climate change. Moreover, the number of websites and blogs specialising in climate change has grown exponentially in recent years. More informed citizenship can contribute to the development of individual ENCI initiatives in the private sphere (**Type 1**) or through their workplaces (**Type 3**), although this might be expected to be from a more reforming and less profound perspective.
- ***Dissemination and awareness-raising:*** national dissemination publications (IPCC reports, educational resources and solutions to the climate change, adaptation plans, guides, magazines, and other documents) and dissemination and interpretative equipment dedicated to environmental education (nature classrooms, farm schools…). Again, it is linked to the information of citizens, together with the proposal of materials and equipment that allow for more profound changes in the

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private sphere (**Type 1- 2**) and in the workplace (**Type 3-4**).

- ***Campaigns to raise awareness and promote responsible behaviour***: Central and regional governments, municipalities, non-governmental organisations, and companies have developed and maintained campaigns to raise awareness and promote responsible behaviour in the period covered by this National Communication (e.g. Comunidad #PorElClima; Cero CO^2; #Biodirectos…). These examples can be related to claims for the development of ENCI forms more linked to both individual (**Types 1 to 4**) and collective forms (in the form of social movements, such as **Type 9**).
- ***Programs and initiatives of environmental education***: not only for children, but also for various groups (university community, families, citizens in general), and which develop awareness-raising activities on climate change and its effects, the link and respect for natural environments (parks and beaches), decarbonisation, increasing community resilience and ecological transition, among others. May be related to less active, both individual (**Type 1)** and/or collective ENCI (**Type 7**).
- ***Training***: Some examples at the national level are: Seminars of the National Plan for Adaptation to Climate Change (PNACC); Training for technicians and professionals on impacts, vulnerability, and adaptation to climate change; Iberian Conference on adaptation to climate change; IDAE Digital Classroom; among others. May be related to less active, both individual (**Type 1 and 3)** or collective forms of ENCI (**Type 7**).
- ***Public participation***: Some forms of citizen and NGO participation have been developed through the National Climate Council (NCC), which is a collegiate public participation body that channels participation on climate change issues; or through the Citizens' Climate Assembly which, through the participation of 100 randomly selected people, reflecting the main social and demographic features of the population, has been established as a forum for public participation in climate change. This is the form most intricately linked to aspects of citizen participation in the public sphere (**Type 5**).

Affected ENCI types: Types 1, 2, 3, 4, 5, 7, 8 and 9.

Local example: Public education, training and sensibilisation in Galicia. In Galicia, there are several direct channels (from the public administration and other local authorities) for citizen information and participation: (a) ***Information:*** Climate Change Portal of the Regional Ministry of the Environment and Territorial Planning, Meteogalicia (climatological reports, historical time series of temperature and precipitation and air quality data) and the Platform of the Registry of Energy Efficiency Certificates for Buildings in Galicia; (b) ***Dissemination and interpretative equipment:*** Wind Farm "Sotavento": Environmental education centre that encourages reflection on the responsible and efficient use of energy resources, by providing contents on sources of energy, the commitment to efficiency, energy saving and its interrelation with environmental problems; and (c) ***Educational programs***: educational programme Meteoescuelas (Plan Proxecta): Xunta de Galicia's programme on meteorology training aimed at all secondary schools and institutes in Galicia. It aims to form a global community of teachers, students, and scientists to work on the common task of learning more about the Galician climate. Students will develop interdisciplinary skills in environmental research through the direct observation of the climate in their own region through direct observation of the climate in their school and comparison with the data from surroundings.

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S3. Citizen engagement and passivity in society

How is this factor manifested in Spain: Spain does not have a tradition of municipal public services, although in recent decades there has been an increase in innovative business models that place the citizen at the centre of the process, jointly participating in RES and energy efficiency projects (Capellán-Pérez et al., 2018). These new types of organisations (e.g. energy communities, cooperatives…) are characterised by voluntary and open membership, the development of democratic control by members, economic participation and direct ownership with autonomy and independence, the creation of networks that foster education, training and information between cooperatives and the community; and a collective environmental concern (REScoop, 2022). Social movements or "processes of political protest that mobilise human, material and cultural resources in networks linking individual actors and organisations in pursuit of a common cause" (Campos & Marin-González, 2020, p. 2) materialise among the Spanish population in cultural and collective initiatives. The most prominent forms in Spain are cooperatives (local, regional, and national), local and regional public institutions, regional public-private partnerships, private for-profit and non-profit companies, as well as, more recently, Energy Communities (Campos & Marin-González, 2020; REScoop, 2022).

How the factor influences ENCI: As initiatives that could fall under ENCI **Type 7 or 8**, the Energy Communities are beginning to be introduced in Spain as a social concept, where the governance of citizens, SMEs and local authorities takes precedence. The Institute for Energy Diversification and Saving (IDEA, n.d.a) - dependent on the MITECO in Spain - reports that the main purposes of these entities are to generate energy from renewable sources; to offer energy efficiency services (including, for example, building renovations); to supply, consume, aggregate and store energy and, potentially, distribute it; and to provide electric vehicle charging or other energy services. Revenues and profits from these activities are primarily used to provide environmental or socio-economic services and benefits to members of the local community or the local area. Project stakeholders (citizens, micro/small/medium enterprises, or local authorities) participate in and exercise strategic control and direction of the EC. In the Energy Communities, internal decision-making is based on democratic governance, which guarantees the maintenance of the community's "autonomy". In addition, Energy Communities lend themselves to public-private-citizen collaboration, a governance model that is still underdeveloped in Spain. Although these factors limit the deployment of democratic participation initiatives (economic, regulatory, administrative, technical), there is increasing talk of collaborative and participatory proposals among the neighbours of an area through the creation of **Local Energy Communities** (LECs), which can be an advantage in developing ENCI, not only for individual and organisationally-rooted ones (**Types 3 and 4**), but also for citizen-based and hybrid collective ones (**Types 7 and 8**).

Affected ENCI types: Types 3, 4, 7 and 8.

Local example: Tameiga (Galicia): the first Mountain Joint Community. The communities of owners of Montes Vecinales of Tameiga (Mos, Pontevedra) (also called "Mountain Joint Community") manages part of the Monte Faquiña industrial estate, located on its land, and manages its own socio-cultural centre. One of the recent steps taken by the Mountain Joint Community has been the creation of one of the first Energy Community in Galicia. The community members have installed photovoltaic panels for self-consumption on the roofs of their socio-cultural centre and two warehouses of the industrial estate they manage.

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S4. Trust (or lack thereof) in institutions and collective endeavours

How is this factor manifested in Spain: Eurobarometer No. 527 (2022) found that, in Spain, a majority (88%) believe that the ecological transition leaves no one behind, although almost half of these people (49%) are not confident that in 2050 sustainable energy, products and services will be affordable for everyone, including the poorest people. These statements must be seen in relation to the fact that there is a lack of confidence that regional, municipal, and local authorities (54%) and the government (57%) are working to achieve this. What these data show is a certain level of mistrust in public institutions to achieve a just ecological transition. Similarly, the data obtained by the Ideara report (2020) revealed reluctance among the population to trust the information provided by scientific studies on climate change because of disagreements between the data provided by each of them. The lack of transparency of some of these institutions, together with a certain lack of individual and collective knowledge about some forms of social organisation, hinders the development of more advanced forms of ENCI. For example, despite experiencing rapid growth in Spain, RES co-operatives still have a minor presence in the Spanish energy system compared to the rest of Europe, and this is not only due to legal, economic, and technical barriers, but also to the existence of cognitive barriers such as low awareness and understanding of the co-operative model among politicians, bankers, potential members and the general public faced by Spanish RES co-operatives (Huybrechts and Mertens, 2014, as cited in Capellan-Pérez et al., 2018). This can also be seen in the still **very incipient nature of the development of Energy Communities in Spain**, where there are still numerous legal, administrative, and technological gaps that leave many people hesitant and lacking in confidence to invest in them (National Institute of Law and Environment, IIDMA, 2020).

Faced with this are promising data from a report prepared in 2017 by CE Delft for Friends of the Earth, the European Federation of Renewable Energies, Greenpeace and REScoop.eu, which states that a third of the Spanish population could generate their own electricity with renewable energies by 2050. The report underlines the potential that renewable projects would have in the hands of Spanish citizens, with 16.4 million people with the capacity to participate in the electricity sector thanks to renewable energies. In 2050, collective projects and cooperatives could contribute 37% of the electricity provided by energy-producing citizens, while micro and small businesses could do so with 39%, households with 23% and public entities with 1%.

How the factor influences ENCI: These data point to promising growth in the number of energy citizens, as long as legislation supports it and protects the citizen's right to produce and consume self-generated energy and receive fair payment for pouring excess electricity into the grid, storing energy and participate in demand management (**Types 1-2**), and that there are initiatives that act as tools to make it easier for citizens to create their own energy sources (**Types 7-8**). But at the same time, the evidence of the existence of socio-environmental problems (Ideara, 2021; Linares et al., 2022) awakens in people feelings of indignation and injustice that can give rise to shared emotions that can materialise in collective actions against those responsible for the environmental problem (Vercher, 2022), such as the public powers (Eurobarometer, 2022). The result can be the involvement in protest initiatives against public policies and authorities that allow the development of actions that are not very respectful to the environment (for example, in Spain, the fight against the threat for the marine fauna caused by oil exploitation in the Balearics Islands) (Vercher, 2022) (**Type 9**).

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Affected ENCI types: Types 1, 2, 7, 8 and 9.

Local example: Energy sovereign in Oñati (Basque Country). Energy in Oñati is generated by six power stations in the Deba river valley. Since the Town Council bought one of the power stations in 1989, 90% of the ownership has belonged to the Local Government and 10% to the Autonomous Government (Ente Vasco de la Energía, EEE). This scenario reflects Oñati's historical commitment to becoming a self-sufficient municipality in terms of electricity supply, basically residential and commercial. In the last five years, it has gone from just producing to also distributing and commercialisation with the support of the Goiener energy production and consumption co-operative to advise them on the most convenient and democratic technical option, given its experience in helping other co-operatives and its knowledge of the field.

S9. Willingness to invest in energy transition

How is this factor manifested in Spain: Spain, from an investment point of view, is one of the most attractive destinations to develop green processes that are respectful of the environment (EY Rethinking Sustainability 2021a). Likewise, the reports from Ideara (2021) and Linares et al. (2022) show the **social consolidation of certain socially established and naturalised behaviours**, which are related to daily routines with low behavioural costs (limiting time in the shower), expectations of economic savings (turning off lights), the implementation of specific regulations (own shopping bags), or generalised institutional campaigns and messages (separating waste and recycling). But there are also others that have **little follow-up, as they are linked to cultural practices** that are **not well established in society** as a whole (cycling), or to **actions with a greater civic-ethical commitment** (active participation in pro-environmental organisations or events). Specifically, the Ideara report (2021) revealed a change in mentality towards a greater awareness of the risks of climate change and the threat it represents, but it is still not the priority for Spaniards to introduce radical changes in their way of life. A certain psychological gap in the face of climate change stands out, with the perceived threat potential increasing as the affected sphere distances itself from the circles closest to the individual, both in time and space.

The inactivity of some citizens in the face of the climate change may be due to a lack of support and measures to carry out broad changes in living habits (e.g., insulation of housing, changing cars, etc.), although they do take small everyday actions (e.g., reducing electricity and water consumption, recycling, responsible shopping, etc.). In line with this, the Spain 2022 Report (Linares et al., 2022) highlighted as one of the main problems in tackling environmental challenges the refusal of more than 50% of the Spanish population to pay higher prices to protect the environment, more taxes for this cause, or to make cuts in their standard of living to curb climate change. However, they adopt small-scale measures such as the consumption of local products. This data agrees with the information provided by the Eurobarometer (2022), which shows that economic reasons (71%) and, to a lesser extent, environmental ones (27%) are the main reasons in Spain for fairly reducing energy use. In addition, less than 50% of people trust that they can use less energy than they currently use.

How the factor influences ENCI: These data reflect that the economic motivation and the introduction of small actions are those that may be at the base of the changes linked to the concept of ENCI, especially in its individual form (**Types 1-2**), but that in the long run can give shape to collective initiatives (**Type 8**) such

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as cooperatives, Energy Communities, or even, social movements (**Type 10**).

Affected ENCI types: Types 1, 2, 8 and 10.

Local example: Parque Nordés: offshore wind energy for Galicia conceived through consensus and dialogue. Galicia has maritime potential of interest for the development of a wind power generation project with floating technology in Parque Nordés. Currently, it is in a phase of dialogue with the territory, since the objective is to design and integrate the project in Galicia in a consensual manner. The wind farm proposes an installed capacity of approximately 525 MW, with the installation of 35 15 MW wind turbines, and an estimated production of 2,100 GWh/year. It is estimated that Parque Nordés would create 6,000 direct jobs during the construction and dismantling phases and 100 jobs per year associated with operation and maintenance; and would contribute to saving 26 million tons of CO2 emissions. All this, as long as the project can be integrated into the territory in a consensual manner, as the companies involved deem necessary. They have a commitment to transparency and the search for consensus with the different agents involved.

Technological factors

T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy.

How is this factor manifested in Spain: Spain has necessary technologies for the clean energy transition although R&D activities aim to overcome the technical issues related to renewable energy technologies e.g., intermittency and storage issues related to wind and solar energy sources (Ilieva & Bremdal, 2020; Spanish Government, 2020; Onishi et al., 2018). The share of renewable energy supply has increased by 47% between the period 2009-2019 and holds 55% of the domestic production in Spain (IEA, 2021). Similarly, in 2020 almost 44% of the electricity production was provided by the renewable energy technologies which shows that the share of renewable energy technologies has an increasing trend in Spanish energy mix (REE, 2020). In fact, the technological advances in renewable energy generation have accelerated quite rapidly over the last years which confirms the relevance of the decarbonisation scenarios (MITECO, 2020a). Besides, Spain has a well-developed national innovation system for energy technology and the public budget for the energy innovation mostly directed to the research on clean energy technologies (e.g. since 2020 on average only 1% of annual public budget for energy R&D has been dedicated to the fossil fuel research). The National energy R&D strategies also promote the green hydrogen (e.g., at present hydrogen accounts for 4% of the energy related R&D expenditures), energy storage and innovation in mobility and industry (IEA, 2021). Regarding the technology and fuels for district heating and cooling, it is reported that in 2019 almost three out of four grids used biomass or combined with other fuels because of the proximity of the small and medium-sized municipalities, farms, and factories. Indeed, the use of renewables in district heating and cooling networks has shown an increase recently (i.e. from 16% to 22% between 2015-2019; IEA, 2021). PV solar technology is the most developed one in terms of self-consumption installations (MITECO, 2021), followed by the off-shore wind energy for Spanish energy industry (the natural resources, climate and geographical features are quite suitable for the off-shore wind

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and marine energy production). The technological potential of Spain, including the technical skills, is also quite promising since Spain has more than two decades of experience in the onshore wind implementation. The industrial capability of Spain has boosted the wind and naval sectors to participate the offshore wind projects at global level such as exporting components and services within the value chain (MITECO, 2022).

How the factor influences ENCI: The technological advances promote the adoption of renewable energy technologies at individual level specifically, the availability of PV solar panels in Spain promotes households to produce their own energy cheaper (Kriechbaum et al., 2021; Mathy et al., 2018) hence it will create a great opportunity on the ENCI **Type 2**. Not only individual level but also the collective energy production may be boosted by the onshore wind and PVs technologies (**type 7-8**). The research activities that aim to overcome intermittency and energy storage issues or even the advances on offshore wind power generation and progress in green hydrogen could motivate the business organisations to change their norms on energy consumption and lead the industry to adopt or even participate industrial processes for the renewable energy generation (**type 3**). Finally, to ensure the technological advances to support the progress in Energy Communities it is important to adopt a systems approach which integrates social and policy dimension; otherwise the successful transition will be hindered by techno-centrism (strong dependence on new technologies and innovation and not taking any behavioural action).

Affected ENCI types: Types 2, 3, 7 and 8.

Local example: Parque Nordés: offshore wind energy for Galicia conceived through consensus and dialogue. One of the priorities of the Parque Nordés is to improve Galicia's weight in the digital transformation of the energy sector, helping to make the region a benchmark in the construction of offshore wind farms and in the promotion of R&D in offshore wind energy. In this sense, Galicia will become one of the poles of attraction for the training and research of universities, research centres and Galician companies, which will play a key role in offshore wind. The park will cover 13% of Galicia's current electricity demand, thus meeting the decarbonisation targets set by the Autonomous and the National Governments (i.e. Galicia and Spain, respectively). It will also cover the demand of the Galician industrial sector due to the characteristics of the generation profile of this technology.

T2. Decentralised energy system and storage

How is this factor manifested in Spain: The Spanish energy sector is subject to a change from a more centralised fossil fuel-based energy system to a more decentralised, intelligent, and interconnected energy generation system. On top of that this new energy system is going to be supported by large scale storage and demand-side management to ensure the flexibility of the system (IEA, 2021). A recent study conducted with the Spanish stakeholders shows that to ensure the transition to renewable energy the future energy system will be decentralised and be mostly based on smaller scale production schemes mostly dominated by Solar PV, onshore wind, solar thermal (CSP), offshore wind and biomass. In addition, the geothermal and marine energies might be also an option if sufficient public support is received (Sorman et al., 2020). On the other hand, the electricity discharged might be observed in renewable energy system and this surplus energy can generate an opportunity to exploit with a complex storage system. Although there are various alternatives to exploit these discharges through energy transformation and

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subsequent energy storage, one of the alternatives is converting the potential renewable waste into hydrogen since it is possible to store the hydrogen fuel (MITECO, 2021). According to Spanish Electricity Network (REE) it is hard to store electricity in large quantities however it can be easily generated, transported, and transformed. Throughout the supply chain large-scale energy storage (e.g., reversible hydro/pumped storage, thermal storage), storage in grids (e.g., batteries, capacitors superconducting coils, flywheels) and at the end-user level (for instance, batteries, superconducting coils, flywheels) are the main methods to store the energy (REE). Although the adoption of renewable energy technologies has an important role in the energy transition, the generation of new waste streams should be considered. For instance, the Spanish action plan devises a pilot project to promote the reuse of PV panels and lithium batteries discarded by the automotive industry for domestic self-consumption (MITECO, 2021c).

Not only net zero emission technologies and business initiatives but also social innovation supports this energy transition. In other words, groups of Spanish citizens develop new governance and business models as well as alternative financial mechanisms to support the renewable energy production and self-consumption (Inês et al., 2020). In this sense, decentralisation of energy generation can promote the renewable energy transitions because centralised, large power station depends on non-renewable energy sources whereas decentralised energy system provides energy through various distributed networks, e.g., self-consumption or combining waste plants with district heating and cooling, to the households in other words, decentralisation ensures the proximity of renewable energy sources which makes it more available to the end-users (Rikkonen et al., 2021; Otto et al., 2020). On top of that, this distributed network makes energy system more resilient and eliminates the disruptions in regards with the international energy trade (Zakeri et al. 2022).

How the factor influences ENCI: Accordingly, providing adequate technologies including the energy storage together with decentralisation policies, creates a great opportunity for individual prosumers (**type 2**) as well as public-community collaboration for development of local Energy Communities (**type 7**). The decentralised, local energy system supported by energy storage technologies also promotes organisations to change their current practices which creates opportunity for **type 4.** Finally, the citizens would collaborate to build and expand organisational forms of Energy Communities, namely for **type 8**.

Affected ENCI types: Types 2, 4, 7 and 8.

Local example: Som Energia: Green Energy Cooperative. Som Energía is a non-profit cooperative of green energy consumption, whose main activities are the commercialisation and production of renewable energy. It is committed to promoting a change of the current energy model to achieve a 100% renewable model. This cooperative, established in Catalonia, is distributed throughout Spain through its local working groups and creates a national decentralised network around Spain, besides having their very own plants for collective self-production (Inês et al., 2020).

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T3 Digitalisation of the energy system

How is this factor manifested in Spain: The digitalisation of the energy system can facilitate the energy transition if the digital technologies are aligned with the sustainability targets in a way that is connecting energy systems to increase smart and efficient management of energy use (Ternés, 2019; IEA, 2017). Accordingly, the majority of the national policy guidelines devised by Spanish government and the MITECO leverage the use of smart, digital technologies e.g. the **PRTR** (MITECO, 2021d), the **PNIEC** (MITECO, 2021d) and the **JTS** (MITECO, 2020a)**.** About the PRTR, Spain has worked intensively on defining a plan to increase productivity and potential growth, moving towards a green, digital, inclusive Spain, with greater social and territorial cohesion, and without gender gaps. Thus, one of the four cross-cutting pillars that form the backbone of this plan is the **"Digital Transformation"** which includes actions ranging from the urban agenda to education, from agriculture to tourism, from industry to mobility, from the modernisation of public administration to the new care economy. On the other hand, the PNIEC reflects Spain's commitment to R&I and competitiveness, which is materialised in a series of priority objectives, including "Competitiveness to improve the efficiency of the Spanish and European grid through the **development of a highly digitalised internal energy system and market**" (MITECO, 2021d, p. 73). This objective is implemented through the **Strategic Plan for Energy Technologies** (SET Plan), in which measures are developed, such as, e.g., the achievement of a secure and resilient system in the context of the energy transition through digitisation, power electronics, storage, improved equipment and materials (Action 4).

The PNIEC is accompanied by the JTS, aimed at foreseeing and managing **the consequences for those regions and people directly linked to technologies that will be progressively displaced** because of the transition promoted by this Plan. Specifically, this strategy refers to the opportunities that digitalisation can generate, on the one hand, in the availability of energy resources by reducing generation and distribution costs (MITECO, 2020a). For instance, automotive companies will undergo a major transformation into providers of advanced mobility services, combining zero-emission vehicles with connectivity, autonomous vehicles, shared service offerings, etc., which will be transferred to the value chain of various sectors such as component suppliers, mechanics, etc. On the other hand, it will create growth opportunities for the economy and employment; that is, in the energy system, systems for predicting renewable generation and its dispatch, home automation and home energy management systems, systems to optimize the transmission capacity of existing lines, smart grid management systems by grid managers, new smart meters or systems that enable the management and control of active demand elements, will result in new employment niches (MITECO, 2020a).

How the factor influences ENCI: This intention to modernise the industry-services ecosystem towards digitisation and energy transition, to gain in competitiveness and thus contribute to the objectives of sustainable development goals, is aligned with reforming ENCI forms in **type 3** (in the workplace, notably as support to SMEs). Moreover, the technological development can impact on the capacity of certain organisations (e.g. cooperatives, Energy Communities) to consolidate smart grids, increase asset flexibility, and renewables manageability (**Type 7**). Another measure to be implemented by the SET-Plan concerns the provision of new services and technologies for the consumer, smart cities, and communities (Action 4). Thus, the importance of a digitised society is highlighted so that consumers can adjust their energy consumption according to market indications by accessing energy consumption data in real time (MITECO, 2021d), which can be linked to ENCI **type 1-2**. Finally, the actions promoted by the JTS can have an impact on the development of workplace actions consistent with the ENCI **type 3**, as well as on the

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introduction of smart home systems (**type 1-2**).

Affected ENCI types: Types 1, 2, 3, 4 and 7.

Local example: ICT City A Coruña (Cidade das TIC, A Coruña, Galicia). Strategic initiative to create an ICT and digital innovation hub of national and international reference in A Coruña, taking advantage of the former site of the Fábrica de Armas. This project, launched in 2020, aims to contribute to Galicia's specialisation in emerging technologies, to develop connected and more competitive business fabrics, as well as to boost ICT and the digitalisation of Galicia, and will create a benchmark centre in artificial intelligence (AI) of national and international reference to develop innovative solutions linked to climate change, green infrastructure and nature-based urban solutions. The use of AI would be used to address environmental challenges in a project that would also involve neighbourhood associations, addressing the needs and concerns of citizens in the field of the environment. In addition, it will boost the area in which it is located and generate economies of proximity, as well as it is expected to generate more than 500 new jobs in the coming years.

T4. Energy efficient buildings

How is this factor manifested in Spain: Energy consumption in the private home and workplace, as well as other services used by citizens (e.g. educational, health, cultural) that require heating, cooling, hot water availability, ventilation, lighting, cooking, washing, food preservation or office automation, account for 20% of final energy consumption that is used to provide different energy services in Spain, and is increasing (IDAE, n.d.b).

Spain's commitment to renewable energies, together with building refurbishment and energy efficiency, is highlighted. As IEA (2021) pointed out, in Spain the energy general strategy is based on the *efficiency first* principle, but further reductions will be needed in all sectors, which is reflected in the **Climate Change and Energy Transition Act**, as well as the **PNIEC**. PNIEC incorporates specific objectives linked to energy efficiency regarding buildings that are specified in the **SET-Plan through its Action 5**. Solutions are proposed to facilitate the deployment of heating and cooling generation systems, the participation of renewable energy in urban heating and cooling networks, the use of renewable energy in buildings, as well as energy produced by cities, Energy Communities and self-consumers, and active and passive solutions in the energy rehabilitation of buildings. These measures are in line with the EU proposal to move towards a horizon of low carbon emissions in the building sector. As for Spain, the **last modification of the Technical Building Code in 2020** (Royal Decree 314/2006) establishes that any building that ensures compliance with the regulations will obtain the category of almost zero energy consumption building. However, the implementation of the nZEB standard in the Spanish framework is very recent and the climate classification is still outdated and based on a provincial division, which can give rise to great inequalities derived from the current climate zoning (Bienvenido-Huertas et al., 2021).

How the factor influences ENCI: In line with the emergence of ENCI **types 1-2** (individual) and **7-8** (collective), Spain is committed to self-consumption as a key axis that requires the mobilisation of the different social actors in the public and private sector: Public Administration, Companies and Citizens. Through the Self-consumption Roadmap – under the framework of the PNIEC – the aim is to reach 9 GW of

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installed power in Spain by 2030, from the 1.5 GW currently installed, as well as to develop specific programmes - under the Next Generation European funds - for municipalities with less than 5,000 inhabitants, such as PREE 5,000, for energy rehabilitation in buildings, and DUS 5,000, for Sustainable Urban Development. It is argued that to achieve this broad objective - and, consequently, to achieve a transition from a reformist model (types 1 and 8) to a transformative one (**types 2-8**) - it is necessary to involve and mobilise the business sector and civil society in the energy transition. At a conference organised by IDEA, its director general put it this way: “If we move towards a decentralised and democratised model, in which the decision to commit to renewables is made by each community of owners or each cooperative, we must be able to generate this context together” (IDAE, 2021).

Affected ENCI types: Types 1, 2, 7 and 8.

Local example: La Borda Housing Cooperative in transfer of use. La Borda lays out a model for sustainable building and living based on low-tech solutions and material decisions which make for greater affordability through energy efficiency and shared resources. The monthly rent for residents is about 20% less than the local private-sector average. One of the singularities of the project is the participation of the user in all its phases, from the design to the construction and further management. Their involvement has been crucial for defining the environmental strategies, and for challenging standards and current regulations. The first action to reduce the environmental impact during construction was to redefine the programme. Once the programme was defined, passive bioclimatic strategies were developed, as much as possible with solutions that involve the users' active role in climate management. The result is a net energy consumption rate of almost zero while maintaining a level of comfort in the domestic spaces that comes with the least associated cost.

T6. Energy labelling

How is this factor manifested in Spain: Improving energy efficiency is one of the pillars of the transition to a low-emission economy. According to data from the 2020 Summary Report on Energy Efficiency Indicators in Spain by the IDAE (2020), prepared with data from 2018, 11.75% of household electricity consumption is used for lighting, so the user's energy efficiency decisions in this area represent significant savings on their bill (Figure 13.6). The need to provide consumers with greater knowledge about the labelling of the household consumer products has led to a regulatory change at European level, with its consequent implementation in Spain.

In 2017, a **European Regulation came into force that affects the classification of the energy labelling of energy-consuming appliances** (EuPs). The adaptation to the new labelling is taking place progressively to make it available to the consumer. The regulation stipulates that all labelled products must be *re-scaled* by 2 August 2030 at the latest. To adapt to this requirement, MITECO has promoted the entry into force, from 1 March 2021, of the new energy labelling of products to adapt the energy efficiency classification to the new test methods on the consumption of these appliances. Throughout 2021, new labelling has been introduced for five families of electrical products in both physical and online shops. Refrigerators, freezers, wine coolers, washing machines, dishwashers, electronic displays (including monitors and TVs) and light sources were re-labelled. The main reason is the saturation of A+, A++ or A+++ products that considerably reduce the range of consumer choice. Such labelling has been removed, reverting to an A to G rating scale,

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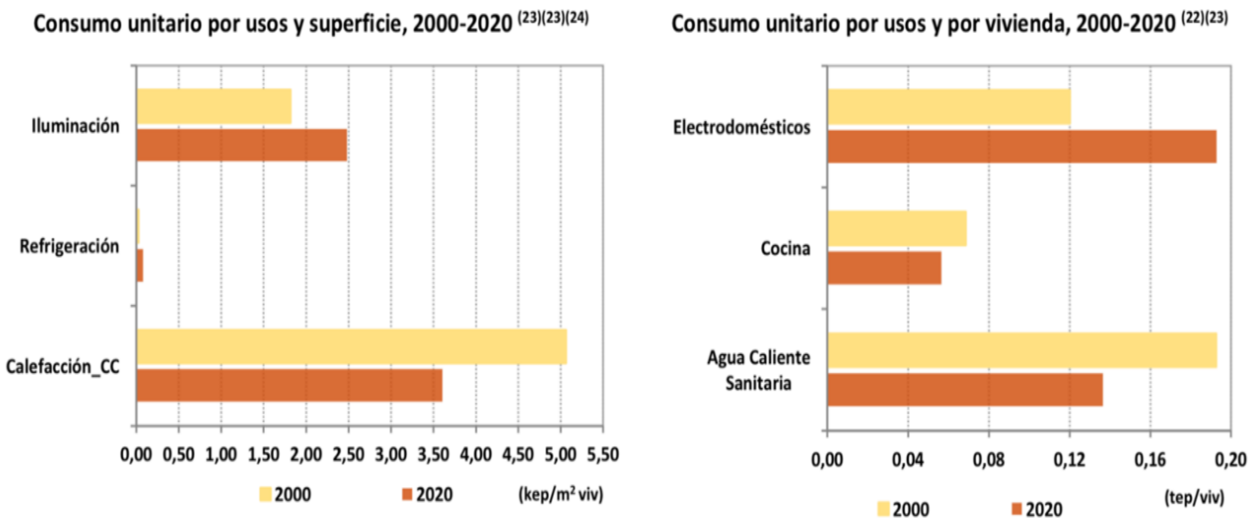
where A is assigned to products with the lowest energy consumption and highest energy efficiency, and G to those with the highest consumption and lowest energy efficiency. It had been found that **with the A+, A++ and A++ labels, the motivation to buy more efficient appliances was lower than with the A to G scale**: consumers were less inclined to opt for "first class" appliances without a clear "buy A" message.

Figure 13.6: Individual consumption by use and area (left) and by use and area (right).



Note: Source IDAE (2020). Information in the left chart refers to the individual consumption in terms of lighting, cooling, and heating; in the right chart household electric appliances, cooking and domestic hot water are mentioned.

How the factor influences ENCI: The change in energy labelling poses the challenge of a more informed citizenry for making decisions on the purchase of products, especially at home (**Type 1**). The re-labelling is intended to make this information clearer and more comprehensible to consumers, and to make it clearer to them which is the most efficient option. To do that, the new labels also incorporate a QR code so that consumers can access, via Smartphone, the specific characteristics, and data of each model within a new database EPREL (*European Product Database for Energy Labelling*).

Affected ENCI types: Type 1.

Local example: Belt project (Boost Energy Label Take upSpain). The Office of Consumers and Users of Spain is part of the European Belt (Boost Energy Label Take Up) project, which aims to support the transition by avoiding misinterpretation and helping consumers to continue choosing quality products, and also helping manufacturers to investigate and launch more efficient appliances.

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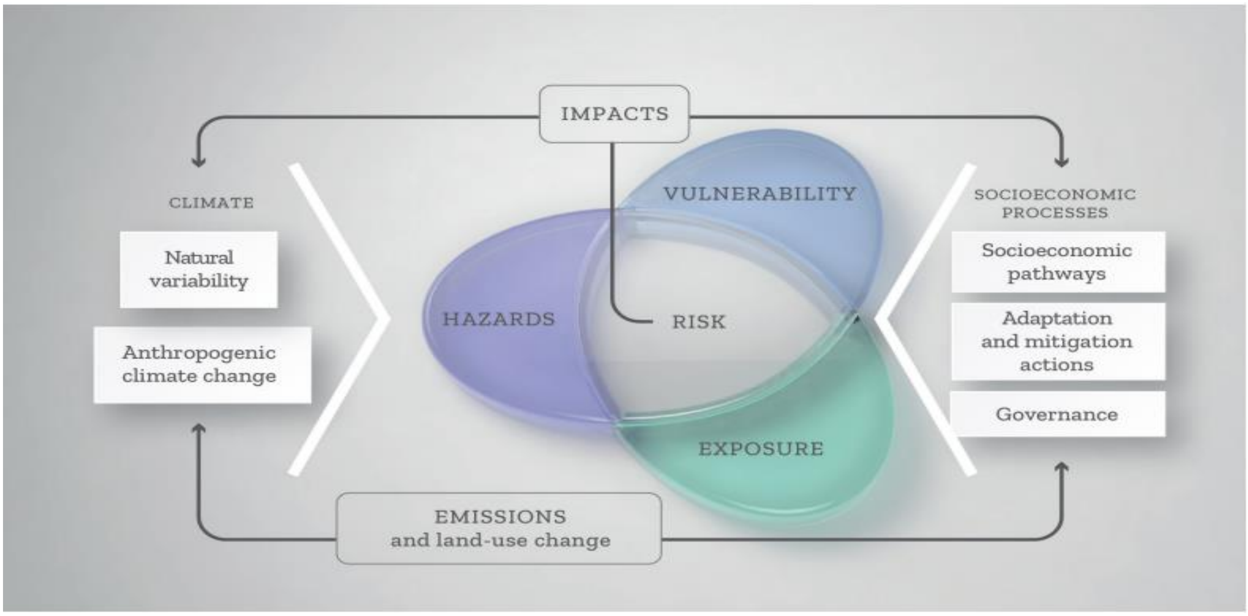
Environmental factors

EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)

How is this factor manifested in Spain: Climate change in Spain is a reality that has been confirmed through a wide range of observations. According to the **National Plan for Adaptation to Climate Change 2021-2030** (PNACC, MITECO 2021b), the effects of climate change will cause a series of cascading effects on ecological systems and economic sectors in the future (Figure 13.7). For instance, the impacts on ecosystems, fauna, flora and geological heritage, on cultural heritage and social change, on human health, on the agricultural and tourism sector, and on loss of coastal resources; the decrease in water resources; the increase in fire danger and the risk of desertification (in turn influenced by the increase in fires, among other causes); the changes in energy production and consumption; or the loss of operability of transport infrastructures.

Figure 13.7: Components defining climate change risk.



Note: Source PNACC (2021). Based on the information extracted from IPCC (2014). Fifth Assessment Report. Group II. Summary for policymakers.

The National Strategy to Combat Desertification (ENLD) indicates that all the instruments that make up the Strategic Energy and Climate Framework for 2021-2030 recognise the importance of forest ecosystems as carbon sinks that allow for a synergistic fight against climate change and desertification. The MITECO indicates that the integration of climate change into public and private planning and management requires broad social involvement. To this end, tools based on information, awareness-raising, training, and participation are available. One example of these tools is the *Platform on Adaptation to Climate Change in Spain* (AdapteCCa), a tool at the service of experts, organisations, institutions, and agents interested in information, knowledge and experiences on impacts, vulnerability, and adaptation to climate change, as well as an instrument to promote communication between all of them.

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How the factor influences ENCI: This type of tool, together with the coordination, advice and participation forums foreseen in the PNACC, can favour the ENCI at various levels: individually at the private and organisational level (t**ypes 1, 2, 3 and 4**), taking action according to the knowledge acquired from these tools, and individually and publicly (**type 5**) and of citizen and hybrid groups (**types 7 and 8**), with the possibility of generating social movements (**type 9**) through the exchange of information and participation with experts, organisations and other interested agents promoted by the PNACC and its tools.

Affected ENCI types: Types 1, 2, 3, 4, 7, 8 and 9.

Local example: LIFE Montserrat Project (Catalonia). This project, located in Montserrat Mountain and its surroundings, in the Barcelona, has created a green protection infrastructure to prevent large forest fires and promote the conservation of natural heritage. Its forestry-pastoral management model is aligned with the need to adapt to climate scenarios for Catalonia and the Mediterranean as a whole and is an essential tool for mitigating the impacts of climate change. Different institutions are involved, but they emphasise the importance of society and its commitment and responsibility in the management of the territory. In fact, they believe that the real key to the project's success has been thanks to social participation, especially the shepherds and livestock farmers, who have formed the Montserrat Livestock Farmers' Association.

EN2. Availability of resources (geological challenges, geographical opportunities, and limitations)

How is this factor manifested in Spain: Spain's geography and weather conditions, both solar radiation and constant and moderate winds, mean that wind and PV energy have an important weight, with wind being the country's first source of renewable electricity generation. Red Eléctrica de España's 2021 Renewable Energy Summary Report indicates that energy generation with renewable sources at the end of 2021 reached 46.7% of total generation, registering an all-time high (Figure 13.8). The increase in renewable installed capacity was mainly due to the **increase in solar PV capacity and wind power**. In addition, the **decrease in the production of coal-fired power plants** during 2021 has favoured that the equivalent CO2 emissions associated with electricity generation have registered a historic low.

According to the Spanish Energy Balance reported by the MITECO, solar thermoelectric power increased by 3.6% in 2021, while hydroelectric power decreased due to a year with less rainfall than the previous one. According to data from the Spanish Wind Energy Association, there are more than 21,500 wind turbines installed in Spain, 1,298 wind farms in more than 850 municipalities and 250 manufacturing centres in 16 Autonomous Communities, being, in addition, the third largest exporter of wind turbines in the world. They point out that to achieve the 2030 objectives of the PNIEC, **it would be necessary to double wind power capacity to achieve a 23% reduction (compared to 1990) in GHG emissions.**

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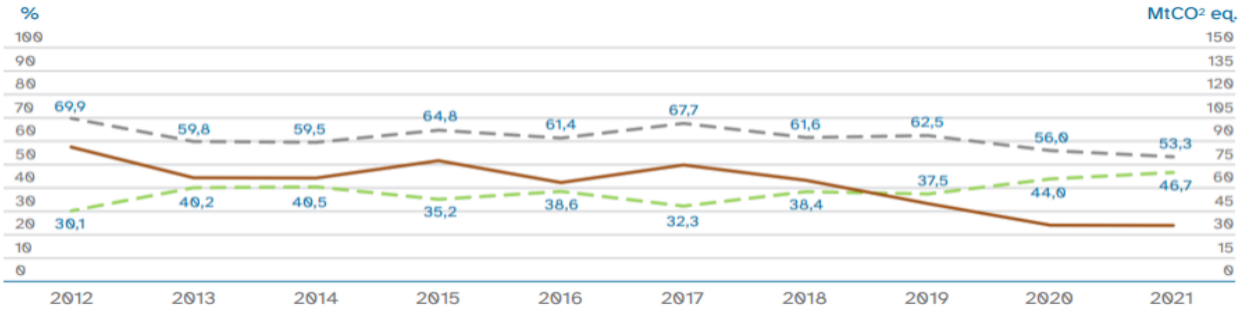
Figure 13.8: Components defining climate change risk.



Source Electric Network (2021). Note: Green line refers to renewable energy (hydraulic, hydroelectric, Eolic, photovoltaic, and thermic, renewable waste and other renewable). Grey line refers to non-renewable energy (nuclear, carbon, fuel/gas, combined cycle, co-generation, non-renewable resources and turbinating pumping). Red line refers to the emissions (tCO_2 eq.).

How the factor influences ENCI: Several social movements against the current system of wind energy implementation block to some extent the development of ENCI **types 7 and 8,** although their attempts to have a voice in the energy system, propose a fair and sustainable model, and react against the energy oligopoly can be related to **types 5 and 10.** Furthermore, instruments and measures are proposed in the PNIEC to strengthen the role of LEC (Local Energy Communities), a **type 7 or 8** alternative that is more socially accepted as a way of guaranteeing the right to access to energy. Finally, it should be noted that MITECO intends to make Spain the European reference for technological development and R&D of renewable energies in marine environment, especially floating wind power, which could favour, like onshore wind power, **types 5 and 10**, given the possibility of negatively affecting fishing activity or areas of high ecological value.

Affected ENCI types: Types 5, 7, 8 and 10.

Local example: Parque Nordés (Galicia): an offshore wind farm with supporters and detractors. Although the Parque Nordés initiative is being well received by some citizens who see it as a way to make Galicia a benchmark in the construction of offshore wind farms and in the promotion of R&D in offshore wind energy, the project has not been free of criticism. Environmental organisations denounce the negative effect of offshore wind turbines on birds (SEO/Birdlife) or on fishing and the sea (Plataforma Manifiesto de Burela) in a region where a large part of the economy depends on this sector. It has even been considered an "environmental offensive" that endangers the fishing activity in the area (Galicia en Común).

EN3. Pollution (air, water, noise, visual pollution, waste management)

How is this factor manifested in Spain: According to the report of the MITECO (2021a) on *Air Quality Assessment in Spain 2021*, the values of most of the pollutants analysed do not exceed the legislated values, with a few exceptions, such as tropospheric ozone, which continues to show high levels although with a downward trend, nitrogen dioxide and the concentration of particulate matter below 10 microns. Air quality plans may include structural measures (air improvement acts) and short-term measures (short-

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term action plans).

How the factor influences ENCI: The **National Air Pollution Control Program** (PNCCA, MITECO 2020b) aims to meet the commitments to reduce anthropogenic air emissions, established in Directive (EU) 2016/2284, from 2020 to 2029, and from 2030 onwards, establishing measures to reduce pollutants in the most relevant sectors. Moreover, the **Sustainable Mobility Act** of the Ministry of Transport, Mobility and Urban Agenda (MITMA), one of the reforms committed by Spain in the framework of the PRTR, is currently being processed, with the aim of coming into force before the end of 2023. Its objectives include, among others, adapting the transport system towards clean mobility (e.g. electric vehicles, **Type 1**), promoting active mobility by bicycle and on foot (**types 1 and 2**), strengthening the sustainability and resilience of the freight transport system and establishing a legal framework for ICT (**type 4**). Additionally, visual pollution, mainly due to the large extensions of wind farms, and contamination by radioactive waste provoke social protest from affected neighbours to environmental organisations and political parties.

Affected ENCI types: Types 1, 2 and 4.

Local example: Mobi-liza (A Coruña, Galicia). Association established in the city of A Coruña in 2008, with the aim of promoting and defending sustainable and responsible mobility by promoting two main activities: the Bicycle School, where they instruct adults and children to ride and circulate by bicycle, and the self-managed social workshop Reciclos, where they help citizens to repair their bicycles and accept donations of bicycles for reuse. Among other activities, there are organize sustainable mobility workshops at the University of A Coruña (UDC).

EN4. Conflicts and opportunities about land use connected to renewable energy.

How is this factor manifested in Spain: According to the MITECO (2020c), the development of renewable energies in Spain, driven by the objectives of transitioning the energy system towards a climate-neutral one, has contributed to a considerable increase in requests for the installation of new wind farms and PV solar plants. As they have an impact on the environment, they require an environmental assessment. To facilitate the location of these infrastructures, MITECO has developed **a tool to identify the areas of the national territory that present the greatest environmental conditions for the implementation of these projects**. However, it is focused on projects for large wind and PV installations, and therefore does not include small self-consumption installations, isolated low-power infrastructures or those located on roofs or roofs of buildings or urban land, or small R&D facilities. Although it does not seem to promote ENCI types, it does so indirectly. The large expansion of solar and wind installations has created a debate in Spain about the real impacts on biodiversity and on the territory, which is a conflict at a social level. This is because several associations and organisations, such as the NGO SEO/BirdLife or the Association for the Ecological Defence of Galicia (ADEGA), have denounced irregularities in the application of environmental impact assessment regulations. Another major challenge facing the country, known as the Demographic Challenge, is to solve **the depopulation of a large part of the territory** (especially rural areas), the low population density, the fall in the birth rate and the effects of seasonal overpopulation. The MITECO (2021d) aims to respond to this complex phenomenon by means of 130 measures (divided into 10 lines of action), aligned with the PRTR, guaranteeing a green, digital, gender-sensitive and inclusive recovery.

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How the factor influences ENCI: The irregularities in the application of environmental impact assessment regulations together with the visual impact assessment, and the perception of citizens that they have no power of choice over their own land, cause social unrest where different entities participate in events to discuss the issue, draw conclusions and alternative proposals (**type 5**), and demonstrating to make their voice heard and produce changes to transform an energy system that they consider unfair with the environment and with them (**type 10**).

Moreover, regarding the measures proposed by the MITECO (2021d) the influence of their lines of action can be highlighted: *axis 1, boosting the green transition,* which promotes a transition adapted to LEC by favouring the development of innovative and sustainable initiatives, favouring individual and private initiatives (**types 1 and 2**) and citizen and hybrid groups (**types 7 and 8);** *axis 6, promotion of entrepreneurship and business activity*, to boost development and innovation in the territory, encouraging the re-adaptation of the most traditional economic activities towards the ecological transition and the digital transformation (**types 3 and 4**); and *axis 9, promotion of culture*, that aims to deepen the potential of culture to induce dynamics of resilience and social, economic and demographic transformation, as well as for climate and environmental sustainability (**type 5**).

Affected ENCI types: Types 1, 2, 3, 4, 5, 7 and 8.

Local example: Social movements against wind farms in Galicia "Eólica así non." In Galicia there has been a boom in the wind energy industry due to its geography (a large part of its surface is mountainous) and its meteorology (constant and moderate winds), affecting several towns and causing great concern. According to the website of the Association for the Ecological Defence of Galicia (ADEGA), there have already been several mobilisations called by the Coordinadora Eólica Así No (Wind Power Coordinating Committee), demanding an alternative energy model from the government, as opposed to the one being imposed by the electricity oligopoly. More than 200 organisations are participating in these social movements, including neighbourhood, environmental, cultural, social, and political groups and platforms, which reject the massive and unplanned development of large wind farms, which is causing multiple irreversible impacts on the territory. They warn that the model that is being imposed continues to perpetuate the role of Galicia as a territory of sacrifice in the State and in Europe, in favour of the large energy hyper-demanding metropolises.

EN8. Environmental disasters

How is this factor manifested in Spain: According to the National Geographic Institute (IGN), Spain is a territory with a high environmental risk. It classifies these risks as: **natural hazards**, such as insect pests, floods or volcanism, and **technological risks**, i.e., hazards related to economic development and technological advances that can cause serious environmental or economic damage or loss of life. Potential hazards include nuclear power generation facilities in the face of radiation leakage. The safety level of nuclear power plants is very high and all of them have special emergency plans to deal with possible accidents. However, in recent years there have been cases of accidents, such as in 1989 at the Vandellós plant, in which no radioactivity was released to the outside, or in 2007 at the Ascó nuclear power plant, which resulted in the release of radioactive particles into the atmosphere. In 2013, an explosion occurred at the Repsol chemical plant on the Tarragona petrochemical site, which activated the External Emergency

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Plan for the Chemical Sector in Catalonia. It should be noted that to prevent this type of accident, petrochemical facilities have emergency plans coordinated by the autonomous communities where they are located, and companies are obliged to draw up self-protection plans. There have also been accidents in the fertiliser and oil and natural gas refinery industries in Huelva in recent years (1989, 2005, 2010, 2015), making this town and its area of influence one of the most polluted areas in Spain.

Significant oil spills have also occurred on the Spanish coast. The coastline of Galicia is at substantial risk due to its location on a major oil transport route from the North Atlantic. The Urquiola tanker spill in 1976, the Aegean Sea tanker spill in 1992 and especially the Prestige tanker spill in November 2002 stand out for their considerable environmental and economic effects on the Galician coastline. In these major accidents, tens of thousands of tonnes of oil have been spilt, causing oil slicks and ecological disasters of great magnitude in the affected coastal area. The degradation or corrosion of toxic or hazardous waste storage materials has also caused spills with wide-ranging environmental impact. In 1998, a spill of toxic materials occurred in the Doñana National Park due to the rupture of a mine settling pond in Aznalcollar. It affected 4,600 ha of the Guadiamar river basin. The recovery of the affected area involved the removal of soil and the creation of a protected green corridor.

How the factor influences ENCI: This type of disasters especially encourages collective ENCI, as citizens often actively participate as volunteers to help with the recovery work, favouring **types 7 and 8**. It also promotes **type 9** with campaigns to raise public awareness, as well as **type 5**, to generate debate and find solutions. **Type 10** also, especially when the cause of the accident, or how it is managed, is due to negligence.

Affected ENCI types: Types 5, 7, 8, 9 and 10.

Local example: “Nunca más” Platform (Galicia). According to its official website, this platform was created on 21 November 2002, a few days after the wreck of the Prestige oil tanker and is made up of more than 200 different associations and groups. They created this platform to demand political responsibility, the declaration of Galicia as a disaster area, the allocation of resources of all kinds to repair the serious consequences and the implementation of prevention mechanisms for the future. It mobilised more than 300,000 people at the same time in different parts of the country and brought together more than 200,000 people in Santiago de Compostela (the capital of Galicia). In 2022, it participated in a documentary, 20 years of dignity, with testimonies from different people who participated in the movement and from the seafarers who directly experienced the catastrophe, taking stock of the last 20 years. One of the spokespersons of the platform highlights how much they learned during the days of reflection with the different sectors (scientific community, marine, education...) united under the platform, and the solidarity of the volunteers.

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Legal factors

L1. Legal framings of ENCI forms

How is this factor manifested in Spain: In Spain, there is a joint action between government and administration that puts citizens at the centre, based on transparency and access to public information, participation and collaboration is called **Open Government.** This refers to a culture of governance based on transparency, integrity, accountability, and stakeholder participation in support of democracy and inclusive growth (OECD, 2017). In this framework, Spain has carried out several **Open Government Action Plans,** which act as a lever to achieve *SDG16 of the 2030 Agenda*: to build just, peaceful, and inclusive societies that are accountable. Spain's Third Open Government Plan is currently in force, which incorporates advances in legal matters. Specifically, *Act 39/2015, on the Common Administrative Procedure of Public Administrations*; *Act 40/2015, on the Legal Regime of the Public Sector; Act 50/1997, on Government*; and *Act 19/2013, on Transparency, Access to Information and Good Governance.*

How the factor influences ENCI: Within this plan, to improve citizen participation in public affairs, different projects are proposed, including, on the one hand, the **public participation service** for citizens in energy and environmental matters, the impact of which can be seen reflected in an **ENCI type 5**. This service is covered by the aforementioned common regulations and other specific environmental regulations (Act 21/2013, on Environmental Assessment; *Act 27/2006, which regulates the rights of access to information, public participation and access to justice in environmental matters*; and *Order AAA/1601/2012, which issues instructions on the application of Act 27/2006 in the Department*. It is also worth noting the existence of an instrument of **ratification of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters**, in which the fundamental objective is "In order to contribute to the protection of the right of every person, of present and future generations, to live in an environment adequate to their health and well-being, each Party shall ensure the rights of access to environmental information, public participation in decision-making and access to justice in environmental matters in accordance with the provisions of this Convention" (Art. 1). On the other hand, there is a commitment in this Open Government Plan to implement the **regulatory footprint**, with the aim of improving the public's knowledge of the rule-making process and its implementation. In other words, the aim is not only to get citizens to respond to the public consultation, and also to involve them in the process of drafting regulations (**Type 6**). These measures consider citizen participation and knowledge about energy and environmental policy, although this may not be sufficient in the face of the "regulatory avalanche on sustainability" (EYRethinkingSustainability, 2021b, p. 3) that is causing systemic change in the management of companies and organisations at three legal levels: environmental, social, and corporate governance. The rapid changes required to respond to the need to mitigate and adapt to climate change are challenging the development of **types 7 and 8**.

Affected ENCI types: Types 5, 6, 7 and 8.

Local example: 4th Open Government Plan of the Autonomous Regions and Cities. The 4th Open Government Plan includes general measures on transparency and accountability, participation, integrity, awareness raising and training. These proposals can be adopted in different ways by each autonomous region. For example, the Basque Government incorporates accountability through mandate plans; the Generalitat de Catalunya has the participacatalunya.cat platform, a participation space to fight corruption

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and strengthen public integrity and an open data strategy for gender equality policies; and the Xunta de Galicia includes instruments to manage and evaluate public policies and services, a framework of institutional integrity, an integrated system of citizen attention and Open Government, a digital administration and participation, and a system of transparency, accountability and accessibility.

L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion.

How is this factor manifested in Spain: In Spain there are specific legal measures aimed at vulnerable consumers, energy poverty and social inclusion. One of the first references is the *Act 24/2013 on the Electricity Sector*, which defines **vulnerable consumers** as " electricity consumers who meet the determined social, consumption and purchasing power characteristics " (art. 45). These consumers are entitled to a reduced tariff compared to the voluntary price for small consumers, establishing the tariffs of last resort and the minimum vital supply (Art. 45bis). The measures to be adopted are determined by the Government regulation (Art. 45), with various updates in line with changes in the energy system. Currently, *Royal-Decree 897/2017, which regulates the figure of the vulnerable consumer, the social bonus and other protection measures for domestic electricity consumers* is in force. This measure is adopted within the framework of the **+SE Plan** which, following Russia's invasion of Ukraine, has brought the criticality of energy security back into the social, economic, and political spotlight, highlighting the vulnerability of external energy dependence in terms of prices, confidence, and availability of supply.

Due to the high prices of raw materials (natural gas, oil, coal) in international markets and, on the other hand, the increase in the price of CO2 emission rights, *Royal Decree-Act 15/2018 on urgent measures for energy transition and consumer protection*, has been published. Specifically, Title I contains measures to protect vulnerable consumers and combat energy poverty and to increase information, protection, and rationalisation of contracting mechanisms, increasing the protection of electricity consumers. This regulation is based on the **National Energy Poverty Strategy** (MITECO, 2019), an strategy that is introduced within the **Strategic Framework on Energy and Climate**, whose three pillars are, in turn, the PNIEC (MITECO, 2021c) the Climate Change Act and the ETJ (for more information, see factor P1 and P3). Focusing on the regulatory framework, *Act 7/2021, on climate change and energy transition*, establishes the need for Spain to offer "supportive and inclusive responses to the groups most affected by climate change and the transformation of the economy, as well as to provide the appropriate signals to attract the confidence of investors and reduce the financial risks associated with the increase in the volume of greenhouse gas emissions or greater vulnerability to the physical impacts of climate change" (Preamble I). This law identifies, as one of the basic pillars for achieving this, the **PNIEC** which, together with the ELP, become key figures for climate action. Likewise, the Climate Change Act is responsible for the creation of the **ETJ**, as an instrument at state level to optimize opportunities in just transition activity and employment and regulates the figure of Just Transition Agreements to materialise the actions. Finally, it should be noted that, in accordance with the decentralisation that is inherent to the Spanish State, this law establishes the possibility of participation by the Autonomous Communities in accordance with the powers attributed to them and even that "the Autonomous Communities with powers in this area may establish higher levels of protection than the basic state legislation" (Preamble III).

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How the factor influences ENCI: This regulatory framework and the policies derived from it to protect vulnerable consumers, mitigate energy poverty, and achieve social inclusion are consistent with the search for solutions to reduce household energy dependency, and fall under ENCI **type 1**.

Affected ENCI types: Type 1.

Local example: Catalan legislative development in terms of protecting families from energy poverty. Catalan legislative development in terms of protecting families from energy poverty stands out compared to other Autonomous Communities. Law 24/2015, of 29 July, on urgent measures to address the emergency in the field of housing and energy poverty, takes up the agreement of the Parliament of Catalonia, acts in several directions with regard to energy, especially Article 6 which includes measures such as guaranteeing the right of access to basic supplies of drinking water, gas and electricity to people and family units at risk of residential exclusion, thereby prohibiting companies from cutting off electricity, gas or water to families who have a certificate of vulnerability from social services.

L3. Rights and duties of consumers, prosumers, and new producers in interaction with the energy market

How is this factor manifested in Spain: Rights and duties of consumers in relation to the supply of electricity are established in article 44 of *Act 24/2013 on the Electricity Sector*. The term prosumer does not exist in Spanish legislation; however, *Royal Decree 244/2019, of 5 April, which regulates the administrative, technical, and economic conditions for self-consumption of electricity*, defines **self-consumption** as the consumption by one or several consumers of electricity from production facilities close to the consumption facilities and associated with them. It also indicates that a consumer participates in **collective self-consumption** when he/she belongs to a group of several consumers who feed themselves, in an agreed manner, with electrical energy from production facilities close to those of consumption and associated with them. According to the *Act 24/2013, of 26 December on the Electricity Sector*, there are two types of self-consumption: *without surplus*, when the physical devices installed prevent any injection of surplus energy into the transmission or distribution grid, and therefore there will be only one type of subject of those provided for in the law, the consumer; and *with surplus*, when the generation facilities can inject surplus energy into the transmission and distribution grids, with two types of subjects, the consumer and the producer (art 9.1a). In the latter case, the rights and obligations of electricity producers are established in the Act 24/2013 (art. 26).

According to the MITECO, those consumers of electrical energy who acquire electrical energy directly on the production market for their own consumption, and who meet the conditions foreseen, will be considered **direct consumers on the market** by supply point or installation. The Act 24/2013 also establishes their rights and obligations in articles 44.1.c).2 and 46.3. Moreover, their activity is regulated in chapter II of title V of *Royal Decree 1955/2000 which regulates the activities of transmission, distribution, commercialisation, supply, and authorisation procedures for electrical energy installations*. According to the Spanish PNIEC (MITECO, 2021c), self-consumption activity has barely taken off due to the existence of regulatory barriers that hinder its economic viability. Thus, with the *Royal Decree 244/2019*, the aim is to make it easier for consumers to obtain cleaner energy at a lower cost. In addition, the aim is to promote the proactive role of citizens in decarbonisation, increase the diversity of actors and the existence of

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participatory projects, both in the generation of renewable energy and in the wider energy system.

How the factor influences ENCI: This favours individual and collective ENCI, from reformative **type 1, 3 and 7** to transformative **type 2, 4 and 8**, as well as **type 5 and 9**, to promote citizens' knowledge of self-consumption, Energy Communities, among others.

Affected ENCI types: Types 1, 2, 3, 4, 5, 7, 8 and 9.

Local example: Reflection cycle: You have the energy; you have the power (Catalonia). The Catalan Energy Institute, supported by Obra Social la Caixa Foundation, organised a cycle of reflection on the energy transition aimed at society. It consisted of two conferences open to the public and three small-format, participative working sessions, where participants (citizens and experts) were able to reflect, debate and jointly propose needs and solutions in the three proposed challenges: "Photovoltaic self-consumption and solar communities", "Electric vehicles and energy storage opportunities" and "Digitalisation of energy".

L4. Bureaucracy and red tape

How is this factor manifested in Spain: Spain's opportunities of moving towards a sustainable economy may be altered, among other reasons, by the **rigidity of regulatory changes**. Although there are opportunities to move towards renewable energy and energy storage, their implementation requires facilitating administrative procedures and simplifying bureaucratic processes, which are currently inefficient (Valdés, 2022).

The proposals under the Strategic Framework for Energy and Climate make this clear by pointing out **the urgent need for administrative changes**. For instance, the PRTR (MITECO, 2021d) refers to the need to modernize public administrations by digitalising, simplifying, and streamlining procedures. The PNIEC (MITECO, 2021c) explicitly includes the need to review and simplify bureaucracy and administrative procedures in promoting alternative energies (Measure 5.9). Likewise, the +SE Plan (MITECO, 2022b) refers to the specific measures related to simplify administrative processes that have been carried out in Spain, within the framework of energy transition and savings. Specifically, the Plan +SE report points out that Spain has created a regulatory and normative environment conducive to the development of renewable energies, self-consumption, and new energy vectors. In this regard, it highlights that the commitment to simplifying administrative processes for the penetration of renewables has been worked on throughout 2021, through measures covered by regulatory developments such as *Royal Decree-Act 29/2021, adopting urgent measures in the field of energy to promote electric mobility, self-consumption and the deployment of renewable energies*, *Royal Decree-Law 17/2022, adopting urgent measures in the field of energy, Royal Decree-Law 17/2022, adopting urgent measures in the field of renewable energies,* and *Royal Decree-Act 6/2022, adopting urgent measures within the framework of the National Response Plan to the economic and social consequences of the war in Ukraine*.

The latter, RDL 6/2022, contains a series of measures to promote the energy transition to a 100% renewable electricity system in an orderly and rapid manner and to favour economic reactivation in line with the European Green Pact. The aim of this regulation is to remove barriers to the massive deployment of renewable energy sources, among other issues, allowing Spain to take advantage of its potential to

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generate employment and economic activity, linked to a clean, fair, reliable, and economically competitive energy transition. One of these measures refers to the simplification and streamlining of procedures for renewable energy projects and associated electricity infrastructure, thus eliminating barriers to their implementation. The law also amends the Environmental Assessment Act to make it more flexible and legally secure, guaranteeing environmental protection and facilitating the processing of projects that will allow the economy to revive after the crisis caused by the COVID-19 pandemic. In this regard, it regulates the extension of the validity of impact statements, thus avoiding the existing legal vacuum, streamlines the procedure for determining the scope of the environmental impact study and completes certain aspects of the simplified environmental assessment procedure.

How the factor influences ENCI: The Spanish system still has an excessive bureaucratic burden, the uncertainty about what is planned, with very long-term results, and the difference between what is planned and what is done (Farinós et al., 2022). These are reasons that keep people away from making changes in their energy behaviour (**Types 1 and 2**), as well as a brake on the development of collective energy projects (e.g., Energy Communities; production and consumption cooperatives) (**Types 7 and 8**).

Affected ENCI types: Types 1, 2, 7 and 8.

Local example: Aliança contra la Pobresa Energètica (APE), Catalonia. Once again, we mention this initiative that fights against energy poverty and, in this sense, demonstrates its concern about the complexity of the Spanish system's bureaucracy to facilitate citizen's access to subsidies (e.g. the bono social). This initiative advises and helps people to apply for this type of aid, which citizens are all too often bored with and which, for many, represents a clear social disadvantage.

L5. Legal uncertainties

How is this factor manifested in Spain: Since the 2000s, **the promotion of renewable energies has been a key challenge in Spain**. Under the leadership of the EU, Spain enacted several royal decrees granting highly beneficial remuneration schemes for investment in this sector. As a result, the planned renewable energy quotas were exceeded, especially in the photovoltaic sector. However, the economic recession and the tariff deficit led from 2010 onwards to a complete reversal of the economic conditions initially granted, resulting in an avalanche of claims against the State. Specifically, this was a reaction to the enactment of (a) *Royal Decree 1565/2010 regulating and modifying certain aspects relating to the activity of electricity production under the special regime*; (b) *Royal Decree-Act 14/2010 establishing urgent measures to correct the tariff deficit in the electricity sector*; and (c) *Act 2/2011, on Sustainable Economy*. New legislative frameworks followed one after the other until *Decree-Act 9/2013* definitively repealed *Royal Decree 661/2007* and *Royal Decree-Act 1/2012*, suspending the procedures for the pre-allocation of remuneration and abolishing the economic incentives for new electricity production facilities using cogeneration, renewable energy sources and waste. In this way, the incentives recognised for special regime energy production technologies disappear and a new economic regime for this type of technology is definitively consolidated.

Lastly, regarding **electric mobility, it seems that little progress is being made in the automotive sector and in society in general**, especially in terms of electromobility (hybrids, plug-in vehicles, etc.), following

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the guidelines imposed by the EU with a clear objective: to reduce CO2 emissions by manufacturers. The strategy that serves as a national reference framework is the Spanish Sustainable Mobility Strategy (EEMS, MITECO, 2020d) which integrates the principles and coordination tools to guide and give coherence to sectoral policies that facilitate sustainable and low-carbon mobility.

How the factor influences ENCI: This process of evolution in the regulatory framework up to the present day has led to Spain ceasing to be a key axis for investment in renewable energies, hindering the development of both individual **Types 1-2 and 3-4** and, above all, collective **Type 7-8** ENCI forms. Regarding the latter, the case of the Energy Communities stands out. Although they are being well received by the public, the lack of information and, above all, the unclear regulatory framework governing these communities, are aspects that discourage many communities from initiating self-supply work. Another obstacle is the high price of solar panels and installations. As for electric mobility, the challenge remains how to redefine infrastructures to make it easier for citizens to adapt to the challenge of sustainability in transport use (Álvarez-Palau & Suau-Sánchez, 2022), and how to count on citizens and users in the regulation of the mobility transition so that it is possible to favour ENCI **type 2**.

Affected ENCI types: Types 1, 2, 3, 4, 7 and 8.

Local example: Energy Communities Network S. Coop. To combat the misinformation faced by people who wish to join or create a model of sustainable energy generation and consumption, the Red de Comunidades Energéticas S. Coop provides anyone who wishes to find out about subsidies, aid and related regulations with a website and contact by telephone or post. Among the success stories that have joined this project are several in the territory of Alava (El Castillo, Amarita, Ollavarre).

Summary table

Factors		High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
POLITICAL	Key political objectives, targets and goals for energy transition						X
	Multi-level energy governance structure of a country		X				X
	Political support for ENCI (mechanisms, networks, etc.)					X	
	Political/democratic culture and traditions					X	
	Inclusion and empowerment policies					X	
	Geo-political challenges (war in Ukraine, energy supply…)	X					

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ECONOMIC	General economic situation / Inflation rate & purchasing power	X					
	Energy prices		X		X		
	Energy market			X			
	Energy taxation, state aid, fuel subsidies		X			X	
	Financing and investment opportunities						X
	Green industry development and green job creation				X		
SOCIAL	Level of income / wealth disparity and energy poverty	X					
	Energy literacy, awareness and skills			X			
	Citizen engagement and passivity in society				X		
	Trust in institutions and collective endeavours			X			
	Willingness to invest in the energy transition		X				
TECHNOLOGICAL	Availability of technologies for the decarbonisation of energy sector and RES					X	
	Decentralised energy system and storage				X		
	Digitalisation of the energy system				X		
	Energy efficient buildings			X			
	Energy labelling				X		
ENVIRONMENTAL	Climate vulnerability						X
	Availability of resources				X		
	Pollution						X
	Conflicts and opportunities about land use for renewable energy			X			
	Environmental disasters				X		
LEGAL	Legal framings of ENCI forms				X		
	Legal measures dedicated to vulnerable consumers, energy poverty, inclusion					X	
	Rights and duties of consumers, prosumers on the energy market					X	
	Bureaucracy and red tape			X			
	Information and empowerment of citizens to become active consumers			X			
	Total factors per level of barrier/support	3	4	7	9	7	5

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Conclusion

The impacts of climate crisis have become more visible over the last decade, not only in the most climate vulnerable parts of the world but also in regions with mild climate such as Europe. On top of that, the global crisis, first COVID-19 pandemic then the war between Russia and Ukraine, once again has shown the volatility of the global supply chain. Especially, the strong dependence on fossil fuel has significantly affected the European economies, including Spain. To tackle the energy crisis, price volatility and build a more resilient energy system, the Spanish government together with its European allies has taken various political, economic, legal, social, and technological measures that aim to boost energy transitions, which in turn could create a supporting background for ENCIs. The Spanish government has shown a strong commitment to the climate crisis and the need to move towards climate neutrality by establishing a specific ministry for the ecological transition. Secondly, various policy objectives, strategic plans, and roadmaps were devised. For instance, under the Strategic Energy and Climate Framework, documents such as the PNIEC 2021-2030; the ELP 2050; Law 7/2021; the JTS; and the National Energy Poverty Strategy have been highlighted. The PRTR approved in 2020 was also highlighted as the framework guiding the implementation of the funds derived from the *Next Generation EU* instrument to mitigate the social and economic impact of the climate crisis. Due to the decentralised structure of the country, the autonomous governments also develop adequate measures and policies to support the energy transition at regional level.

Spain has a great potential in terms of economic development, but it is strongly dependent on the fossil fuel energy; especially, most of the energy needs of Spain are covered by imports from other countries. This makes the Spanish economy quite vulnerable to the global crisis. The climate and geographical conditions in Spain create a great opportunity for the renewable energy generation such as sun and wind power. This not only refers to the industrial energy production, but also provides a great opportunity for ENCIs such as renewable energy cooperatives **(type 7-8)** and prosumers **(type 2)**. In fact, the decentralised market structure for the energy sector would create a great opportunity to build a local, independent renewable energy supply chain which could create opportunity for individual e.g., **type 2** and collective actions e.g., **type 4, 7 and 8.** R&D activities make a great effort to increase the development of renewable energy, which is also supported by government policies and roadmaps such as JTS.

On the other hand, allocating budget for the R&D activities (e.g., supporting technologies that facilitate the sustainable energy transitions) shows that Spain has adequate technological advances, as well as economic industries to make the renewable energy technologies available. This provides great opportunity for the business organisations both creating new market opportunities and achieve their very own transitions, for instance, **type 4**. However, this strong dependency on technological fixes, also known as *technocentrism*, could be risky for the energy transitions, as citizens would not take any actions since they wait for the technological advances, or lack the knowledge on the use of recent technologies. This could lead to rebound effects such as insulating homes for energy efficiency while the energy consumption increases. To overcome this risk, social and political factors should be incorporated with technological factors. In that sense, with the JTS Spanish government aims to integrate society to the energy transition process, which could be quite fruitful for ENCI **type 2**, even for the collective actions like **type 7-8.**

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Most of the information on the current situation in Spain, especially in political, economic and legal matters, is available at MITECO, which is the Department of the General State Administration. The institutionalisation of climate policies and the establishment of long-term political objectives represents an important point for Spain to move towards greater sustainability, opening the way for social innovation in the search for solutions that mitigate the effects of climate change; for example, the use of strategies that convert the consumer into a prosumer, as well as the promotion of self-consumption (**Type 2**) or the regulatory development and political and economic support for the creation and maintenance of energy communities, also supported by the use of ICTs (**Type 8**). In this sense, the MITECO tries to introduce elements of citizen participation in its actions, submitting its procedures to public participation, disseminating the preliminary drafts of laws, regulations, plans and programmes it carries out, so that citizens can assess them prior to their approval, thus guaranteeing the right of access to information on environmental matters (**Type 5**).

Furthermore, the decentralisation of the Spanish Government facilitates greater proximity between the end user and the public entity, and the transition to renewable energies is seen as a benefit for the individual at home (**Type 1**) or at work (**Type 3**), as well as at the collective level from a pragmatic vision of change (**Type 7**). In this respect, MITECO assigned an organisational body, the Institute for Energy Diversification and Saving (IDAE), to promote energy efficiency, renewable energies, and low-carbon technologies through the integration of various social and economic actors (i.e. citizens, communities, business organisations and public institutions) into energy governance. Thus, the political and democratic culture in Spain provides a fruitful background for active collective action (**type 9**) or even more radical social movements to change the current energy system (**type 10**). This democratic culture aims to favour citizen participation in decision-making (**type 6**), and to promote collective action for energy justice among all sectors of society, empowering the most vulnerable groups within society (**types 8 and 9**).

Another major challenge facing the Spanish territory - the demographic challenge - has to do with the search for solutions to depopulation (especially in rural areas), low population density, falling birth rates and the effects of seasonal overpopulation. The focus of attention to solve this situation has been placed on local communities, given their impact both at the individual and private level (**type 1 and 2**) and collectively (**type 7 and 8**), on the re-adaptation of more traditional economic activities towards ecological transition and digital transformation (**types 3 and 4**) and on promoting the potential of culture to induce dynamics of resilience and social, economic and demographic changes (**type 5 and 8**).

The geopolitical challenges facing Spanish territory arising from Russia's invasion of Ukraine have also been highlighted, as it raised the prices of gas and oil, which have the largest share among Spain's imports. Added to this is the diplomatic dispute over the status of Western Sahara, escalating since 2020 between Algeria and Morocco, which generates an economic and political challenge for Spain due to its strong economic ties with Algeria (i.e. Algeria is one of Spain's main suppliers of natural gas accounting for almost 39% of net imports in 2019; IEA, 2021) and Morocco's crucial role in border security for Spain, also for the EU, by preventing irregular departures. These challenges are, in turn, an opportunity for the search for innovative solutions for citizen participation in the energy transition; for example, financial savings or engaging in social energy discussions without aiming for a substantial change in the current energy system (**types 1, 3 and 5**) or joining green energy projects or facilitating energy transitions through alignment activities (**types 7 and 9**). Also, financial support from public and private institutions facilitates the

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adoption of renewable energy practices, including prosumers, such as the installation of PV at home (**types 1 and 2**), in the workplace (**types 3 and 4**) or even through initiatives funded by national and EU funding (**types 7 and 8**).

The importance given to R&D in Spain also has a positive impact on the generation of green jobs in the renewable energy sector (**Types 3 and 4**) and on the introduction of technological advances at the individual level (**type 2**) and at the workplace (**type 3**) and collective energy production, driven by onshore wind and photovoltaic technologies (**types 7-8**). However, we must not forget that, despite the availability of certain aid and subsidies for access to technological innovations that allow citizens or communities to move towards sustainability, there are still many people who do not have sufficient purchasing power to afford the initial investment involved (negative impact on **type 1 or 2**). In fact, among the groups with more economic difficulties, there is less support for measures such as the promotion of renewable energies, the creation of low-emission zones, limiting the consumption of foreign products or eliminating the use of coal. This is compounded by lack of knowledge, lack of interest or lack of trust in institutions, which limits citizen involvement in proposals to mitigate CC. Against this, the introduction of training and information measures can favour the approach of ENCI initiatives that can be promoted by public and private institutions (**types 5 and 6**). Also the emergence of social entities that propose a bottom-up structure, where the governance of citizens, SMEs and local authorities is a facilitator of **types 7 and 8**.

In short, in Spain a variety of factors converge that can favour the development of ENCI types, above all at the collective level and in a pragmatic or reformist way, as well as at the individual level. On the one hand, there is evidence of political concern in Spain for the transition to a more renewable energy system, which is materialised in a comprehensive strategic framework and in a broad and updated regulatory development. Likewise, the Spanish economy has sufficient resources such as human resources, building renovations, business networks and competitive research centres to benefit from the use of renewable energies. In addition, there are many business actors, large corporations, SMEs, and financing programmes to provide the necessary investment for a resilient and clean energy system. Furthermore, changes in the energy system would have a significant impact on the labour market. Indeed, if the energy sector transition is managed effectively, it would promote job creation. On the environmental level, the favourable meteorological and geographical conditions of the territory for the use of renewable energy resources can be highlighted. Finally, at the social level, there are still obstacles to citizen participation in relation to energy use and ownership given the lack of knowledge, training and even trust in institutions. Spain's lack of tradition in municipal public services and the incipient nature of many initiatives linked to the ENCI concept (e.g. cooperatives, EC) may be a brake in this sense, although there is a growing desire to invest in collective ENCI proposals, given the growing awareness of climate change risks, as well as for reasons of economic savings.

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14. FACTORS HINDERING OR SUPPORTING ENCI – A CROSS-COUNTRY COMPARISON

Important note: The data presented in this chapter is based on the assessments made in the nine country chapters. These assessments were made by different teams, which followed the common methodology, but have inevitably applied somewhat dissimilar criteria in their assessment. Therefore, the assessments below may not be completely comparable and cannot be used to draw undisputable conclusions about the ranking of countries in terms of providing more or less conducive conditions for energy citizenship. Rather, the tables and figures below should be used as orientation only, but also as an invitation to conducting a more in-depth comparative analysis of particular factors described in the country chapters.

Table 14.1: Overview – the number and type of factors impacting ENCI in the nine countries

Country	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Total hindering factors	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI	Total supporting factors
Belgium	1	3	3	**7**	4	9	6	**19**
Bulgaria	8	9	0	**17**	4	7	7	**18**
France	7	7	1	**15**	9	7	1	**17**
Germany	2	3	4	**9**	6	11	7	**24**
Hungary	14	11	1	**26**	10	3	1	**14**
Ireland	4	3	2	**9**	5	6	12	**23**
Latvia	0	1	3	**4**	7	16	3	**26**
Netherlands	3	2	6	**11**	11	7	3	**21**
Spain	3	4	7	**14**	9	7	5	**21**
Total	**42**	**43**	**27**	**112**	**65**	**73**	**45**	**183**

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Table 14.2: Political factors comparison

POLITICAL FACTORS	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
P1. Key political objectives, targets and goals for energy transition	Hungary	Bulgaria		France Hungary Latvia	Belgium Germany	Ireland Netherlands Spain
P2. Multi-level energy governance structure of a country		France Hungary Spain	Belgium	Hungary	Germany Ireland Latvia	Bulgaria Netherlands Spain
P3. Political support for ENCI (mechanisms, networks, etc.)	Hungary	France			Belgium Bulgaria Germany Ireland Latvia Netherlands Spain	
P4. Political/democratic culture and traditions	France Hungary	Bulgaria			Ireland Latvia Netherlands Spain	Belgium Germany
P5. Inclusion and empowerment policies	Germany Hungary			Bulgaria France Latvia	Ireland Netherlands Spain	Belgium
P6. Public participation and multi-level dialogues with non-political actors				Bulgaria		
P7. Political vision on the future of the national energy system	Hungary			France Hungary		
P8. Geo-political challenges (war in Ukraine, energy supply…)	Netherlands Spain	Germany		Ireland	Latvia	
Number of factor manifestations per country and per type of impact	1xFrance 1xGermany 5xHungary 1xNetherlands 1xSpain	2xBulgaria 2xFrance 1xGermany 1xHungary 1xSpain	1xBelgium	2xBulgaria 3xFrance 3xHungary 1xIreland 2xLatvia	2xBelgium 1xBulgaria 3xGermany 4xIreland 4xLatvia 3xNetherlands 3xSpain	2xBelgium 1xBulgaria 1xGermany 1xIreland 2xNetherlands 2xSpain
Total	9	7	1	11	20	9

POLITICAL FACTORS	Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
Hindering factors	1	2	3	2	6	0	0	1	2
Supporting factors	4	4	3	4	3	6	6	5	5

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Table 14.3: Economic factors comparison

ECONOMIC FACTORS	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
EC1. General economic situation / Inflation rate & purchasing power	France Netherlands Spain	Bulgaria Hungary Latvia	Ireland		Belgium Bulgaria Germany	
EC2. Energy prices	Hungary	Spain	Germany	Netherlands Spain	Belgium France Ireland Latvia	Bulgaria
EC3. Energy market	Bulgaria	Hungary	Spain	Ireland Latvia Netherlands	Belgium France Germany	
EC4. Energy taxation, state aid, fuel subsidies		France Spain		Hungary Ireland Latvia	Belgium Bulgaria Germany Netherlands Spain	
EC5. Financing and investment opportunities	France Hungary			Netherlands		Belgium Bulgaria Germany Ireland Latvia Spain
EC6. Security of energy supply, raw materials and other resources		France				Bulgaria
EC7. Sub-national innovation systems: energy sharing						Germany
EC8. Green industry development and green job creation		Hungary		Spain	Latvia	
EC9. Raw material and resource prices		Ireland				
EC10. Grassroots innovation and 'short circuit' alternative economic activities				Netherlands		
Number of factor manifestations per country and per type of impact	1xBulgaria 2xFrance 2xHungary 1x Netherlands 1xSpain	1xBulgaria 2xFrance 3xHungary 1xIreland 1xLatvia 2xSpain	1xGermany 1xIreland 1x Spain	1xHungary 2xIreland 2xLatvia 4xNetherlands 2xSpain	4xBelgium 2xBulgaria 2xFrance 3xGermany 1xIreland 2xLatvia 1xNetherlands 1xSpain	1xBelgium 3xBulgaria 2xGermany 1xIreland 1xLatvia 1xSpain
Total	7	10	3	11	16	9

ECONOMIC FACTORS	Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
Hindering factors	0	2	4	1	5	2	1	1	4
Supporting factors	5	5	2	5	1	4	5	5	4

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Table 14.4: Social factors comparison

SOCIAL FACTORS	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
S1. Level of income / wealth disparity and energy poverty	Bulgaria France Ireland Netherlands Spain	Belgium Germany Hungary			Germany Hungary	
S2. Energy literacy, awareness and skills	Bulgaria Hungary	France	Germany Netherlands Spain	Germany	Latvia	Belgium Ireland
S3. Citizen engagement and passivity in society	Hungary	Belgium Bulgaria		Latvia Netherlands Spain	France	Germany Ireland
S4. Trust in institutions and collective endeavours	Bulgaria France Hungary Ireland		Belgium Latvia Spain	Germany Netherlands		
S5. Age, gender, education and class as ENCI factors		Bulgaria France				
S6. Not-in-my-backyard syndrome						
S7. Climate anxiety/depression (eco-anxiety)						Germany
S8. Social norms, attitudes and perceptions		Hungary Ireland				
S9. Willingness to invest in the energy transition		Spain	Netherlands	Latvia		
Number of factor manifestations per country and per type of impact	3xBulgaria 2xFrance 3xHungary 2xIreland 1xNetherlands 1xSpain	2xBelgium 2xBulgaria 2xFrance 1xGermany 2xHungary 1xIreland 1xSpain	1xBelgium 1xGermany 1xLatvia 2xNetherlands 2xSpain	2xGermany 2xLatvia 2xNetherlands 1xSpain	1xFrance 1xGermany 1xHungary 1xLatvia	1xBelgium 2xGermany 2xIreland
Total	12	11	7	7	4	5

SOCIAL FACTORS	Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
Hindering factors	3	5	4	2	5	3	1	3	4
Supporting factors	1	0	1	5	1	2	3	2	1

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Table 14.5: Technological factors comparison

TECHNOLOGICAL FACTORS	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
T1. Availability of technologies for the decarbonisation of energy sector and RES		Netherlands		Belgium Germany Hungary	Bulgaria France Spain	Ireland Latvia
T2. Decentralised energy system and storage	France Hungary	Netherlands	Belgium Latvia	Germany Spain	Bulgaria	Ireland
T3. Digitalisation of the energy system		Hungary	Germany	Belgium Bulgaria France Hungary Netherlands Spain	Latvia	Ireland
T4. Energy efficient buildings		Hungary	Netherlands Spain	Germany Hungary	Latvia	Belgium Bulgaria France Ireland
T5. Smart mobility and green mobility				France	Hungary	Bulgaria Ireland
T6. Energy labelling				Netherlands Spain		
Number of factor manifestations per country and per type of impact	1xFrance 1xHungary	2xHungary 2xNetherlands	1xBelgium 1xGermany 1xLatvia 1xNetherlands 1xSpain	2xBelgium 1xBulgaria 2xFrance 3xGermany 3xHungary 2xNetherlands 3xSpain	2xBulgaria 1xFrance 1xHungary 2xLatvia 1xSpain	1xBelgium 2xBulgaria 1xFrance 5xIreland 1xLatvia
Total	2	4	5	16	7	10

TECHNOLOGICAL FACTORS	Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
Hindering factors	1	0	1	1	3	0	1	3	1
Supporting factors	3	5	4	3	4	5	3	2	4

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Table 14.6: Environmental factors comparison

ENVIRONMENTAL FACTORS	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
EN1. Climate vulnerability				France Netherlands	Belgium Bulgaria Germany Ireland Latvia	Hungary Spain
EN2. Availability of resources	Hungary	Bulgaria		Belgium Hungary Ireland Spain	Bulgaria France Germany	Latvia Netherlands
EN3. Pollution			Hungary	France Hungary Ireland Netherlands	Belgium Germany Latvia	Bulgaria Spain
EN4. Conflicts and opportunities about land use for renewable energy	Ireland	Belgium Bulgaria France Hungary	Netherlands Spain		Germany Latvia	
EN5. Biodiversity protection issues connected to renewable installations	Bulgaria	Germany			Latvia	
EN6. The impact of water resources in energy production				France	Hungary	
EN7. Impact of the use of existing non-renewable resources on the system			Ireland Netherlands			
EN8. Environmental disasters				Spain		
Number of factor manifestations per country and per type of impact	1xBulgaria 1xHungary 1xIreland	1xBelgium 2xBulgaria 1xFrance 1xGermany 1xHungary	1xHungary 1xIreland 2xNetherlands 1xSpain	1xBelgium 3xFrance 2xHungary 2xIreland 2xNetherlands 2xSpain	2xBelgium 2xBulgaria 1xFrance 4xGermany 1xHungary 1xIreland 4xLatvia	1xBulgaria 1xHungary 1xLatvia 1xNetherlands 2xSpain
Total	3	6	5	12	15	6

ENVIRONMENTAL FACTORS	Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
Hindering factors	1	3	1	1	3	2	0	2	1
Supporting factors	3	3	4	4	4	3	5	3	4

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Table 14.7: Legal factors comparison

LEGAL FACTORS	High impact factor hindering ENCI	Middle impact factor hindering ENCI	Low impact factor hindering ENCI	Low impact factor supporting ENCI	Middle impact factor supporting ENCI	High impact factor supporting ENCI
L1. Legal framings of ENCI forms	Bulgaria Hungary			Netherlands Spain	Belgium France Latvia	Germany Ireland
L2. Legal measures dedicated to vulnerable consumers, energy poverty, inclusion	Bulgaria Germany Hungary			Latvia	France Netherlands Spain	Belgium Ireland
L3. Rights and duties of consumers, prosumers on the energy market		Bulgaria Hungary	France	Belgium Germany	Latvia Netherlands Spain	Ireland
L4. Bureaucracy and red tape	Belgium Bulgaria France Ireland	Hungary	Germany Netherlands Spain	Bulgaria	Latvia	
L5. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)		Bulgaria Ireland				
L6. Support schemes for renewable energy sources			Latvia	France Hungary		Germany
L7. Information and empowerment of citizens to become active consumers			Spain		Netherlands	
Number of factor manifestations per country and per type of impact	1xBelgium 3xBulgaria 1xFrance 1xGermany 2xHungary 1xIreland	2xBulgaria 2xHungary 1xIreland	1xFrance 1xGermany 1xLatvia 1xNetherlands 2xSpain	1xBelgium 1xBulgaria 1xFrance 1xGermany 1xHungary 1xLatvia 1xNetherlands 1xSpain	1xBelgium 2xFrance 3xLatvia 3xNetherlands 2xSpain	1xBelgium 2xGermany 3xIreland
Total	9	5	6	8	11	6

LEGAL FACTORS	Belgium	Bulgaria	France	Germany	Hungary	Ireland	Latvia	Netherlands	Spain
Hindering factors	1	5	2	2	4	2	1	1	2
Supporting factors	3	1	3	3	1	3	4	4	3

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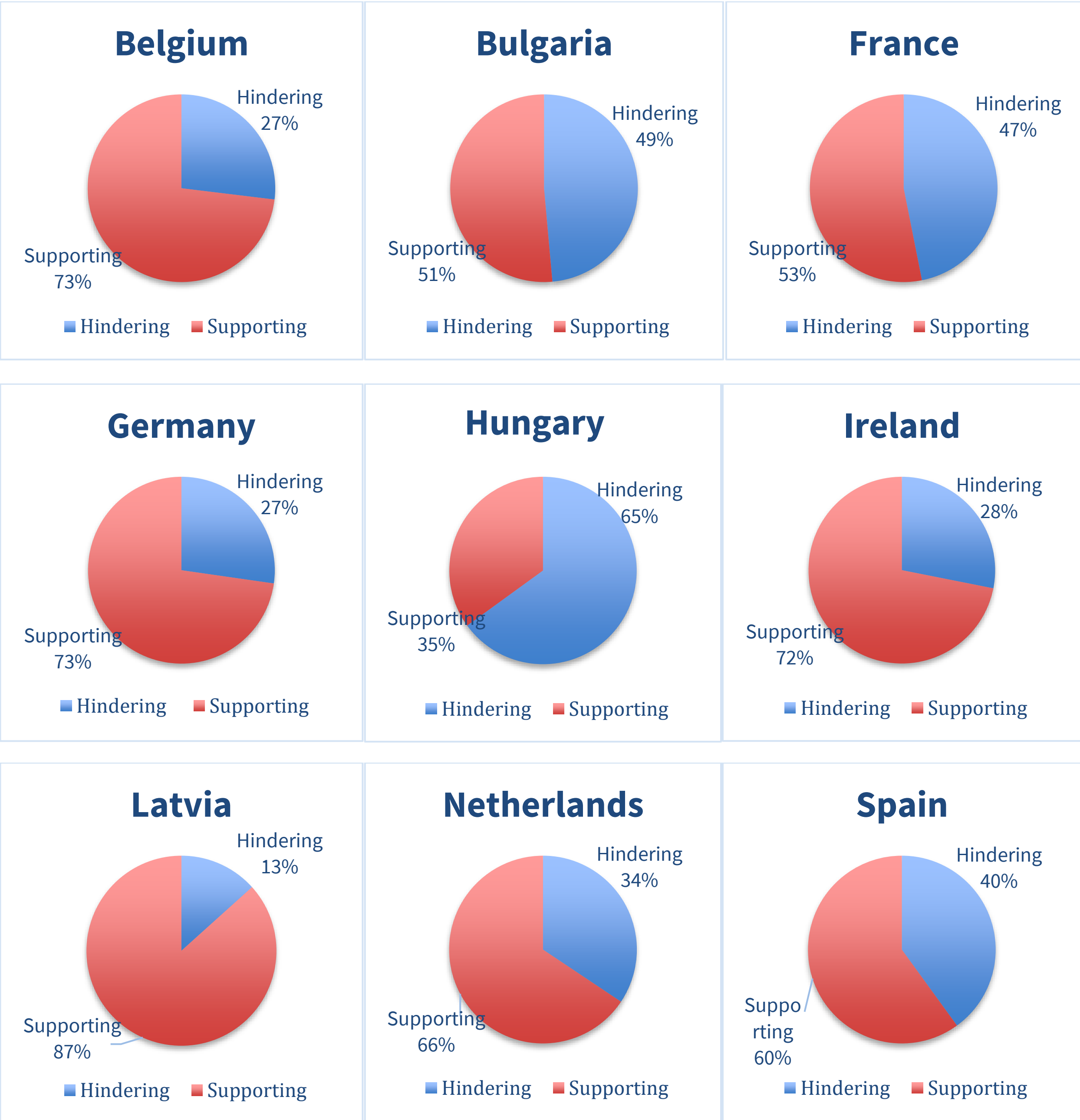
Figure 14.1: Correlation between the hindering and the supporting factors



The data presented above indicate[14] that in five of the nine countries (Belgium, Germany, Ireland, the Netherlands and Spain), between two thirds and three quarters of studied factors support the emergence and development of energy citizenship, while the remaining one third / one quarter of factors represent a barrier. In Bulgaria and France, the share of both types of factors is relatively equal, with a small advantage for the supporting factors. Two countries stand out: in Latvia, an overwhelming majority of factors act as

[14] As already noted, the evaluations of the factors were done by different teams and therefore, the results may not be completely comparable.

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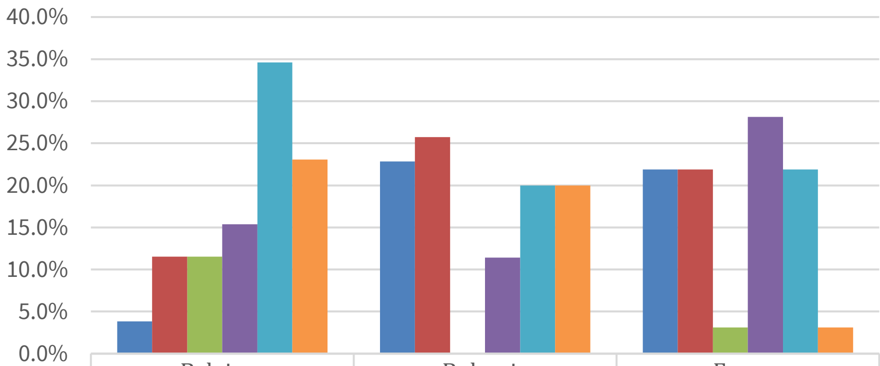
drivers, facilitators or incentives for ENCI, while in Hungary, the conditions for the development of ENCI can be described as very unfavourable.

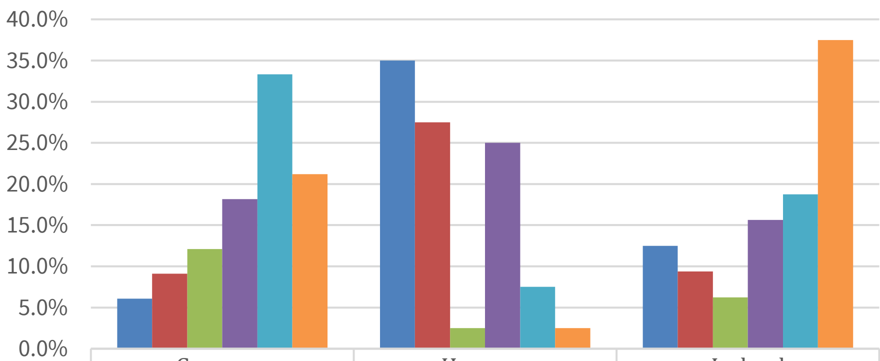
Hungary also stands out with the number of high impact factors hindering ENCI, although Bulgaria and France also feature a much higher number of such factors compared to the other six countries. On the opposite end of the scale, Ireland is very notable with 12 high impact supporting factors, which is twice as many compared to other countries that are performing rather well in this category.

Figure 14.2: Share of factors impacting ENCI per type of impact (Belgium, Bulgaria, France)



	Belgium	Bulgaria	France
High impact factor hindering ENCI	3.8%	22.9%	21.9%
Middle impact factor hindering ENCI	11.5%	25.7%	21.9%
Low impact factor hindering ENCI	11.5%	0.0%	3.1%
Low impact factor supporting ENCI	15.4%	11.4%	28.1%
Middle impact factor supporting ENCI	34.6%	20.0%	21.9%
High impact factor supporting ENCI	23.1%	20.0%	3.1%

Figure 14.3: Share of factors impacting ENCI per type of impact (Germany, Hungary, Ireland)



	Germany	Hungary	Ireland
High impact factor hindering ENCI	6.1%	35.0%	12.5%
Middle impact factor hindering ENCI	9.1%	27.5%	9.4%
Low impact factor hindering ENCI	12.1%	2.5%	6.3%
Low impact factor supporting ENCI	18.2%	25.0%	15.6%
Middle impact factor supporting ENCI	33.3%	7.5%	18.8%
High impact factor supporting ENCI	21.2%	2.5%	37.5%

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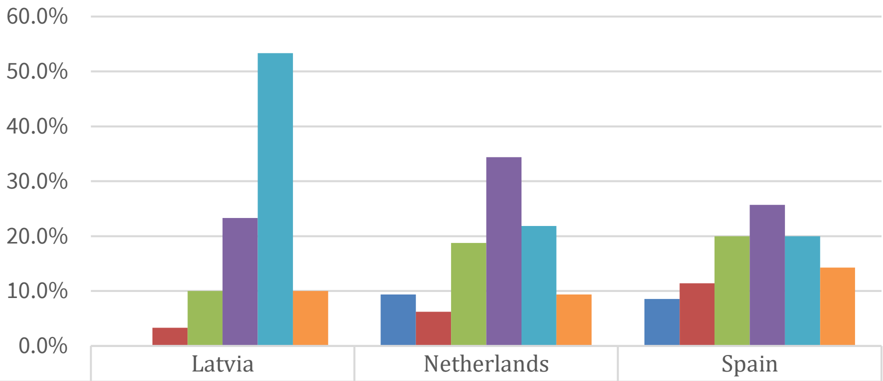
Figure 14.4: Share of factors impacting ENCI per type of impact (Latvia, The Netherlands, Spain)



	Latvia	Netherlands	Spain
High impact factor hindering ENCI	0.0%	9.4%	8.6%
Middle impact factor hindering ENCI	3.3%	6.3%	11.4%
Low impact factor hindering ENCI	10.0%	18.8%	20.0%
Low impact factor supporting ENCI	23.3%	34.4%	25.7%
Middle impact factor supporting ENCI	53.3%	21.9%	20.0%
High impact factor supporting ENCI	10.0%	9.4%	14.3%

In order to evaluate the "weight" of the factors and determine which have the strongest impact on the energy citizenship, we have assigned numerical values to the "verdict" made by the research teams in the nine countries under scrutiny. For each country in which the given factor has a high impact hindering effect, a value of -3 was given, value -2 for middle impact hindering factors, and value -1 for low impact hindering factors. Conversely, stimulating factors were given positive values 1, 2 or 3 for low, middle and high impact, respectively.

Table 14.8: Impact weight of the factors

FACTORS	Hindering value (cumulative)	Hindering value (average)	Supporting value (cumulative)	Supporting value (average)
P1. Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)	-5 (2 countries)	-2.5	16 (8 countries)	2
P2. Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)	-7 (4 countries)	-1.75	16 (7 countries)	2.28
P3. Political support for ENCI (mechanisms, networks, etc.)	-5 (2 countries)	-2.5	14 (7 countries)	2
P4. Political/democratic culture and traditions (prevalent ideals and culture of citizenship)	-8 (3 countries)	-2.67	14 (6 countries)	2.33
P5. Inclusion and empowerment policies	-6 (2 countries)	-3	12 (7 countries)	1.71
P6. Public participation and multi-level climate and energy dialogues with non-political actors	/	/	1 (1 country)	1
P7. Political vision on the future of the national energy system	-3 (1 country)	-3	2 (2 countries)	1

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P8. Geo-political challenges (COVID, war in Ukraine, gas and oil supply…)	-8 (3 countries)	-2.67	3 (2 countries)	1.5
EC1. General economic situation / Inflation rate and purchasing power	-16 (7 countries)	-2.28	6 (3 countries)	2
EC2. Energy prices (incl. relative cost of renewables and fossil fuels)	-6 (3 countries)	-2	12 (7 countries)	1.71
EC3. Energy market (degree of liberalisation, existing decentralisation/ centralisation of the market)	-6 (3 countries)	-2	8 (6 countries)	1.33
EC4. Economic policy instruments (energy taxation, state aid, fuel subsidies)	-4 (2 countries)	-2	13 (8 countries)	1.625
EC5. Financing and investment opportunities contributing to a more sustainable energy system	-6 (2 countries)	-3	19 (7 countries)	2.71
EC6. Security of energy supply and security of supply of raw materials and other resources	-2 (1 country)	-2	3 (1 country)	3
EC7. Sub-national (regional, municipal, local, etc.) innovation systems: energy sharing	/	/	3 (1 country)	3
EC8. Green industry development and green job creation	-2 (1 country)	-2	3 (2 countries)	1.5
EC9. Raw material and resource prices	-2 (1 country)	-2	/	/
EC10. Grassroots innovation and 'short circuit' alternative economic activities	/	/	1 (1 country)	1
S1. Level of income / wealth disparity and energy poverty	-21 (8 countries)	-2.625	4 (2 countries)	2
S2. Energy literacy, awareness and skills	-11 (6 countries)	-1.83	9 (4 countries)	2.25
S3. Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)	-7 (3 countries)	-2.33	11 (6 countries)	1.83
S4. Trust (or lack thereof) in institutions and collective endeavours	-15 (7 countries)	-2.14	2 (2 countries)	1
S5. Age, gender, education and class as ENCI factors	-2 (1 country)	-2	/	/
S6. Not-in-my-backyard syndrome	-2 (1 country)	-2	/	/
S7. Climate anxiety/depression (eco-anxiety)	/	/	3 (1 country)	3
S8. Social norms, attitudes and perceptions towards energy-efficient products, services, technologies and appliances, and towards social innovation	-4 (2 countries)	-2	/	/
S9. Willingness to invest in the energy transition	3 (2 countries)	-1.5	1 (1 country)	1
T1. Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)	-2 (1 country)	-2	15 (8 countries)	1.875
T2. Decentralised energy system and storage	-10 (5 countries)	-2	7 (4 countries)	1.75
T3. Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility	-3 (2 countries)	-1.5	10 (7 countries)	1.43
T4. Energy efficient buildings	-4 (3 countries)	-1.33	16 (7 countries)	2.28

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T5. Smart mobility and green mobility	/	/	9 (4 countries)	2.25
T6. Energy labelling	/	/	2 (2 countries)	1
EN1. Climate vulnerability (global warming, extreme weather, wildfires, etc.)	/	/	18 (9 countries)	2
EN2. Availability of resources (geological challenges, geographical opportunities and limitations)	-5 (2 countries)	-2.5	16 (9 countries)	1.78
EN3. Pollution (air, water, noise, visual pollution, waste management)	-1 (1 country)	-1	16 (9 countries)	1.78
EN4. Conflicts and opportunities about land use connected to renewable energy	-13 (7 countries)	-1.86	4 (2 countries)	2
EN5. Biodiversity protection issues connected to renewable installations	-5 (2 countries)	-2.5	2 (1 country)	2
EN6. The impact of water resources in energy production and the increasing scarcity of drinking water	/	/	3 (2 countries)	1.5
EN7. Impact of the use of existing non-renewable resources on the system	-2 (2 countries)	-2	/	/
EN8. Environmental disasters	/	/	1 (1 country)	1
L1. Legal framings of ENCI forms	-6 (2 countries)	-3	14 (7 countries)	2
L2. Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion	-9 (3 countries)	-3	13 (6 countries)	2.17
L3. Rights and duties of consumers, prosumers and new producers in interaction with the energy market (including rights for active participation of customers in the electricity markets)	-5 (3 countries)	-1.67	11 (6 countries)	1.83
L4. Bureaucracy and red tape	-17 (8 countries)	-2.125	3 (2 countries)	1.5
L5. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)	-4 (2 countries)	-2	/	/
L6. Support schemes for renewable energy sources	-1 (1 country)	-1	5 (3 countries)	1.67
L7. Information and empowerment of citizens to become active consumers on the energy market	-1 (1 country)	-1	2 (1 country)	2

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15. CONCLUSION – FACTORS THAT SHAPE THE ENERGY CITIZENSHIP IN THE EU

The most impactful factors in the nine countries

The PESTEL analysis of conditions that have an important impact on emergence and development of energy citizenship in nine EU countries (Belgium, Bulgaria, France, Germany, Hungary, Ireland, Latvia, The Netherlands, and Spain) has outlined the major contextual barriers and opportunities that can, respectively, hinder or encourage citizens to become active participants on the energy market in their countries, and the EU as a whole. Regardless of the certain limitations of the PESTEL analysis (see chapter 2 on the methodology), the conducted analysis of the political, economic, social, technological, environmental and legal conditions and their impact on the energy citizenship has enabled us to identify the situations, circumstances and aspects that should be prioritised when designing policies aimed at further encouragement and promotion of active energy citizenship.

Table 15.1: The most important factors supporting the development of ENCI on the national level:[15]

Factor code	Factor name	Average score
EC5.	Financing and investment opportunities contributing to a more sustainable energy system	2.71
P4.	Political/democratic culture and traditions (prevalent ideals and culture of citizenship)	2.33
P2.	Multi-level energy governance structure of a country (degree of centralisation/federalism in energy policy)	2.28
T4.	Energy efficient buildings	2.28
L2.	Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion	2.17
P1.	Key political objectives, targets and goals for the energy transition (incl. climate neutrality, renewable energy sources, energy efficiency, mobility)	2
P3.	Political support for ENCI (mechanisms, networks, etc.)	2
EN1.	Climate vulnerability (global warming, extreme weather, wildfires, etc.)	2
L1.	Legal framings of ENCI forms	2
T1.	Availability of technologies for the decarbonisation of the energy sector and renewable energy (solar thermal and photovoltaic, on-shore and offshore wind, renewable hydrogen)	1.875

[15] This list is based on the score assigned to each factor in the Table 14.1 (previous section). To enhance the objectivity of the score and its applicability for the wider EU context, only those factors are included, which were evaluated as having a **supporting impact** in at least 6 different countries.

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S3.	Citizen engagement and passivity in society (Social movements, civil society organisations, NGO sector)	1.83
L3.	Rights and duties of consumers, prosumers and new producers in interaction with the energy market (including rights for active participation of customers in the electricity markets)	1.83
EN2.	Availability of resources (geological challenges, geographical opportunities and limitations)	1.78
EN3.	Pollution (air, water, noise, visual pollution, waste management)	1.78
P5.	Inclusion and empowerment policies	1.71
EC2.	Energy prices (incl. relative cost of renewables and fossil fuels)	1.71
EC4.	Economic policy instruments (energy taxation, state aid, fuel subsidies)	1.625
T3.	Digitalisation of the energy system (incl. smart grids deployment, smart metering, ICT solutions for peer-to-peer energy trading/virtual power plants, smart and green mobility	1.43
EC3.	Energy market (degree of liberalisation, existing decentralisation/ centralisation of the market)	1.33

As can be seen from the Table above, four out of seven factors evaluated to have the strongest supporting impact on ENCI are political – each having score of 2 or more (in other words, having middle or middle to high impact). This result underlines the prime importance of the political and governance frameworks that clearly and unfalteringly support ENCI in the widest variety and scope of its forms and manifestations. While the empowering and encouraging political environment is by no means the sole guarantee for the ENCI proliferation, its absence can undo or limit the (potential) impact of all other supporting factors. This is especially true in countries, in which considerable segments of the political establishment and the wider society are questioning or even opposing the European-wide commitment to the Energy Union and the green energy transition.

The national energy strategies and plans usually focus on the “big” picture (overall energy transition goals and targets), but it is essential that they pay sufficient attention to those who are at risk of being left behind – the energy poor citizens and vulnerable communities. The policymakers, best in active collaboration with the experts and the NGO sector, need to develop the legal framework and measures to address the issues of energy poverty and to ensure that the transition is just and inclusive. This necessity is underlined by the high score given to the factor “Legal measures dedicated to vulnerable consumers, energy poverty and social inclusion.” Another highly scored legal factor, the “Legal framing of ENCI forms”, also conveys the necessity for a clear and supporting legal regulation of ENCI and ENCI-related issues.

Finally, one cannot underestimate the importance of economy. Although most economic factors seem to be rather ambiguous and can under different circumstances act either as a barrier or a driver for ENCI, the factor “Financing and investment opportunities contributing to a more sustainable energy system” tops our list of supporting factors with the highest score (and by a large margin). This shows that even under the most favourable political and legal frameworks, public investment and the availability of accessible and varied financial support mechanisms are crucial conditions for advancement of ENCI.

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As far as social, technological and environmental factors are concerned, most of them received medium to low scores, indicating that they have a rather auxiliary role as motivators or enablers of ENCI, but rarely qualify as indispensable.

Table 15.2: The most important factors hindering the development of ENCI on the national level:[16]

Factor code	Factor	Average score
S1.	Level of income / wealth disparity and energy poverty	-2.625
EC1.	General economic situation / Inflation rate and purchasing power	-2.28
S4.	Trust (or lack thereof) in institutions and collective endeavours	-2.14
L4.	Bureaucracy and red tape	-2.12
T2.	Decentralised energy system and storage	-2
EN4.	Conflicts and opportunities about land use connected to renewable energy	-1.86
S2.	Energy literacy, awareness and skills	-1.83

As can be easily seen, the list of hindering factors is much shorter than the list of supporting ones. However, the relatively high value of assigned scores shows that they can put a very solid spoke in the ENCI wheel. The complicated and slow bureaucratic procedures seem to represent a notable obstacle in all studied countries, although, somewhat paradoxically, also appear to be a motivating factor in some countries, in which citizens are more experienced in taking advantage of legal loopholes or circumventing unfavourable legal restrictions.

The most formidable obstacle for ENCI expansion is a combination of social and economic factors. This has become especially evident over the past few turbulent years, which had a negative effect on ENCI development in many of the studied countries. The high inflation and the rising costs of energy, raw materials and technologies, on the one hand, and the shrinking disposable incomes, on the other hand, are considerably limiting the options for citizens to actively participate on the energy market, either individually or collectively. Wealth disparity and energy poverty, also on the rise, are further deepening the social stratification and leaving considerable groups of citizens behind, with diminishing chances of catching up, unless well-tailored measures are taken without delay.

Two related factors, the lack of trust in state institutions (but also in science and technology, NGOs, collective initiatives of citizens, etc.) and poor energy literacy and awareness are also huge obstacles. Unless properly addressed, they also threaten to dissociate large segments of population from the sustainable and just energy transition and the role ENCI initiatives could be playing in it.

[16] This list is based on the score assigned to each factor in Table 14.1 (previous section). To enhance the objectivity of the score and its applicability for the wider EU context, only those factors are included, which were evaluated as having a **hindering impact** in at least 6 different countries.

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National and EU level PESTEL analysis – a cautious comparison

Due to significant differences in the methodological approach to evaluation of factors, including the different pool of studied factors, it would be highly incorrect to attempt to directly compare the findings of both tasks. Nevertheless, some general observations can be made.

The EU level analysis concurs with the conclusion of the national level study about the high importance of the political framework. This is especially true for the EU-level factors "P2. Agreed upon climate and energy policy targets" and "P3. Commitments to participative governance." The first one corresponds with the national level factor "P1. Key political objectives, targets and goals for the energy transition," undoubtedly underlining the importance of having clearly defined and realistic energy transition targets and goals, which enable, stimulate and rely on active involvement of citizens in the process. The second factor roughly matches the national factors "P3. Political support for ENCI" and "P4. Political/democratic culture and traditions" and confirms that the most favourable conditions for the energy citizenship are those that in general support the active position and participation of citizens in different decision-making processes.

The social factors were assessed to have the heaviest weight in terms of energy citizenship impact at the EU level. This is not surprising, given that the well-established behaviour patterns, beliefs, opinions and social positions of citizens shape their decisions whether to endorse or reject the new technological solutions, and whether to approve or protest against a certain political decision or a new legislation. In a way, these social aspects affect most of the other groups of factors. The national level study confirmed the prime importance of the social factors, but added an important clarification: social factors play only a moderate supporting role, but can be a very strong disruption and a barrier for energy citizenship. Interestingly, the EU-level factors "S3. Social attitudes towards energy transition" and "S4. Social and individual behaviour and habits" were assessed to have the greatest importance for engagement of the citizens with regard to the energy transition issues. While these two factors roughly correspond with the national level factors "S4. Trust (or lack thereof) in institutions and collective endeavours" and "S2. Energy literacy, awareness and skills," they do not encompass the factor "S1. Level of income / wealth disparity and energy poverty," which was assessed to be the most dominant obstacle for ENCI in the nine studied countries.

The most unexpected outcome of the (limited and conditional) comparison between the national and EU PESTEL analysis is the assessment of the legal factors. On the national scale, the legal framework has a very important role, defining the legal status of citizen energy communities and other forms of energy citizenship, and prescribing the rights and obligations of citizens in the energy market. In the EU analysis, the legal factors were evaluated to have the second (after technological factors) weakest impact on the energy citizenship. This might seem somewhat surprising, given that the EU energy law usually entails obligations for the member states, which must be transposed into the national law and therefore establishes the definitions of key notions and approaches that provide an EU-wide shared-understanding of energy issues, including the energy citizenship. However, the enactment and implementation of the legislation remains in many ways a prerogative of the member states, even more so as the EU body of law continues to lack a clear view on energy citizenship and has yet to define how to govern and support it.

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What lies ahead?

The results from the PESTEL analysis in the nine countries will be cross-analysed against the 40 ENCI cases, studied in-depth in WP3, in order to identify and develop potential strategies to advance the energy citizenship. The main findings from the cross-analysis will be discussed and verified on nine national knowledge exchange workshops and then further elaborated in WP6 to be integrated into comprehensive practical recommendations for policymakers and other relevant stakeholders.

The PESTEL analysis will also inform and guide the citizen consultations in the nine countries. On these events, citizens will have the opportunity to design outlines of several proactive scenarios for future manifestation and transformation of energy citizenship, building on their expectations regarding the desired forms and pathways of energy citizenship, and their impact on the energy transition.

These outlines, co-designed by the citizens, will be further elaborated and finalised by experts, who will "translate" them into actionable policy-relevant prospective scenarios for further support and development of energy citizenship. Scenarios will be complemented by targeted recommendations for effective implementation of measures that stimulate, enhance and strengthen energy citizenship at the EU, national and local levels.

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