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Summary

The report presents a detailed analysis of the major political, economic, social, technological, environmental and legal conditions that shape the emergence, manifestations and transformations of energy citizenship at EU level. The report and resulting PESTEL analysis will serve as the reference point for the energy citizenship as observed in different national and local contexts.



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Introduction

Based on the conceptual framework and typology of energy citizenship (ENCI) developed in WP2 and empirical work conducted in WP3 and WP4, this task focuses on a PESTEL analysis (Yüksel, I., 2012) at the EU level. Taking the EU legal and political framework as its starting point, we aim to identify and explain the political, economic, social, technological, environmental and legal conditions that have a considerable impact on the emergence and development of energy citizenship. 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.

The methodology for the PESTEL analysis of the EU context will be developed by the Task Leader (TUB) in M13-15 with support from partners ARC Fund and JDI.

Task outline from GA: The analysis will be conducted in M16-M18 by the task force, consisting of the Task Leader and 5 partners (ULB, GDI, ARC Fund, JDI, NUIG), each responsible for one set of factors. Based on the analysis, an analytical report on PESTEL factors in the EU context will be produced in M20 (D5.1). Other partners will be involved by reviewing and commenting the analytical report (M21) and their contribution will be used to finalise D5.1 in M22.

Task lead: TUB. Methodology development: ARC Fund and JDI. Analysis: ULB, GDI, ARC Fund, JDI, NUIG.



1 Methodology for the PESTEL analysis of the EU context

1.1 Introduction to the methodology for the PESTEL analysis

The emergence and development of energy citizenship (ENCI) depend on a variety of factors. Many of them can be classified as internal – the motivations and goals of the particular ENCI cases; the types of actors and their roles in and perception of ENCI; 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. Equally important are the external factors, i.e. the ones that are relevant to and affect the ENCI case, but are largely beyond the control of the actors involved in the case. These factors can be grouped in the following categories: political, economic, socio-cultural, technological, ecological, and legal. A methodological tool used for the analysis of these factors is called PESTEL analysis.

PESTEL analysis was originally known as PEST, before environmental and legal dimensions were added in the 1980s. Developed by Fahey and Narayanan (1986) for analysing the business environment from a macroeconomic perspective (Gibbs and Deutz, 2007), later on PESTEL analysis found useful and practical application in different other fields as well.

In the EnergyPROSPECTS project, we apply the PESTEL analysis to identify and describe the external factors, which are either conducive or unfavourable to the emergence of ENCI, and obtain information about the conditions which might affect the ENCI cases in the future. PESTEL will also be used to identify the opportunities for supporting ENCI, as well as the threats or barriers that could hinder it.

Building on the conceptual framework and typology of ENCI developed in WP2 and the empirical work conducted in WP3 and WP4, we will identify and explain the political, economic, social, technological, environmental and legal conditions that shape the emergence, manifestations and transformations of ENCI. This study will be conducted on three levels: supranational (EU), national (nine EnergyPROSPECTS countries) and local (2-3 municipalities in each of the 9 countries).

Three common steps can be identified for those three levels:

Step 1. Gathering information about political, economic, social, technological, environmental and legal factors (desk research).

Step 2. Identifying which of the PESTEL factors are conducive and which are unfavourable to the emergence and the development of energy citizenship as defined in D2.1, which factors represent opportunities for supporting the energy citizenship and which represent the threats.

Step 3: Development of predictions/scenarios about how these factors might change in the future.

Design example

The following list of factors and figure exemplifies and illustrates the PESTEL factors as they are commonly presented in the existing literature:

- **Political Factors:** policies, regulations, tariffs, bureaucracy, etc.
- **Economic Factors:** investment costs, depreciation factors, inflation, etc.
- **Social Factors:** Cultural perceptions, acceptance, awareness, etc.
- **Technological Factors:** R&D, international cooperation
- **Environmental Factors:** impact of environment, climatic conditions
- **Legal Factors:** industry regulation, IPR, etc.

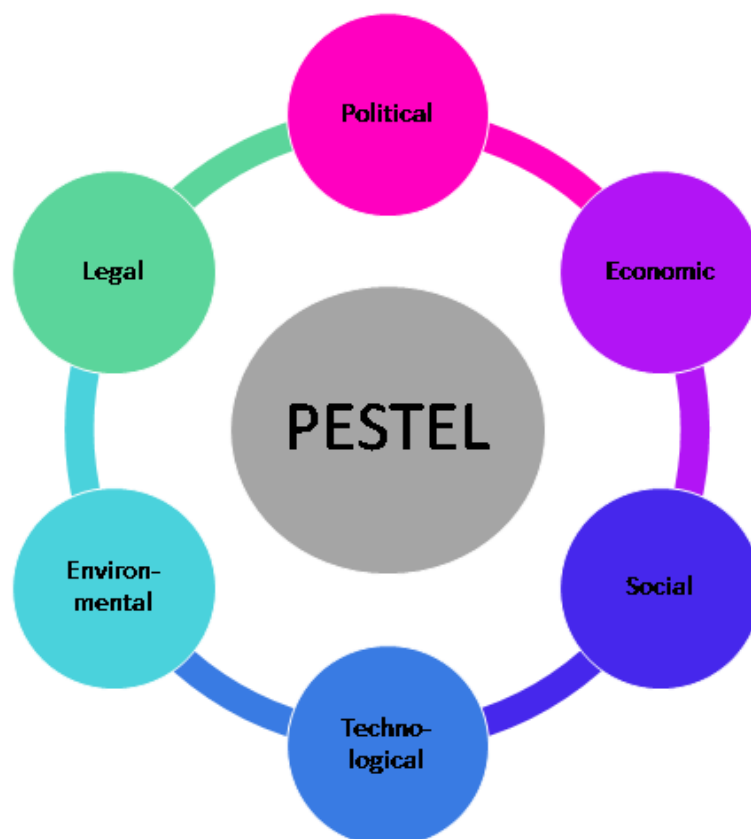


Figure 1: PESTEL factors

Worth to note, is that the PESTEL analysis initially served as a management tool oriented towards the analysis of a business environment, the usual factors displayed in the existing methods require an improved methodology that is adapted to a specific research object such as energy citizenship (ENCI), and especially within the very specific context of the EU.

1.2 Documentation corpus for the EU Context

Understanding and accounting for the factors associated with the EU context requires to investigate the modes of existence of the EU as such. Where and how is the EU to be seized and get intelligible for the researcher? How to avoid a poor understanding of the EU that would consist in the addition of national states and in the calculation of a sort of average EU member state? To avoid such traps, the WP5.1 team tried to elaborate an appropriate methodology, grounded on the ways through which the EU can be grasped, and therefore on a common corpus which enables deductive and inductive go-and-return for the identification of the EU context factors.

1.2.1 Framing the PESTEL at the EU level: seizing the modes of existence of the EU

Beyond the basic approach of the PESTEL analysis developed above, our understanding of the EU context calls for further methodological details that might impact our investigations. The PESTEL analysis for the EU context (from now on “EU-PESTEL analysis”), considering that it will be completed by further PESTEL analyses regarding national and infra-national contexts, requires to set up boundaries of the investigations that are adequate to address the European union as an ENCI context.

The existing literature does not provide meaningful insights on the appropriate methodology for adopting the PESTEL analysis to such a specific scale as the EU. Indeed, as a supranational entity, the EU presents some specific modes of existence that differ from usual national or regional framings. The ways the European union does actually “exist” are mostly located:

- firstly, in the European treaties that constitute binding agreements between the EU member countries. The treaties contain objectives for the Union and rules on the functioning of the EU. These objectives are achieved through binding regulations, directives and decisions, complemented by non-binding recommendations and opinions, together with associated documents, strategies and plans, public policy assessments, reports and grey literature analysing EU-policy outcomes, which are

also part of the discourse and narratives impacting the views on ENCI (as described in D2.1: Pel et. Al, 2021);

- secondly, in the funding allocated to different policy areas and regions by the EU through its budget (the multiannual financial framework);
- thirdly, in the statistical activity of the EU and the data collected that give consistency to the EU level.

Consequently, regarding the EU-context, several alternative views might be considered for conducting the PESTEL analysis:

- A narrow view on the EU-Context that would be circumscribed to the main decision-making European Union institutions and the ways their various actions perform the current ENCI context.
- A more extended view on the EU-Context with a main focus on the EU-institutions and their actions but that additionally would include key actors at the EU level such as other EU bodies and agencies, lobbies, EU-networks and coalitions, etc.
- A rather wide view on the EU-Context that would encompass EU-institutions, actors as well as picture the heterogeneity within the EU, notably with regard to the current state of the energy transition in EU-countries.

To account for the contextual factors at the EU level, a rather wide view on the EU context has been considered as more adapted, and can extend to the heterogeneity between member states when relevant for the identification of the PESTEL factors.

1.2.2 Status of the documents published by the EU institutions

Whatever the scope adopted for the task 5.1, the production of documentation and the related actions undertaken by the EU institutions will lay at the centre of the EU-PESTEL analysis. Therefore, it is necessary to consider the various status of the EU-documents to assess their potential and actual performativity within the EU.



Figure 2: Hierarchy of the EU instruments and documents

1. Legally binding acts from the EU, i.e., regulations, directives, decisions, delegated acts and implementing acts and the EU-budget, are the instruments that frame the EU context to the most. Because of their legal status and compulsory enforcement, the regulations and directives that are dealing with ENCI as defined in EnergyPROSPECTS (Pel and al., 2021) within the EU have to be considered as the most performative sources for the EU-PESTEL analysis.
2. Priorities, strategies, planning and reporting, notably from the EU-Commission, are to be found in various types of documents published by the EU-institutions (recommendations, opinions, guidelines, communications, declarations etc.). While recommendations and opinions are considered legislative acts, since they follow the legislative procedures set out in the EU treaties, they do not impose any legal obligation as the types of legislative acts mentioned in the section above. These documents can, however, be considered as key secondary documents that give shape to the EU context.
3. Grey literature from the EU, notably studies, reports, surveys, etc. published by the [publication office of the EU](#) compose a third layer of information that accounts for the EU-Context.
4. A fourth set of information of the EU context consists in the statistics published at the EU level by EUROSTAT, notably for the [energy domain](#). The available statistics can indeed help to ground the EU-PESTEL analysis by providing factual statements dealing with various aspects of ENCI.

This hierarchy has been considered way beyond the single “Legal” aspects of the PESTEL, to account for the prioritisation of the envisioned factors at the EU-level.

This basic normative hierarchy has then to be completed by an evaluation of the sort of influence exerted, whether indirectly or directly, whether by exerting soft or hard power on ENCI. Considering the fact that indirect or soft power factors might have – at least theoretically – more influence on ENCI than direct or hard power ones, those distinctions have not been considered as determinant for the identification of the relevant factors and required a specific evaluation for each envisioned factor.

1.2.3 First collection of resources for the PESTEL analysis for the EU Context regarding ENCI

The main EU Policies and initiatives, already synthetised within the proposal, can be considered as the primary sources for the PESTEL analysis. These policies are displayed below and completed by the other main documentary sources that can be found to investigate the EU as a context for ENCI.

1.2.3.1 Main EU Policies and Initiatives

The corresponding documents are of various sorts and therefore of different status in terms of enforcement of the policy measures. The PESTEL analysis aims at giving a more detailed view on the effective ENCI context at the EU level and will thus have to identify more precisely the degree of commitment and enactment of the principles claiming within this set of main policies.

Table I: Main EU Policies and initiatives impacting ENCI context

EU Policies and initiatives	Key principles
European Commission Energy Union strategy	Energy should be secure and sustainable, with more competition and choice for every consumer.
Clean Energy Package	Breaks new ground for consumers by recognising, for the first time under EU law, the rights of citizens and communities to engage directly in the energy sector.
Internal Electricity Market Directive (EMD) 2019/944	Introduces new roles and responsibilities for ‘citizen energy communities’ in the energy system covering all types of electricity.
Renewable Energy Directive (REDII) 2018/2001	Sets the framework for ‘renewable energy communities’ locally covering renewable energy.

Strategic Energy Technology (SET) Plan	Priority: Consumers in the Energy System
European Green Deal	Strategy to transform the EU into a fair and prosperous society that is more resource-efficient and climate-neutral by 2050. Fairness and solidarity are defining principles.
“Fit for 55” package	Legislative package to ensure that EU legislation is “fit for” reaching the 55% emission reductions objective by 2030.
Just Transition Mechanism	Making sure no one is left behind in regions most affected by the energy transition
European Climate Pact	Giving citizens a voice in climate action / Climate action based on broad societal engagement
Building Renovation Wave	Decarbonising the European building stock while addressing energy poverty and creating employment
New Consumer Agenda	Consumers can play an active role in the ecological and digital transitions
The Conference on the Future of Europe	Give Europeans a greater say on what the European Union should do with emphasis on climate change, a fair economy, digital transition and democracy
REPowerEU Communication	Plan to phase out Russian energy imports as soon as possible, builds on the Fit for 55 package and proposes an additional set of actions that are of relevance for ENCI, in particular related to energy savings through behavioural changes and increasing targets for renewables and energy efficiency.
The Recovery and Resilience Facility (+ Recovery and Resilience Plans)	Financial instrument based on common debt put in place to mitigate economic and social impact of the Covid-19 pandemic in Member States. MS were obliged to spend at least 37% of their share on climate measures, and 20% on digital measures to make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions.
Guidelines on State aid for climate, environmental protection and energy 2022	Updated state aid guidelines for climate, environmental protection and energy that facilitate state support for renewable energy communities up to a certain production capacity, energy efficiency measures in SMEs, clean mobility, and buildings renovation.

1.2.3.2 Grey literature

A common corpus of grey literature has been shared among the team as a basis for the PESTEL factors elaboration. Most of them are mentioned in the bibliography.

The grey literature corpus provides insights in various ways:

- first, it produces discourses and narratives that contribute to frame ENCI at the EU scale, to link ENCI with some specific norms and values, and to make some ENCI forms particularly salient as exemplary forms of ENCI;
- second, considering that a large number of the non-binding documents composing this corpus are often mentioned within the EU ruling, if so, they tend to be granted a more important status and role in defining the EU context;
- third, it provides assessment on the existing regulations as well as important insights on future development of the Energy Union in general.

1.2.3.3 Statistical resources

Eurostat represents the main source of statistical data for the energy domain in the EU. The available datasets on energy provided by [EUROSTAT](#) give a good overview of some of the key energy issues and possible factors.

Moreover, many [infographics](#)¹ and information regarding the EU energy policies, the energy within the EU, energy consumption and energy and the environment can also be found on the dedicated pages of Eurostat.

1.2.3.4 Transnational actors and networks

Transnational actors and networks operating at the EU level also impact the EU context for ENCI through various means: by acting towards the development of ENCI across the EU, by setting new social norms spreading ENCI, by lobbying the EU institutions towards the enhancement of ENCI, etc.

Amongst others, the following actors and the documents they elaborate is of particular interest for the EU PESTEL factors elaboration:

- Covenant of Mayors for Climate & Energy
- Energy Cities
- Friends of the Earth Europe
- Greenpeace Europe
- ICLEI
- NetZeroCities
- REScoop.eu
- Energy Poverty Advisory Hub

The sources for the PESTEL elaboration are of course to be completed according to the needs for each letter of the PESTEL.

¹ <https://ec.europa.eu/eurostat/cache/infographs/energy/index.html?lang=en>

1.2.3.5 Scientific and academic literature

The resources for the PESTEL analysis of the EU context for ENCI will be completed by published academic and scientific literature that are dealing with the considered issues.

1.3 Data treatment for identifying the PESTEL factors and subfactors

The existing literature is remarkably silent about the definition and characterisation of what a factor is and how it has to be identified in a PESTEL, whatever the considered level of analysis. The factors tend indeed to come “out of the box”, as if they were self-evident or should be taken for granted.

The identification of a consistent and relevant set of factors for ENCI at the EU level requires first a shared basic definition of what a “factor” is. Basically, a factor “does something”. In other words, one can consider a factor as an actor or matter of fact that affects or influences a particular result or situation. In other words, a factor can be considered as something that helps produce or influence a result. In our analysis, this “something” constitutes a wide range of political, economic, social, technological, environmental and legal circumstances, actors, agreements, trends, etc. Correspondingly, the “result” that we are interested in are these factors’ influence on ENCI.

As such a factor contributes actively (most of the time directly, yet sometimes indirectly²) to a certain result, and has therefore to be differentiated with something that is only a part or a component of something without implying any causality.

These factors may also be subject of variations and/or changes across time and/or space, so they can be either rather fixed factors or rather variable ones. This aspect has also to be considered in the identification of the main factors and subfactors of the EU context that are impacting ENCI, while keeping in mind that the list of factors addressing the EU level shall be adapted enough to be translated to the national level.

Complementary to the fixed or variable factors, the timeline represents a further difficulty for the formulation of appropriate factors. Indeed, shall the PESTEL analysis be considered as a snapshot displaying a “T” time situation or shall it include a broader time perspective? If we agreed on the idea that the PESTEL analysis is anchored in short time periods rather than long ones, we tried to find a balance between immediate factors (such as [the energy crisis](#) induced by the rapid post-Covid economic recovery, greatly exacerbated by the Ukrainian war and the anticipated difficulties for energy supply during the coming winters),

² Though the focus has to be placed on direct factors, it is theoretically possible that an indirect factor impacts the result more than some other direct factors. In such cases, indirect factors have to be included.

and more long-lasting factors (such as the social factors, which cannot change from one day to the next).

1.3.1 Identification of the PESTEL factors for ENCI

The main EU policies and initiatives listed above are providing a core set of inputs covering most of the aspects of the EU-PESTEL analysis of ENCI. The identification of the main PESTEL factors for ENCI will thus result from a **go-and-return process** between a deductive approach of the factors based on the requirement for the factors' exploration as listed above in Table I and an inductive approach based on the investigations of the main EU policies and initiatives completed by all the available documentation. According to the considered "letter" of the PESTEL, inductive or deductive analysis may be privileged, yet both of them are undertaken for each identified factor.

Indeed, the usual factors to be found in the literature as composing the basic frame for the PESTEL analysis (see Figure 1) can hardly be seen as a closed and definitive set of parameters. Some of them might indeed require some adaptation to fit to the ENCI focus, some other might require to be decomposed in several subfactors, and some new factors might emerge from the extended literature review.

For each partner responsible for a "letter" of the PESTEL analysis, the process consisted in the identification of a relevant set of factors through go and returns between inductive and deductive approaches in the light of the main EU energy policies. To do so, each team collected a dedicated corpus of documents (steps 1 and 2 in the figure 3 below) to inform the elaboration of the PESTEL factors (step 3) and the identification of the associated opportunities and threats (step 4):

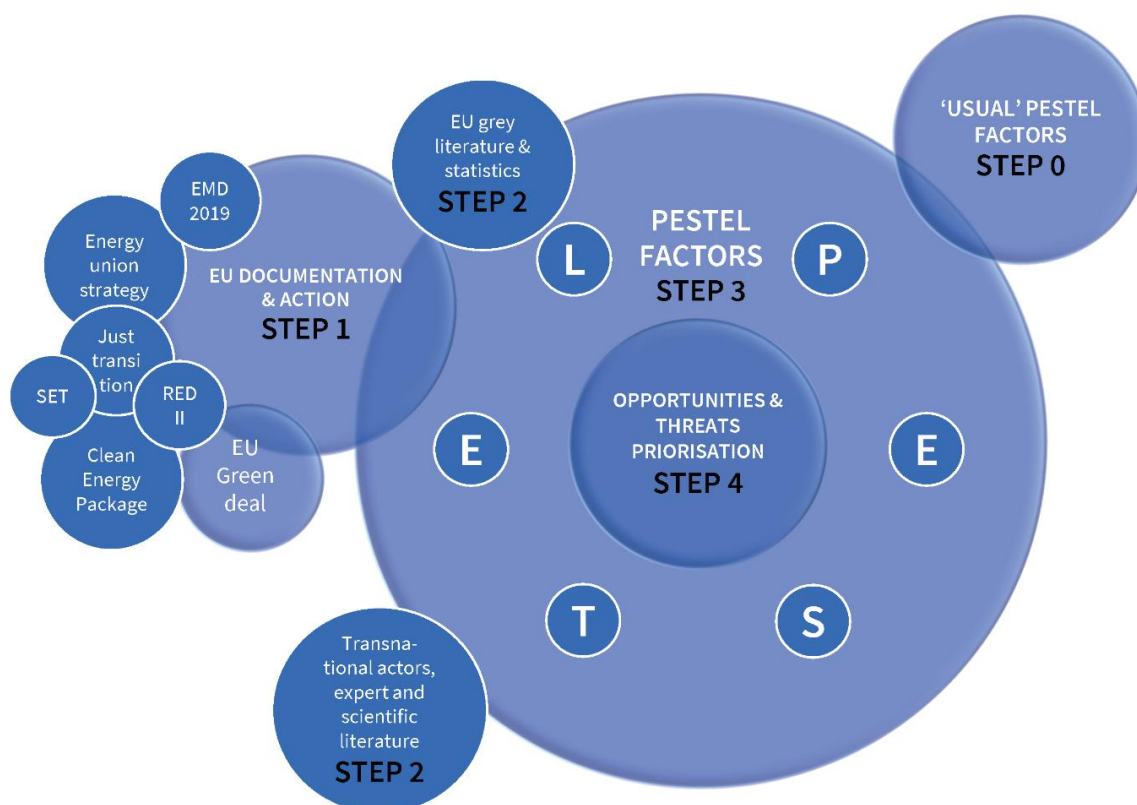


Figure 3: Main steps of the EU-PESTEL Analysis of ENCI

On the basis of the dedicated process and corpus, each partner came up with a list of factors dealing with a specific letter. However, some factors seemed to be redundant or were mentioned in too many “letters” of the PESTEL. In some case, this issue was solved by finding some more precise formulations. For example, a theme like energy communities can be addressed in the political, economic, social, or legal factors: if so, the factors have to be formulated in a way that makes both the differences and the relationships between the factors clear. Intensive exchange amongst the team progressively enabled to overcome this difficulty, mostly through dedicated meetings.

1.3.2 Assessing the impacts of the factors on ENCI

Steps 2 and 3 consisted in exploring further the identified impacts in the light of the EU documentation and that of transnational actors, completed eventually by scientific literature. This step allowed a critical analysis of the various factors and the assessment of the extent to which they are conducive or unfavourable to ENCI as defined in the conceptual framework (step 4). At this stage of the somehow artificial partitioning of the components of the socio-technical regime for ENCI at the EU level, some issues arose, within a “letter” or between the PESTEL “letters”.

1.3.2.1 Within a PESTEL “letter”

The identified factors needed to be refined progressively, notably by precisising their current (and eventually) future states, their actual enforcement, the critics they are facing from transnational actors etc. In this process, some contradictory views, uncertainties, or possible unintended consequences for ENCI may thus emerged from the in-depth desk analysis and had to be clarified in a rather pragmatic way by the team.

For clarity purposes, the legal status of the various sources (cf. Figure 1 above) has to be considered to account for the current state of each factor – especially when it is stated within a legally-binding document. Alternative views regarding this factor shall then be reported as such, and their potential impact(s) on ENCI assessed accordingly. However, in some cases, scrutinising the factors through the lenses of the legally-binding documentation proved to be hardly sufficient: the 2019 EU-Directive on the energy market sets the core rules regarding the energy prices, yet it does not enable by itself to identify how it becomes a factor impacting ENCI – how shall we consider the price volatility, the current trend of increasing prices due to the war in Ukraine and more generally the geopolitical situation, and other conditions that affect prices beyond the laws of the markets (national energy mix, import diversification, network costs, environmental protection costs, severe weather conditions, or levels of excise and taxation, etc.)? For such issues, the team had to decide for the best possible choices considering the very reductionist nature of the PESTEL factors.

1.3.2.2 Overlap and/or contradiction regarding a factor assigned to various “letters” of PESTEL

As illustrated before by the example of the energy communities³, the same (or rather similar) factors might be assigned to several PESTEL letters, which would introduce regrettable confusion within the whole PESTEL analysis and possibly lower its possible uses.

In line with previous methodological propositions, the strategy to adopt in case of multiple assignment of a similar factor to various PESTEL letters consisted in:

- considering the aspect of PESTEL in which the factors seem to be enforced “the most”. For instance, a factor that is mentioned in a legally binding source can be more clearly attributed to the letter of the PESTEL that corresponds obviously to the realm of the source (e.g. Legal or Economic if the factor is mentioned in a directive dealing with the energy market). The critical assessment of the factor according to the corpus of documentation enabled in some cases to determine

³ Another typical example could be an economic or market policy, which could be a valid factor for the Political aspect and/or for the Economic one.

the most relevant attribution with regard to the more significant potential impacts of the factor on a certain ENCI aspect;

- leading a bilateral/trilateral discussion on the factor to attribute it to one letter or adapt and refine the formulations to avoid the overlaps. The same “theme” could indeed be considered as a factor for various PESTEL letters, yet it might act rather differently in each of them (e.g. subsidies for renewable energy development could be part of both political and economic aspects, and impact ENCI in specific ways). The team has therefore formulated the subfactors as precisely as possible, to underline how a theme can appear in several factors with a specific orientation or impact on the ENCI context.

Next to the possible overlaps, interdependencies between the factors have also to be considered. To address such critical issues, two kinds of answers are provided:

- First, some key interdependencies are highlighted and explained the narrative parts preceding and following the factors tables.
- Second, the interrelations between the factors have been part of the expert assessment, which provided an overview of the respective weights and interdependencies between the main factors and within a factor.

1.4 Interrelations between the factors and assessment of their respective weights through AHP and DEMATEL methods

The critical appraisal of the factors and the extent to which they are conducive or unfavourable to ENCI might also raise the issue of the degree of independence or dependence of one factor to one or more other factors, whether within a “letter” or between different PESTEL “letters”. The second key issue has to do with the weighting of the impacts on ENCI and how to proceed to such an assessment in a qualitative way.

The existing literature on PESTEL analysis entails some scientific papers that are addressing those two issues. One of the most convincing is proposed in Yüksel (2012), in which the DEMATEL and AHP (analytic hierarchic process) models are consecutively applied to quantify the influence of the subfactors and factors on each other (according to Saaty’s scale (1986) and AHP method) and their interdependence (DEMATEL).

To do so, the WP5 team assembled an expert panel, composed of three Advisory Board members: Henrike Rau, Gary Goggins and Mario Pansera; and completed by four other experts from various fieldworks: Nives Della Valle, Namita Kambli, Thomas Meister and José

Halloy⁴. The experts were sent a synthesis of the identified factors and a template for the assessment of their influence and interdependence (template reproduced in annex).

Such a collective assessment of the PESTEL factors has been indeed strongly contributing to complete the five steps summarized in the figure below, notably the prioritisation and the development of predictions and scenarios (in upcoming tasks of WP5).

1.5 Summary of the whole PESTEL process

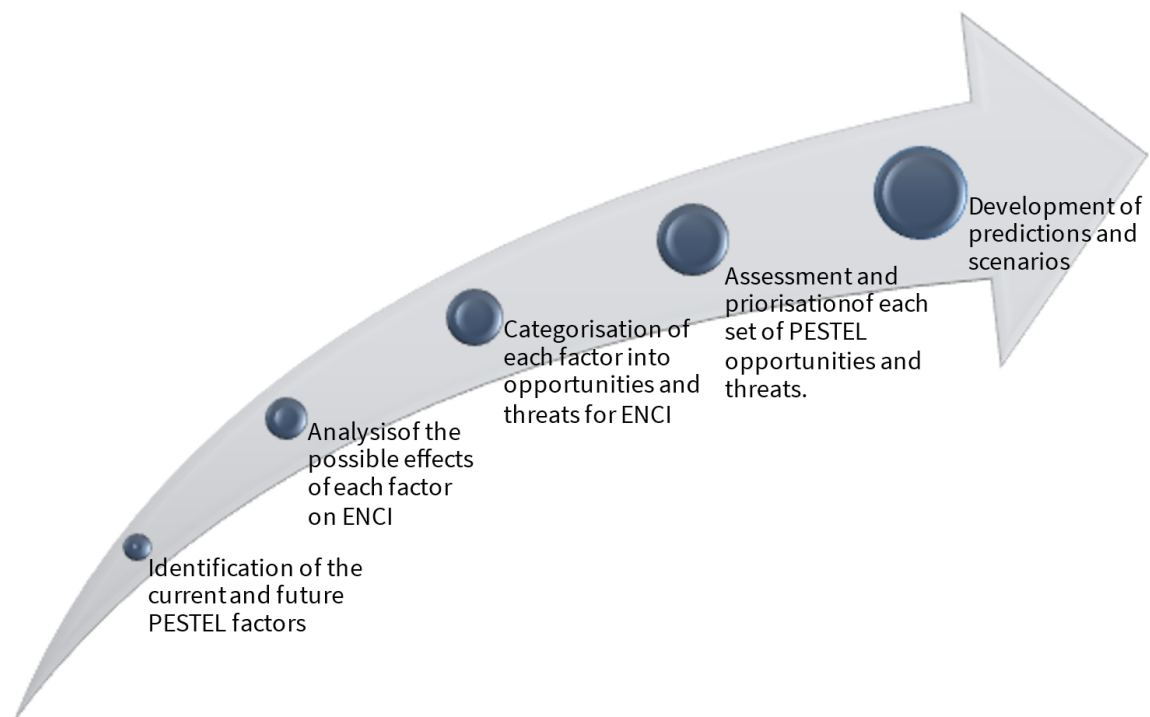


Figure 4: Summary of the process and stages of EU-PESTEL Analysis

⁴ Our expert panel provided a great support for the achievement of this EU-PESTEL analysis, for which the team is deeply grateful.

2 PESTEL factors

This chapter describes the PESTEL factors in detail, letter by letter. The letter-specific sections describe first the methodological specificities for these six analyses. Next, they present the factors and subfactors through an overview table. The sections conclude with a synthesizing narrative on the identified (sub-) factors.

2.1 Political factors

2.1.1 Methodological specificities

This analysis has been developed through an iteration between inductive and deductive approaches. In line with the general methodological guidelines (Chapter 1), we have explored inductively which political factors have been considered salient or crucial in the different types of EU documents. Important sources were policy frameworks, policy visions, and official communications. Another important source, were the media (newspapers, radio and social media): These sources did not only help to verify the salience of factors, or to identify issues overlooked in official EU documents – most importantly, they shed light on the ways in which the factors are considered as opportunities/threats or crucial/secondary by politicians, experts and journalists. We have consulted EU-focused as well as nationally focused⁵ news. A third element of data gathering and validation were webinars and discussions with experts. The latter has been particularly important for the deeper understanding of the factors: *How do they induce or hinder ENCI? Of which particular forms/ideal-types of ENCI are these factors the drivers?*

There was also a necessary deductive part of the analysis, to structure the miscellany of salient factors and subfactors in a coherent way. An important deductive strategy has been the discussions across the PESTEL team, to re-distribute factors over the connected, partially overlapping factors⁶. Next to this overall synchronization, it is relevant that we have conducted the analysis of political factors in close connection with the analysis of economic factors (**section 2.2**). This has informed an analysis along the basic distinction between market forces and governmental intervention, complemented by various phenomena of

⁵ The analyses of political and economic factors were conducted in collaboration between Karin Thalberg and Bonno Pel. The former follows French and Swedish media, the latter follows franco-Belgian and Dutch newspapers.

⁶ For example, various legislative (L) factors correspond with political (P) factors.



institutional intertwinement. As described further in section 2.1.3, we have accordingly approached the political factors along basic questions on the scope for purposive political steering: *How can ENCI be created/stimulated by policy? Or do economic and technological developments better explain its configurations? Which different kinds of political factors can be distinguished, and what kinds of ENCI do they tend to produce, and how?*

Regarding the analysis of the political factors, all the general limitations of the PESTEL analysis (not fully exhaustive qua empirical basis, limitations of precision, debatable categorizations) apply. There is also a specific limitation, however: Informed by political communications and media analysis and developed in a politically and economically rather turbulent period, the analysis may have overemphasised the present, rather volatile developments– at the expense of certain more stable, structural factors.

2.1.2 Synthesis table of the Political factors

Texts of reference (main EU documents are mentioned here, other sources are integrated as links in the table below):

Theme	Official journal publication
The Energy Union	25/2/2015 - Communication (EU) 2015/080
Governance of the Energy Union and Climate Action	21/12/2018 - Regulation (EU) 2018/1999
Renewable energy	21/12/2018 - Directive (EU) 2018/2001
Energy efficiency	21/12/2018 - Directive (EU) 2018/2002
Electricity regulation	14/06/2019 - Regulation (EU) 2019/943
Electricity directive	14/06/2019 - Directive (EU) 2019/944
Energy performance of buildings	19/5/2010 - Directive (EU) 2010/31 (recast)
Strategic energy technology plans	15/9/2015 - Communication (EU) 2015/6317
Strategy for Energy System Integration	8/7/2020 - Communication (EU) 2020/299
The Climate Law	30/6/2021 - Regulation (EU) 2021/1119
REPowerEU plan	8/5/2022 - Communication (EU) 2022/230
Tackling rising energy prices: a toolbox for action and support	13/10/2021 Communication (EU) 2021/660
Energy poverty	14/10/2020 - Recommendation (EU) 2020/1563
Fit for 55	14/7/2021 - Communication (EU) 2021/550
Just transition fund	14/1/2020 - Proposal for a Regulation (EU) 2020/22

FACTORS SUBFACTORS	DESCRIPTION	HOW IT WORKS AS A FACTOR FOR ENCI	EXPLICIT MENTION OF ENCI	AFFECTED TYPES OF ENCI & OUTCOME- ORIENTATION	OPPORTUNITY and/or THREATS for ENCI (O and T)
P1. EU-level political unification in the energy sector	<p>The Energy Union vision expresses - as also indicated in the very term Energy Union - the ambition to counter fragmentation (in policies, regulations and market ordering of member states). <i>"We have to move away from a fragmented system characterised by uncoordinated national policies, market barriers and energy-isolated areas."</i> The degree of success of creating cohesion in policies, regulations and markets in EU members states is additionally an indicator of the EU's capacity to even out prerequisites for ENCI across members states.</p> <p>Part of the striving for the Energy Union is also to form an "Energy Union that speaks with one voice in global affairs". This striving for unification and solidarity (between countries, and between EU citizens) can thus be considered a political initiative towards ENCI.</p>	<p>The degree of unification can be high (as hoped for by the political actors behind the Energy Union), or it can be low (as hoped for by the Putin regime, it appears, considering the attempts to create political divide in the EU and in NATO). Political analyses indicate how this factor could develop into both 'high' and 'low' - the situation anno 2022 is uncertain. Leaving aside the uncertainty over the high/low values that the factor may take, implications for ENCI seem to be the following: First of all, high political unification can be expected (following the reasoning behind the Energy Union) to increase solidarity between member states -and by extension, between their members. Second, low political unification could lead towards nationalist, protectionist go-alone strategies of EU member states, and quests for national-level energy independence. This could undermine ENCI - though it could also be conducive to localist-nationalist variants of ENCI ('solidarity with our own').</p>	No	The factor does not drive towards particular kinds of ENCI. It affects ENCI in general.	<p>O: High political unification could contribute to even out and expand prerequisites for ENCI across EU members states.</p> <p>T and O: The (foreseen) impacts of this factor are multiple, and two-sided. Low political unification could undermine ENCI through nationalist, protectionist strategies at the member state level. On the other hand, low political unification could also turn out to be conducive for localist-nationalist variants of ENCI.</p>
P.1.1. Level of political integration and functioning of multilevel governance	<p>The level of political integration in the EU energy sector largely depends on common agreements on policies and targets, and on the implementation of those in Member States (MS). The key EU principles of subsidiarity and proportionality are important to consider here. They may be used as arguments by MS to limit integration, thus providing different enabling/constraining contexts for ENCI in different MS. Certain aspects can be directly enacted at the EU level through regulations, but directives need to be transposed into national legislation. Another key factor for integration is thus the sanctions that the EU can enforce on non-compliant MS.</p>	<p>If the level of political integration is high and multilevel governance functions well, this factor can ensure common legislative frameworks that can enable ENCI to develop in a similar direction across the EU and even out national differences. If integration is low, and multilevel governance does not function well, ENCI can develop in variegated ways across the union creating disparities across member states. This depends to a large extent on political unification and the power given to the EU to enforce sanctions to those MS who do not comply with agreed upon provisions.</p>	No	Especially relevant for type 1, 2, 7 and 8.	<p>O: A high level of political integration and well-functioning multi-level governance between EU and MS could contribute to ENCI developing in a similar fashion across MS and even out national differences.</p> <p>T: If the EU does not have the political power to enforce sanctions on MS who do not comply with agreed upon legislation, EU legislation is weakened.</p>
P1.2. Consensus on citizens' role in the EU energy system	<p>An EU-wide common vision of citizens' role in the energy system enshrined in the Energy Union: <i>"Most importantly, our vision is of an Energy Union with citizens at its core, where citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, participate actively in the market, and where vulnerable consumers are protected"</i>.</p>	<p>The more citizens are acknowledged as key stakeholders in the energy transition, the more political support and societal enthusiasm is generated – empowering and legitimizing ENCI.</p>	Explicit mention of citizens	Type 1	<p>O: Citizens could become recognised as key actors of the Energy Union (even if this recognition may still be focusing on their roles as consumers).</p> <p>T: All the five dimensions of the Energy Union (energy security; the internal energy market; energy efficiency; decarbonisation; and research, innovation and competitiveness) could end up with no, limited or narrow recognition of citizenship and ENCI.</p>
P1.3. Consensus on the future EU energy system	<p>Integration of the energy system is a key tenet of EU energy policy. The vision on the future EU energy system expresses a transition from the system today with <i>"linear and wasteful flows of energy in one direction only"</i> to a future EU integrated energy system defined by <i>"energy flows between users and producers, reducing wasted resources and money"</i>. This vision involves existing and emerging technologies, processes and business models, such as ICT and digitalisation, smart grids and meters and flexibility markets.</p>	<p>Increased flexibility of the energy system has implications for energy consumption and behaviour. As such it leads potentially to a more active role for EU citizens. In the EU Strategy for Energy Systems Integration, consumers are placed at the centre: Information is the key tool to change energy consumption patterns and switch to solutions that can support an integrated energy system. Customers, as both citizens and businesses, should be "informed on their rights, on the technology options available to them and their associated carbon and environmental footprint, so they can make informed choices and truly drive decarbonisation".</p>	Citizens, consumers, businesses	Type 1 and 3 Potentially type 2, 4, 7 and 8	<p>O: Increased energy system integration and flexibility could be an opportunity for more active types of ENCI, such as type 8.</p> <p>T: The envidaged role of citizens could be reduced to one of mere energy consumers, or as ENCI of type 1.</p>

<p>P1.4. EU responses to the energy price crisis and the war in Ukraine</p>	<p>Following the Russian invasion of Ukraine, the EU decided to phase out Russian fossil fuels by 2027 (about half of which to be achieved already in 2022). Until the Russian invasion of Ukraine, natural gas from Russia was considered a key medium-term component of the European energy transition since it would allow for a faster phase out of coal. The current situation (where Russia has cut off/reduced gas supplies to the EU as a response to the sanctions) pushes decision makers to deal with short term, medium term, and long-term considerations at the same time. The political reality involves dealing with the short-term urgency in ensuring enough gas for citizens and industry during the coming winter(s), and keeping electricity prices in check, while simultaneously fulfilling GHG emissions targets.</p>	<p>The war in Ukraine influences ENCI directly through the effect it has on energy bills and inflation (Cf. Economic factors). It also has an influence through the political agenda-setting and awareness-raising in media and political debates, creating discussions, protests, and responses. The EU responses to the energy price crisis and the war in Ukraine will equally have consequences on energy bills and inflation. Moreover, it influences ENCI through the extent to which (different categories of) citizens are considered in these political responses. The REPowerEU strategy involves several suggestions that could involve citizens to a large extent, especially through energy savings measures and an increased deployment of renewable energy.</p>	<p>Citizens, consumers, vulnerable households, small businesses</p>	<p>Potentially all</p>	<p>O: Unified, streamlined crisis responses could generate initiatives towards climate neutrality that increase citizen involvement, and enthusiasm for ENCI. T: Short-term oriented, myopic decision-making could exacerbate long-term fossil fuel lock-in (and neglect the opportunities to enhance ENCI). T: Crisis management and hasty policies could undermine the social acceptability and the democratic nature of energy transition. Quick fixes, side-lining citizen participation in drafting and implementing emergency measures, could undermine ENCI.</p>
<p>P2. Agreed upon climate and energy policy targets</p>	<p>ENCI, as we defined it in Pel et al. (2021:64), "...refers to forms of civic involvement that pertain to the development of a more sustainable and democratic energy system". The aspect of <i>sustainability-oriented civic involvement</i> is arguably shaped politically, through policies of sustainable development and in particular climate. Importantly, this factor comprises not only the formulation and projection of targets, but also the political elaboration of and commitment to actions leading towards these targets - awareness-raising, binding agreements, climate policy programs, and climate policy instruments.</p>	<p>Ambitious climate policy targets (i.e. aiming for substantial and fast decarbonization) arguably stimulate ENCI, as far as they institutionalise (normalise, formalise, elaborate, propagate) the sustainability objectives underlying ENCI. Still, very unambitious climate policy targets do not necessarily discourage from ENCI - it could incite a certain 'bottom-up' counterreaction of citizens taking over the initiative of a lethargic, passive state.</p>	<p>No</p>	<p>This factor influences especially the ENCI outcome-orientation of sustainability</p>	<p>O: Ambitious agreement on policy targets could institutionalise sustainability objectives underlying ENCI. T: Unambitious agreements –downplaying urgency and withdrawing political legitimization of ENCI - would make it harder for ENCI to develop. T: Ambitious energy-climate policies could support ENCI, yet they may also entail unintended consequences with negative effects on ENCI. An important example is the risk of increasing energy poverty, due to rising prices.</p>
<p>P2.1. Agreement on a binding objective of climate neutrality in the EU by 2050 and the recognition of citizens' roles</p>	<p>EU Member States have agreed upon a binding objective of climate neutrality in the EU by 2050, aligned with the Paris Agreement, and binding domestic reduction of net greenhouse gas emissions of at least 55% compared to 1990 levels by 2030. This confirms the EU's commitment to a more sustainable energy system. To reach this objective, the European Climate Law acknowledges the role of citizens, communities and multi-level consultation processes with a range of stakeholders in the transition.</p>	<p>The binding EU target locks the EU Member States to a common path towards climate neutrality. Together with the recognition of public participation in the fulfilment of the objective, it works as an overarching conditioning framework for ENCI. <i>"The Commission shall engage with all parts of society to enable and empower them to take action towards a just and socially fair transition to a climate-neutral and climate-resilient society. The Commission shall facilitate an inclusive and accessible process at all levels, including at national, regional and local level and with social partners, academia, the business community, citizens and civil society, for the exchange of best practice and to identify actions to contribute to the achievement of the objectives of this Regulation"</i> (EU 2021/1119: Art. 9).</p>	<p>Citizens, communities, consultation, empower</p>	<p>Potentially all, but in particular type 5.</p>	<p>O: This is an overarching conditioning factor for sustainability-oriented ENCI at the EU-level. Recognition of the role of public participation (with a wide range of stakeholders) is a clear opportunity for ENCI. T: The public participation is motivated by goals of climate neutrality. This entails risks of instrumentalization, i.e. of ENCI practices in which broader transformative goals of democratisation become subservient to the achievement of climate policy goals.</p>
<p>P2.2. Agreement on a binding renewable energy target at the EU-level and recognition of citizens' roles</p>	<p>EU Member States have agreed upon a binding renewable energy target at the EU-level of at least 32% renewable energy sources in the EU's overall energy mix by 2030. This agreement confirms the EU's commitment to increasing the integration of renewables in the energy mix. Through the Renewable Energy Directive, citizens, consumers and businesses should be empowered to participate in the clean energy transition. The role of local and regional authorities is furthermore recognised. The Renewable Energy Directive is currently subject to dialogue negotiations.</p>	<p>Similar to P2.1., the EU-level binding renewable energy target is an overarching conditioning framework for ENCI within the EU, as it sets out the path towards an increasing deployment of renewables in the European energy mix and recognising the role of citizens, in different functions, to achieve this target. The target is currently being revised. The war in Ukraine and the energy price crisis has had an impact on the proposals. In September 2022, an agreement was reached in the European Parliament to increase the target to at least 45% to 2030, and an introduction of sub-targets for sectors such as transport, buildings, district heating and cooling. It remains to be seen where it will land.</p>	<p>No</p>	<p>In particular type 2, 4, 7 and 8.</p>	<p>O: Agreements on this renewable energy targets could, if set ambitiously and with due attention to citizen participation, provide impulses to ENCI. T: Neither RED in its current form, nor in the revision contains binding national targets. Some MS reached the 2020 targets and others did not, which translates into an EU energy transition at different paces. Potentially this could mean 'a race to the bottom' (due to lack of will) that could discourage more advanced states especially considering the absence of consequences from the Commission in case of non-compliance.</p>

<p>P2.3. Agreement on an EU-level energy efficiency target and recognition of citizens' roles</p>	<p>EU Member States have agreed upon an energy efficiency target of at least 32.5% by 2030 at the EU-level (compared to projections of the expected energy use in 2030). Member States set indicative national energy efficiency contributions towards the 2030 target through their National Energy and Climate Plans (NECPs). This agreement confirms the EU's commitments to increased efforts in terms of energy efficiency. The Energy Efficiency Directive is currently subject to triologue negotiations. In the proposals to the recast EED, MS are to ensure transparent information to all relevant market actors on available energy efficiency improvement measures, individual actions and financial and legal framework. Furthermore, multi-level, multi-stake holder participation should be supported by member states.</p>	<p>Similar to P2.1. and P2.2., the agreement on an EU-level energy efficiency target is an overarching conditioning framework for ENCI, as it sets out a path towards increasing efforts on energy efficiency and energy savings in Member States and recognises the role of citizens, in different ways and capacities. The target is currently being revised. The war in Ukraine and the energy price crisis has had an impact on the proposals. The Fit for 55 proposal, in July 2021, promotes 'energy efficiency first' as an overall principle of EU energy policy. The proposal raises the level of ambition of the EU energy efficiency target and makes it binding. The war in Ukraine and the energy price crisis has had an impact on the proposals. In September 2022, the European Parliament agreement on at least -14.5% mandatory reduction of energy consumption by 2030.</p>	<p>Behaviour of citizens, consumers and enterprises Empowerment citizens & consumers Energy poverty Active role in the green transition Renewable energy communities and citizen energy communities</p>	<p>Potentially all.</p>	<p>O: Agreements on these renewable energy targets could, if set ambitiously and with due attention to citizen participation, provide impulses to ENCI. T: An ambitious EED requires an ambitious Energy Performance Directive recast, with minimum energy performance standards for all existing buildings leading to climate neutrality before 2050. In September 2022, the EPBD is still under negotiation within the Council and the EP, each institution could reach an agreement on their respective positions before winter 2022.</p>
<p>P3. Commitments to participative governance</p>	<p>ENCI, as we defined it in Pel et al. (2021:64), "...refers to forms of civic involvement that pertain to the development of a more sustainable and democratic energy system". Just as the sustainability aspect (Cf. P2) is not only a matter of individual preferences and lifestyles, democracy-oriented civic involvement is arguably shaped politically as well, through the overall development of more or less participative, horizontal rather than vertical-hierarchical, modes of decision-making. This factor 'participative refers to a broad set of decision-making procedures and modes of political interaction that somehow pertain to matters of energy. It therefore comprises a broad range of subfactors, covering different areas of energy policy and different aspects of participation (formal arrangements and procedures, as well as informal political cultures and ways of shaping the participation).</p>	<p>Higher levels of this factor are in principle conducive to ENCI: ENCI commitments to energy democracy are institutionalized. The basic idea is that 'bottom-up' initiatives towards democratization can be formalized, supported, and institutionally safeguarded. Still, the formalization and institutionalization of participation is notoriously complex (qua implementation and qua institutional embedding) and politically ambiguous (intrinsic motivations can be crowded out by extrinsic motivations, participative procedures are opening up but also closing down political debate, et cetera). Given these ambiguities, it is also well conceivable that, by contrast, low levels of 'participative governance' give rise to ENCI initiatives - from non-state actors who seek to democratize as a reaction to autocratic, over-centralized modes of decision-making.</p>	<p>No</p>	<p>In particular influencing the agency-dimension of ENCI. Depending on level of participative governance, collective or individual kinds of ENCI are encouraged or triggered.</p>	<p>O: 'Bottom-up' initiatives towards democratization could be formalized, supported, and institutionally safeguarded. T: The formalization and institutionalization of participation is notoriously complex (qua implementation and qua institutional embedding) and politically ambiguous. Intrinsic motivations for ENCI activity can be crowded out by extrinsic motivations. Participative procedures can open up participation and political debate, but –if formatted in a narrow, exclusive way – they can also close it down.</p>
<p>P3.1. Political priorities of the Commission towards increased participative governance</p>	<p>All newly appointed Commissions formulate priorities for their term in office, that to different extents could influence ENCI. The current European Commission has a number of priorities (2019-2024) that directly or indirectly could serve to enable ENCI. For example, the priority 'A New Push for European Democracy' has an explicit emphasis on increased participative governance. Key initiatives related to ENCI under this priority is: The Conference for the Future of Europe.</p>	<p>The key initiatives and strategies mentioned in the description integrate public participation in different ways. The 'Conference for the Future of Europe' was an EU-wide citizen consultation held under the priority 'A New Push for European Democracy' to shape a common future, for example on climate change and environment, but also more broadly on how to reform the European institutions and processes to embed participatory democracy into EU policy and law-making. Under the same priority, the Joint Research Centre is working to implement participatory and deliberative practices in science and policy through the Competence Centre on Participatory and Deliberative Democracy, recognizing that expert knowledge may not be enough to address citizens' concerns and complex governance issue.</p>	<p>Citizens</p>	<p>Type 5</p>	<p>O: Priorities during a five-year period could serve to formalise/ institutionalise/ normalise participatory democracy into EU policy and law-making. T: Shifting political priorities may also lead to a weakening of ENCI.</p>

<p>P3.2. Commitment to the involvement of local and regional governments</p>	<p>The EU institutions involve local and regional governments through different mechanisms and to different degrees. The Covenant of Mayors is one such mechanism, that was initiated by the European Commission in 2008 and has since then become the world's largest movement for local climate and energy actions. The network is still supported by the European Commission and the initiative is mentioned in a number of new legislation and strategies as a best practice and a partner for the implementation of policy. Through the Covenant of Mayors, among other things, mayors from all over Europe commit to: "ENGAGE [...] citizens, businesses and governments at all levels in the implementation [...] in the transformation of our social and economic systems. We aim to develop a local climate pact with all the players who will help us reach those objectives".</p>	<p>The EU institutions can commit to the involvement of local and regional governments through different mechanisms and to different degrees. The Covenant of Mayors is one such example that could serve to support ENCI in several ways, in particular organisationally embedded ENCI within regional governments, municipalities and cities. When officially joining the Covenant of Mayors, signatories commit to developing a Sustainable Energy (and Climate) Action Plan within two years. Adopted by the local council, a signatory's action plan describes the steps towards its 2020 or 2030 targets. Related to the war in Ukraine, the Cities Energy Saving Sprint was launched as a joint initiative of the European Commission, the Covenant of Mayors and the European Committee of the Regions to encourage cities to take measures that will immediately reduce their energy consumption.</p>	<p>Citizens, business, governments at all levels</p>	<p>Potentially all. In particular type 2, 3 and 5.</p>	<p>O: Devolution and development of regional-level governance constitutes in principle opportunities for ENCI – it implies, decentralization and governance that is relatively closer to the citizens. T: Devolution and local/regional level action always come with certain risks. Relevant threats are the weakening of supra-local arrangements that ensure basic services to citizens, and the emergence of major inequalities between more and less vulnerable regions.</p>
<p>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</p>	<p>Under the Regulation on the governance of the energy union and climate action (EU 2018/1999), Member States are required to submit National Energy and Climate Plans to outline how they intend to address energy efficiency, renewables, GHG emissions reductions, interconnections, research and innovation to reach the agreed objectives. Public participation and multi-level dialogues are required for the preparation of these plans (see Article 10 and 11).</p>	<p>The inclusion of binding public participation and multi-level climate and energy dialogues in the preparation of the Integrated National Energy and Climate Plans has the potential to influence ENCI depending on the type of actors that are included, what type of roles and responsibilities that they are given in the process, and the ambition of the Member States to create an inclusive process.</p>	<p>The public</p>	<p>Potentially all. In particular type 2, 3 and 5.</p>	<p>O: The general kinds of opportunities apply: venues for participation could be opened. T: The corresponding threat consists in the introduction of misconceived, narrow participation procedures that are insufficiently suitable for the expression of political voice and 'lay' expertise.</p>
<p>P4. Non-governmental initiative towards energy transition</p>	<p>Political factors extend beyond the policies of governments. As indicated through the 'from government to governance' formula, they also comprise various developments that are co-shaped or even initiated by non-state actors coming from the hybrid institutional sphere: Enterprises (P4.1), semi-governmental organizations (P4.2), public-private partnerships (P4.3) and triple helix innovation initiatives (P4.4). This factor indicates how ENCI is partly shaped by a 'social middle field', an institutional structure beyond state organizations, that can be very active or very passive in its pursuit of ENCI ideals and ethical commitments. For example, some European MS have very strong traditions of social economy, social enterprises, democracy at the workplace, corporate social responsibility, whilst other much less so.</p>	<p>The indicated non-state/hybrid sphere actors can stimulate ENCI. High levels of CSR/active organizations will in principle incite ENCI - either through acts of intermediation (Cf. WP4) that support and empower citizens, or rather directly as organizational contexts in which individuals and groups enact ENCI. Also in this case, the operation of the factor and its kind of influence are not entirely clear-cut: Very low scores on this factor do not necessarily lead to disempowerment, but may also evoke the emergence of ENCI in other institutional spheres - to the extent that market, state and hybrid institutional sphere work as communicating vessels for the emergence of ENCI agency.</p>	<p>No</p>	<p>In particular affecting the ENCI agency-dimension.</p>	<p>O: This factor seems to indicate quite unambiguous opportunities and impulses to ENCI. T: In contrast to purely state-led or market-based forms of ENCI (coming with risks of commercialization and silent instrumentalization), this possible 'hybrid institutional sphere' boost to ENCI seems not to evoke particular suspicions.</p>
<p>P4.1. Energy Transition initiative through enterprises</p>	<p>Enterprises are not only relevant for ENCI through their activities on energy markets (i.e., through economic factors). They are also political actors: developing political lobby power through sector organizations, setting environmental standards, acting as sponsors, negotiating local/regional employment, responding with shareholders, managing Human Resources and well-being of workers, and taking corporate decisions in more and less hierarchical/democratic ways. The widespread concerns about 'greenwashing' underline it: It makes a significant difference to which degree and in which forms enterprises take up these initiating roles in energy transition.</p>	<p>The indicated non-state/hybrid sphere actors can stimulate ENCI. High levels of 'enlightened' enterprise (i.e., taking initiatives towards energy transition) will in principle incite ENCI - either through acts of intermediation (Cf. WP4) that support and empower citizens, or rather directly as organizational contexts in which individuals and groups enact ENCI. Also in this case, the operation of the factor and its kind of influence are not entirely clear-cut: Very low scores on this factor do not necessarily lead to disempowerment, but may also evoke the emergence of ENCI in other institutional spheres - to the extent that market, state and hybrid institutional sphere work as communicating vessels for the emergence of ENCI agency.</p>	<p>No</p>	<p>In particular, type 3 and 4</p>	<p>O: The entrepreneurial initiatives towards energy transition are in principle an opportunity, a possible boost for ENCI. Companies may develop organizational cultures of ENCI (placing signs asking to mind turning out lights and heating after leaving, or initiating discussions about parking facilities and mobility management). High energy prices (see economic factors) provide direct incentives towards such political agency of firms - some of which are facing decisions to temporarily shut down their production. T: A possible threat is the 'capture' of ENCI by firms - appropriating the ENCI language whilst filtering out the ENCI elements that are less convenient and possibly disruptive.</p>

<p>P4.2. Energy transition initiative through semi-governmental organisations and utilities</p>	<p>The liberalisation of the energy market, and more generally the liberalisation wave that has led to the privatization of various utilities and state-owned companies, has created a situation in which governmental actors are tied up closely with semi-governmental actors: Utilities and housing corporations, notably. These actors have strong national-level influence, but they also have political lobbies/interest organisations at the EU level. These semi-governmental organizations can operate entirely in line with governmental visions and policies - and to a certain extent they just need to comply. Yet as semi-governmental organizations they also have a certain autonomy and particular interests and constraints: Their choices to take more or less initiative towards energy transition is therefore a subfactor in its own right.</p>	<p>These initiatives, to the extent that they work towards similar energy transition objectives of energy democracy and sustainability, can support ENCI (through the actions of intermediaries, or as collective forms of ENCI).</p>	<p>No</p>	<p>In particular, type 3, 4 and 9</p>	<p>O: These initiatives, to the extent that they work towards similar energy transition objectives of energy democracy and sustainability, are in principle opportunities for ENCI (through the actions of intermediaries, or as collective forms of ENCI). T: The main threat is that these major institutional actors become too strong intermediaries, taking over the initiative and thereby stifling ENCI.</p>
<p>P4.3. Energy transition initiative through public-private collaborations</p>	<p>Much implementation of governmental energy visions, policies and projects takes place through public-private partnerships (PPP). This is especially the case regarding large-scale projects of infrastructure development and/or construction - governmental actors lack funds, expertise, resources and market actors have incentives to implement in cost-effective and innovative ways. The very construction of a PPP implies a hybrid institutional logic, partly informed by governmental objectives and partly by profit motives. Accordingly, PPP is a subfactor in its own right.</p>	<p>These initiatives, to the extent that they work towards similar energy transition objectives of energy democracy and sustainability, can support ENCI (through the actions of intermediaries, or as collective forms of ENCI).</p>	<p>No</p>	<p>In particular, type 3, 4, 7 and 8</p>	<p>O: These initiatives, to the extent that they work towards similar energy transition objectives of energy democracy and sustainability, are in principle opportunities for ENCI (through the actions of intermediaries, or as collective forms of ENCI). T: The main threat is that these collaborations between state and market actors become too strong intermediaries, taking over the initiative and thereby stifling ENCI. A specific risk is 'mission drift', away from the political ideals informing ENCI, in favour of considerations of profit, efficiency or administrative control.</p>
<p>P4.4. Energy transition initiative through triple-helix innovation programs</p>	<p>The energy transition involves a wide range of innovations in technologies (Cf. technological factors), infrastructures, production processes, and in various social and institutional components of the energy system as well. In all cases, these innovations require knowledge, learning and experimentation facilities. Academia, R&D organizations and schools are therefore particularly important non- or semi-governmental actors. The degree to which they undertake initiatives towards energy transition is therefore a relevant subfactor in its own right.</p>	<p>The very existence of H2020 (and this research project) reflects the belief in European-level political-decision-making that this factor is a potential boost to ENCI. Identifying what ENCI is, where it can be found, what factors are conducive to its flourishing, and through what actions/policies it can be stimulated - these are all knowledge resources through which to boost ENCI. The effects of this factor on ENCI are not clear-cut: Research and innovation follow their own dynamics of prioritization and thematic focus, and funding can increase or decrease.</p>	<p>No</p>	<p>In particular, type 3, 4, 7 and 8</p>	<p>O: These initiatives, to the extent that they work towards similar energy transition objectives of energy democracy and sustainability, are in principle opportunities for ENCI (through the actions of intermediaries, or as collective forms of ENCI). T: The main threat is that these collaborations of established actors become too strong intermediaries, taking over the initiative and thereby stifling ENCI. A specific risk is that research and innovation follow their own dynamics of prioritization and focus, and funding can increase or decrease.</p>

<p>P5. Empowerment policies</p>	<p>Our working definition considers that ENCI is ...<i>"an ideal that can be lived up to and realized to varying degrees, according to different framework conditions and states of empowerment"</i> (Pel et al. 2021:64). The latter point about states of empowerment reminds of the relevance of framework conditions and indeed political factors that can empower individuals - and especially vulnerable, underprivileged individuals - to a greater or lesser extent. This factor captures the range of governmental policies and non-state initiatives dedicated to the empowerment of vulnerable groups: those suffering from energy poverty, those marginalized through a lack of energy literacy, and those overlooked or underrepresented in decision-making on energy matters.</p>	<p>This factor works relatively unambiguously as a boost to ENCI. Taken together, they allow passive or not-yet-active energy citizens to become energy citizens that make certain achievements in terms of sustainability and energy democracy. High levels of 'inclusion and empowerment policies' - assuming that they are effective - leads to higher-achieving ENCI, i.e., forms of ENCI that reach beyond shallow greening, and to higher degrees of ENCI within populations, i.e., towards broader transformative goals of inclusion and inclusion of marginalized social groups.</p>	<p>No</p>	<p>This factor affects (or is linked to) in particular the outcome-orientation of ENCI.</p>	<p>O: Intensified efforts on these policies would enhance, deepen, spread out, ENCI. The 'Just transition' policy programs to 'leave no-one behind' are essentially responding to the risk that this factor may be neglected.</p> <p>T: Empowerment may remain incomplete, i.e. fail to reach those who need it most. There is a risk of ending up with unequally distributed ENCI capacities and ENCI results - an 'ENCI divide', similar to the 'digital divide' or the 'education gap'.</p>
<p>P5.1. Recognition of energy poverty and vulnerable citizens as a political priority</p>	<p>Energy poverty has only quite recently become known and acknowledged as a concern for policy. Poverty has been on the political agenda, for a long time, but energy poverty is still in the process of gaining political salience. There is an increased recognition of energy poverty and vulnerable citizens, households and consumers, in EU legislation and strategies, especially in the Fit for 55. The ongoing energy price crisis has moved this issue further up the agenda. Still, energy poverty and the associated issues of vulnerability can move up and down the political agenda, and gain or lose priority. This political recognition is therefore a subfactor in its own right.</p>	<p>This subfactor adds to the overall working of factor P5 - as a boost to ENCI and especially to its political commitments to inclusion, energy democracy, and empowerment of vulnerable groups.</p>	<p>No</p>	<p>This factor affects (or is linked to) in particular the out-come-orientation of ENCI.</p>	<p>O: This political acknowledgement is quite unambiguously an opportunity for ENCI – notably for the agenda-setting and the societal awareness of democratization and energy justice challenges.</p> <p>T: The political recognition may remain incomplete, i.e., fail to reach those who need it most. A further risk resides in polarized politicization of the issue- who is entitled to what?</p>
<p>P5.2. Data gathering and mapping of energy poverty at the EU-level</p>	<p>Political agenda-setting also depends on the evidence gathered and the monitoring systems developed. These are essential parts of evidence-based policymaking, and of institutionalization of a policy issue. The Energy Poverty Advisory Hub/EU Energy Poverty Observatory was established with the aim of fostering transformational change in knowledge about the extent of energy poverty in Europe, and innovative policies and practices to combat it. The creation of an Energy Poverty Observatory was part of the European Commission's policy efforts to address energy poverty across EU countries. It is an important actor in the collection of data regarding energy poverty across Member States. The Energy Poverty Atlas is an example of how this work is being disseminated.</p>	<p>This subfactor adds to the overall working of factor P5 - as a boost to ENCI and especially to its political commitments to inclusion, energy democracy, and empowerment of vulnerable groups.</p>	<p>No</p>	<p>This factor affects (or is linked to) in particular the out-come-orientation of ENCI.</p>	<p>O: This subfactor adds to the overall working of factor P5 - as a boost to ENCI and especially to its political commitments to inclusion, energy democracy, and empowerment of vulnerable groups. Evidence articulates and calls attention to as yet somewhat less visible problems.</p> <p>T: Mapping also comes with certain biases and measurement errors – excessive contestation over the data could undermine the legitimacy of the policies and the recognition of the issue.</p>
<p>P5.3. Energy literacy and energy poverty empowerment programs.</p>	<p>The empowerment policies are to a significant extent a matter of problem articulation and agenda-setting - but of course they also consist of concrete actions that can be more or less far-reaching, ambitious and impactful. On EU-level there is a marked rise of initiatives, projects and programmes (financed with EU funding, see H2020 projects on energy poverty) dedicated to the empowerment of disadvantaged groups - lacking the material resources but also the skills and the 'energy literacy' to become active energy citizens. Other examples include the LIFE Clean Energy Transition Programme.</p>	<p>This subfactor adds to the overall working of factor P5 - as a boost to ENCI and especially to its political commitments to inclusion, energy democracy, and empowerment of vulnerable groups.</p>	<p>No</p>	<p>This factor affects (or is linked to) in particular the out-come-orientation of ENCI.</p>	<p>O: The projects and programs add to the overall working of factor P5 - as a boost to ENCI and especially to its political commitments to inclusion, energy democracy, and empowerment of vulnerable groups.</p> <p>T: The translation of general objectives into programs and projects comes – as usual -with risks of fragmentation and uneven distribution. A specific threat resides in the sensitivity of any empowerment program: They can be experienced or perceived as patronizing, and the target groups may mistrust the interventions.</p>
<p>P5.4. Education/ professional training programs/ projects</p>	<p>The empowerment projects and programs are not limited to energy poor citizens and households. There are also various initiatives, projects and programmes (financed with EU funding) geared towards professionals, towards intermediary organizations, and towards citizens that have already started to undertake ENCI activities, in order to strengthen 'sustainable competitiveness' as set out in the European Green Deal. See the European Skills Agenda. These broader projects of education, re-skilling and professionalization are relevant subfactors of 'empowerment policies' in their own right. Re-skilling and re-orientation under the Just Transition Mechanism is one example that targets workers in regions and sectors that are most affected by the transition given their dependence on fossil fuels, including coal, peat and oil shale or greenhouse gas-intensive industrial processes.</p>	<p>This subfactor adds to the overall working of factor P5 - as a boost to ENCI.</p>	<p>No</p>	<p>This factor affects (or is linked to) in particular the out-come-orientation of ENCI, and the ENCI in organisations.</p>	<p>O: The projects and programs add to the overall working of factor P5 - as a boost to ENCI and especially to the ENCI in organisational-professional contexts.</p> <p>T: No major threats apply. Compared to the programs targeting vulnerable groups, the political and implementation risks are lower.</p>

2.1.3 Considerations on the political factors

As indicated earlier, the P of political factors stands out within the PESTEL: It indicates purposive steering rather than autonomous developments. On the EU-level, such purposive influencing of ENCI is not self-evident – it requires agreement between member states, and such consensus can be lesser or greater. This is the basic reasoning behind factors **P1 (EU-level political unification in the energy sector)**, **P2 (Agreed upon climate and energy policy targets with current strategic developments)**, **P3 (Commitments to participative governance)** and **P5 (Empowerment policies)**. Associated with different political objectives and ethical commitments, these four factors correspond quite directly with the normative contents of ENCI. Accordingly: All four factors are by and large factors indicating opportunities for, and possible governmental empowerment of, ENCI. This empowerment can be increased through non-state or semi-state actors. As this governance beyond-the-state is arguably a factor in its own right, we have included **P4 (Non-governmental initiative towards energy transition)**.

Even if generally operating as supportive factors and as possible opportunities, these political factors are far from straightforward 'drivers' of ENCI. The overview table specifies this. The factors can of course develop adversely, into, for example, lacking consensus and diminishing European-wide commitment to the Energy Union and the associated ENCI ideals. Yet there are also certain inherent ambiguities that make these factors into rather complex 'drivers': For example, certain forms of state and market initiatives may empower ENCI and act as intermediaries, yet they may also cancel out the bottom-up initiatives towards ENCI. Moreover, these five factors indicate that there is a multitude of policy tracks and political ideals that each prioritize different aspects of ENCI (energy poverty, sustainable development and decarbonization, democratization), and different target groups (vulnerable citizens, professionals, or society at large). Finally, much remains to be clarified about the ways in which different political factors favour different forms of ENCI. The analysis has sketched how the factors may drive towards a great range of (individual/collective, reformative/transformational) ENCI futures, and provides a detailed map that could serve as a base of discussion for future policy development.

Meanwhile, the point of the PESTEL analysis is that the political factors are factors amongst others. The next section on economic factors exemplifies how ENCI is the product of multiple, often divergent forces – including the, sometimes unpredictable, dynamics of markets.

2.2 Economic factors

2.2.1 Methodological specificities

The economic factors were developed by the same team as the political factors. As explained in section 2.1.1., the development of the political and economic factors was undertaken in an integrated manner. Consequently, the main methodological specificities in terms of iteration between induction and deduction and the sources of information used at EU and national levels are the same for both the political and economic factors. Due to the reductive nature of the PESTEL analysis, the basic distinction between governmental intervention and market forces was used to structure the analysis. As described further in section 2.2.3, our analysis of the latter returns to the very origins of the ENCI concept: Defined as a shift away from energy consumerism, i.e. economically-driven and market-logic dominated forms of participation in energy systems (Devine-Wright 2007), how does ENCI continue to be shaped by economic factors? *And given this spectrum of consumerism and prosumerism, which kinds of ENCI could the various economic factors be driving towards?*

Regarding this analysis of economic factors, all the general limitations of the PESTEL analysis (not fully exhaustive *qua empirical* basis, limitations of precision, debatable categorizations) apply. The latter limitation may apply particularly strongly to this analysis of economic factors: The analysis does not present a consistent economic line of reasoning or a systematic consideration of key economic parameters (interest rate, inflation rate etc.). The lack of rigour is only relative, however: Rather than attempting an economic analysis of the European energy system, this section presents an analysis of economic factors that – together with other PESTEL factors – shape the development of energy *citizenship*.

2.2.2 Synthesis table of the Economic factors

Texts of reference (main EU documents are mentioned here, other sources are integrated as links in the table below):

Theme	Official journal publication
Electricity directive	14/06/2019 - Directive (EU) 2019/944
Community framework for the taxation of energy products and electricity	27/10/2003 - Council Directive (EU) 2003/96/EC 14/7/2021 - Proposal for a Council Directive 2021/563 (recast)
State aid in the Treaty on the Functioning of the European Union	09/05/2008 - Article 107 TFUE
REPowerEU plan	8/5/2022 - Communication (EU) 2022/230
Guidelines on State aid for climate, environmental protection and energy	18/2/2022 - Communication (EU) 2022/481
Temporary Crisis Framework for State Aid measures to support the economy following the aggression against Ukraine by Russia	24/3/2022 - Communication (EU) 2022/1890
The European Green Deal	11/12/2019 - Communication (EU) 2019/640

FACTORS SUBFACTORS	DESCRIPTION	HOW IT WORKS AS A FACTOR FOR ENCI	MENTION OF ENCI	AFFECTED TYPES OF ENCI & OUTCOME-ORIENTATION	OPPORTUNITY and/or THREATS for ENCI
EC1. Energy prices	The prices of electricity , transport and heating fuels fluctuate. These prices, and the costs they imply for energy consumers, are a very direct way for individuals to become implied in energy systems as consumers. Price spikes can lead to the politicisation of energy consumption, and issues of energy poverty and energy literacy can gain salience on political agendas.	The direct effect of high energy prices is that they pose acute price incentives. They put a premium on, or pose necessities of, energy saving and energy citizenship. Increasing prices also pose more pressing issues of energy poverty, and they make the socio-economic inequality more acutely felt and visible. This could induce a shift in the societal mood towards ENCI practices specifically geared towards fostering energy justice and energy democracy. <i>In general</i> , higher levels of this factor induce higher levels of ENCI. Still the conditioning may be more complex than that. For example, very high prices are likely to be economically and socially disruptive, and can generate collective action such as protests and the ignition of social movements. The ensuing political tensions may work towards conscientious and altruistic ENCI behaviours, but they may also work towards egocentric, competitive behaviours.	No	The price incentives tend to stimulate financial-economically motivated forms of ENCI, rather than ethical-politically motivated forms of it (Devine-Wright 2007 would say that the price incentives drive towards energy <i>consumerism</i> and not towards ENCI). Grosso modo, price incentives can be expected to induce the reformati-ve, pragmatic kinds of ENCI. Yet if this factor also comes with strong effects of (unequal) distribution and vulnerability, it may - through this effect of politicisation - also evoke inclinations and initiatives towards <i>transformation-seeking</i> ENCI.	O: As indicated, the factor poses in principle opportunities for the development of reformati-ve and transformative types of ENCI. T: The effects are ambiguous: Current extreme developments have indicated the potentials for political tensions, which could lead into politicisation and mobilisation <i>against</i> ENCI.
EC1.1. Security of energy supply	Security of energy supply , for example, of fossil fuels, such as natural gas, oil and coal, but also biomass, and renewable energy production of intermittent character, has a direct impact on energy prices. This economic factor is a matter of resource basis and capacity to exploit/develop energy sources, but relative scarcity is also of importance. EU's geopolitical relationships with non-EU actors (Russia, but also suppliers such as Azerbaijan or the Gulf States) are crucial. This subfactor is closely related to the political factors.	The direct effect of scarcity/variation of supply is that it poses price incentives. They put a premium on, or pose necessities of, energy saving and energy citizenship.	No	Potentially all. See above.	O: This subfactor opens up opportunities for transformative-seeking ENCI, as far as it calls attention to and political urgency of issues of unequal distribution and vulnerability. T: Without adequate planning and investment in storage solutions, demand flexibility, energy savings, grid capacity and interconnections, intermittency of renewable energy could impact decisions to keep or invest in nuclear and fossil fuels. Short-term investment decisions (for example in LNG infrastructure or new long term gas contracts with new trade partners) risks locking the EU into fossil fuel dependency even longer. More generally, crisis-mode decisions could lead to 'bring the state back in' and favour a resort to command-and-control, rather than democracy and ENCI.
EC1.2. Security of supply of raw materials and other resources	Next to the energy prices themselves (of electricity, heating, and fuels, cf. factor EC1.2.), there are also various other costs that determine the scope for consumption and investment in the energy system. For example, the installation of solar panels comes with costs of the panels themselves, possible costs of retrofitting or adaptations in the built environment, and labour costs. The domestic/European access to raw materials is a key concern, as is the availability of technology . The prices for these secondary energy materials and resources can fluctuate considerably, and certain materializations of ENCI (e.g. prosumerism) even run into waiting lists for services and materials. This subfactor is strongly related to the technological factors.	The direct effect of high prices for materials and resources is that they. They put a premium on, or pose necessities of, energy saving and energy citizenship.	No	Potentially all. See above.	O: High prices pose price incentives towards ENCI. T: Tight labour markets, hampering supply, dependence on critical materials and sudden rises of demand have led to fears that various ENCI ambitions run into material-physical constraints. T: Increase in European production of raw materials and recourses can lead to conflicts over land use and protests.

<p>EC1.3. Relative cost of renewables and fossil fuels</p>	<p>The cost-competitiveness of renewables is a key factor in the phase out of fossil fuels and to ensure access to affordable clean energy for citizens. It is dependent on the factor EC1.2. In 2020, the price of solar photovoltaics was for the first time cheaper than natural gas, a trend that has continued since.</p>	<p>The relative prices of renewable and fossil energy production pose incentives towards investment in the one or the other. The effects on ENCI are not straightforward: The development of the price differential could put a premium on (individual or collective) renewable energy prosumerism, and bring it within reach of broader groups beyond the well-to-do citizens. It could empower towards ENCI, in the sense of providing the financial resources for it. Yet the price differential could also lead to increased gaps between the privileged active energy citizens, and the disadvantaged citizens remaining locked-in in passive energy consumership. More generally, the price incentives could provide both pushes towards ENCI behaviours as well as - in the case of sudden changes and threats to the livelihood of individuals and households - anxiety and resentment.</p>	<p>No</p>	<p>Potentially all. See above.</p>	<p>O: The relative prices of renewable and fossil energy production could put a premium on (individual or collective) renewable energy prosumerism, and bring it within reach of broader groups beyond the well-to-do citizens. It could (financially) empower towards ENCI.</p> <p>T: The price development could engender increased gaps between the privileged active energy citizens and the disadvantaged citizens.</p> <p>T: Sudden changes and threats to the livelihood of individuals and households could create anxiety and resentment.</p>
<p>EC1.4. Inflation rate and purchasing power</p>	<p>Inflation means that the prices of goods and services in an economy increase. When price levels rise, i.e., the inflation rate increases, this has an impact of citizens' purchasing power as each unit of currency can buy fewer goods and services. Inflation has a direct impact on the purchasing power of citizens, and on the affordability of energy.</p>	<p>The direct effect of inflation on citizens' purchasing power affects ENCI in deep yet not entirely straightforward ways. However strongly determined by energy prices, currently and possibly for a longer time to come, receding buying power is not only determined by energy. And 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, or poses necessities of, energy saving and energy citizenship.</p>	<p>No</p>	<p>Potentially all. See above.</p>	<p>O: This factor can provide financial incentives towards ENCI</p> <p>T: Sudden changes and threats to the livelihood of individuals and households creating anxiety and resentment. The development of overall inflation also depends on various non-energy developments - this underlines the uncertainty involved.</p>
<p>EC2. Steering the European economy through market intervention</p>	<p>Energy is not a regular good: Prices are intervened in by governments through a range of instruments (e.g., subsidies, taxation, and emissions trading) and for a range of reasons (e.g., energy security, environment, etc.). This factor EC2 amounts to purposive interventions in factor EC1, and can be considered in direct relation to those.</p>	<p>The subsidies and market corrections typically serve to correct market failures and promote public goods/collective political goals. In this sense they can generally be expected to support ENCI: Creating favourable conditions for sustainable energy production and for energy saving, and/or empowering vulnerable individuals/organizations towards more active forms of energy citizenship. Meanwhile, notwithstanding this general positive influence on ENCI (one can think of the various subsidies available for ENCI-related projects and initiatives), there are various complications and uncertainties: This factor can also work against ENCI, if implemented inaccurately (e.g., subsidies favouring the relatively privileged groups and missing the vulnerable), or if interpreting 'sustainability' in a too loose fashion (e.g., the discussions on gas and nuclear energy). Unbalanced subsidies leading to more social injustice can, on the other side, fuel political protest and engagement.</p>	<p>No</p>	<p>Regarding the agency dimension of ENCI, it can favour individual citizen/consumers but can also turn out to rather support collective actors - profit, non-profit, or hybrid. Regarding the 'outcome-orientation' dimension of ENCI, no clear distinctions can be made. Revolving around price incentives, this factor may generally stimulate the reformative-minded forms of ENCI - but as indicated, these interventions in the market can serve various goals, including 'transformative' oriented politics of deep sustainability and fundamental redistribution.</p>	<p>O: The subsidies and market corrections typically serve to correct market failures and promote public goods/ collective political goals. In this sense they can generally be expected to support ENCI:</p> <p>T: There are various potentially perverse effects of subsidies - favouring domestic 'flagship industries', incumbent actors, and relatively privileged citizens. As such they may work against (or insufficiently in favour of) ENCI ideals.</p>

<p>EC2.1. Integration and liberalisation of the EU electricity market</p>	<p>The liberalisation and unbundling of the energy market (the first energy package in 1996 and 1998) enabled the development of many forms of ENCI. The Directive on common rules for the internal market for electricity (last updated in 2019) establishes common rules for a "consumer-centred" integrated and competitive European energy market, where affordability and transparency for consumers are especially highlighted through provisions on consumer empowerment and protection, and open access to the integrated market. This economic ordering towards decentralization can be maintained, pursued further, or fine-tuned. This factor can also 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. This subfactor is strongly related to the legal factors.</p>	<p>The liberalised and integrated European electricity market aims to ensure affordable and transparent electricity prices for consumers. Consumers are supposed to be free to choose their electricity supplier on a competitive market. This supports reformative household-level ENCI. Furthermore, the decentralization of the energy system works in principle as an enabler of ENCI, through the development of decentralized renewable energy production, notably citizen-led renewable energy communities. With the energy price crisis, the cost of living and energy poverty have become prominent issues. The functioning of the European electricity market and Government intervention have been widely politicised. Member States have spent billions of euros to shield costumers and businesses from high electricity prices, although not necessarily targeted towards the most vulnerable or incentivising energy savings for big consumers. These (envisioned) policies could ignite both reformative and transformative types of ENCI.</p>	<p>Consumers, citizens, vulnerable consumers, businesses</p>	<p>Potentially all. See above.</p>	<p>O: This factor provides opportunities for greater involvement of citizens in electricity generation, lifting remaining barriers such as high administrative costs, complex procedures, etc. T: The energy price crisis shows the fragility of the liberalised market. Many alternative suppliers purchased their electricity on spot markets and did not invest in their own generation capacity, and found themselves in financial trouble. The ensuing uncertainty and acute risks may undermine the trust, the means and the courage for ENCI.</p>
<p>EC2.2. Steering through EU fiscal policy</p>	<p>The Energy Taxation Directive (ETD) establishes the framework conditions for the taxation of electricity, motor, aviation fuels and most heating fuels through EU-wide minimum tax amounts. Energy taxes have a steering effect. 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 minimum tax amounts vary according to the type of fuel and their use. The ETD is currently being revised in the European Commission's 'Fit for 55' climate policy package with the purpose to align it with the Union's climate objectives.</p>	<p>Energy taxation is one way to create price incentives for citizens and businesses to shift to clean energy sources. "<i>Taxation plays a direct role in supporting the green transition by sending the right price signals and providing the right incentives for sustainable consumption and production. In this context, effective environmental taxation and the removal of incentives for fossil fuel consumption throughout the EU are needed to deliver the greenhouse gas emission reductions together with other regulatory measures.</i>" (COM/2021/563 final). The politicisation of energy prices can also result from fiscal policy, as seen for example in France with the Yellow Vest movement, which could have an impact on ENCI.</p>	<p>Energy consumers, citizens</p>	<p>Potentially all. See above.</p>	<p>O: The factor may create price signals that incentivise the phase-out of fossil fuels (especially if the recast directive includes new minimum rates for different energy types based both on energy and CO2 content). As such they pose opportunities for ENCI. T: In the absence of an agreement on the above-mentioned amendments on the Energy Taxation Directive, Member States will be free to cancel the price signal of ETS2 by changing their national taxation rates on fossil fuels. This would undermine the policy, and risks fuelling social frustration and feelings of injustice.</p>
<p>EC2.3. State aid adapted to the European Green Deal</p>	<p>State aid legislation controls state intervention on the European internal market under Article 107, TFUE. All such intervention is deemed unlawful unless provided under an exemption or notified by the European Commission. To align state aid rules with the European Green Deal and the European Climate Law, revised Guidelines on State aid for climate, environmental protection and energy entered into force in January 2022. The formulation of these rules can enable different types of ENCI. These rules are often adapted in times of crisis, such as during the covid-19 pandemic and the energy price crisis (2021-2022).</p>	<p>The revised state aid guidelines can support ENCI in several ways: Renewable Energy Communities can benefit from aid without competitive bidding if projects are below 6MW capacity, or 18MW for wind generation; member states can provide up to 300,000 EUR per project to SMEs for energy efficiency measures, without competitive bidding; aid may be granted for acquisition and leasing of new and used clean vehicles, retrofitting, refitting and adaptation of vehicles, and deployment of recharging and refuelling infrastructure; for buildings, aid is allowed for measures aiming to improve energy and environmental performance, including installation of renewables, energy storage and installation of charging infrastructure.</p>	<p>Renewable energy communities, SMEs, consumers citizens, vulnerable citizens, households</p>	<p>Especially type 2, 3, 7 and 8.</p>	<p>O: If the provisions in article 6.4 in the Climate Law on legislative consistence with the 2050 objective on climate neutrality were applied to the special state aid guidelines during times of crisis, this could provide an opportunity for ENCI. T: The new guide lines allow state aid for gas projects that risks creating further fossil fuel lock in.</p>
<p>EC2.4. The EU Emissions Trading System and the inclusion of buildings and transport</p>	<p>The EU ETS is the European carbon market. It is described as a corner stone of European climate policy to ensure cost-efficient reduction of GHG emissions from carbon intensive sectors. So far, the EU ETS covers electricity and heat generation sectors, energy-intensive industry sectors, and commercial aviation within the European Economic Area. The two latter sectors however benefit from a large amount of free allocations of emissions rights. On July 14 2021, as part of its new climate package (Fit for 55), the EU Commission proposed to introduce an EU-wide carbon price on heating and road transport (ETS2) from 2026 onwards, which would have a direct impact on households and small to medium sized businesses.</p>	<p>On paper, the EU ETS should create the right price signals to phase out fossil fuels. However, the free allocations to a large extent cancels out these price signals, together with a weak ETD (Cf.EC2.2). Furthermore, the proposed ETS2 is a high-risk low-reward policy that risks triggering social unrest against EU and climate policies, until mass access to affordable clean alternative is achieved. The rationale for a carbon price is two-fold: first, to incentivise the switch from fossil fuels to low-carbon alternatives, and second, to raise revenues to finance the energy transition. However, carbon price signals do not work very well for buildings and mobility decarbonization for several reasons (see paper linked above).</p>	<p>No</p>	<p>Potentially all. See above (main factor).</p>	<p>O: This factor could create the price signals towards a sustainable and fair energy transition. T: If the price signals are cancelled out, there is a risk that the ETS is inefficient and viewed as an illegitimate mechanism. T: If the ETS2 is introduced before mass access to affordable clean alternatives and/or adequate support mechanisms are put in place for vulnerable citizens, it risks creating social backlash.</p>

<p>EC2.5. Fossil fuel subsidies</p>	<p>In order to reach climate neutrality by 2050, the EU needs to phase out subsidies to fossil fuels in a socially fair manner. Fossil fuel subsidies accounted for €52 billion in the EU in 2020. Petroleum products account for more than half of the total fossil fuel subsidies in the EU.</p>	<p>On the one hand, fossil fuel subsidies lower the economic burden on citizens and businesses for electricity and transport fuels. A phase-out that does not take social implications of price increases into consideration or includes investments in accessible clean alternatives could serve to enhance existing vulnerabilities and create further vulnerabilities. On the other hand, fossil fuel subsidies pose a legitimacy challenge for governments, as governments incite citizens and businesses to act in sustainably while continuing to financially support carbon-intensive and polluting fossil fuels.</p>	<p>No</p>	<p>Potentially all. See above (main factor).</p>	<p>O: Fossil fuel subsidies distort price signals that could incentivise investments and a switch to clean energy and therefore pose a legitimacy challenge for governments. This could evoke certain (transformation-oriented) forms of ENCI.</p> <p>T: If a phase-out does not take into account social implications, this could risk widening existing inequalities.</p>
<p>EC3. Design of and access to financing and investments</p>	<p>This factor indicates the various financial support measures that are available to support investment choices in line with ENCI (i.e., geared towards sustainability and energy democracy).</p>	<p>The various financing opportunities amount to financial empowerment towards ENCI. They can be weakly developed, and in that case, we see individuals and organizations struggling to materialize their ENCI ideals and suffering from heavy financial risks. By contrast, if the factor is strongly developed, we see how the frontrunners are being followed by a large group of middle-class late adopters - and how active forms of ENCI become both normal as well as feasible and within reach for a broad range of people. As indicated through the notion of 'bringing within reach': This factor also influences the social distribution of ENCI, i.e., the degree to which ENCI mainstreamed, or limited to particular privileged groups.</p>	<p>No</p>	<p>These financing opportunities tend to stimulate financial-economically motivated forms of ENCI, rather than ethical-politically motivated forms of it. As such they tend to reinforce especially the reformist modes of ENCI. Importantly, financing opportunities can be provided through a variety of institutional arrangements - some favouring individual modes of agency, some rather favouring collective forms of ENCI.</p>	<p>O: Financial empowerment of ENCI, across EU MS.</p> <p>T: A threat is the possibility of increasing inequalities between those who can, and those who cannot, for different reasons, seize these opportunities.</p>
<p>EC3.1. EU funds and investment schemes that aim to contribute to a more sustainable EU</p>	<p>Within the EU system there are different types of funding: grants, financial instruments (loans, guarantees and equity), subsidies, trust funds prizes and procurements (public contracts). Several funding programmes have the potential to support ENCI in different ways, for example by funding projects that work with re-skilling and up-skilling of workers for green jobs, energy efficiency in companies, energy renovation schemes, renewable energy production and the development of clean transport. Climate contribution targets are set for the programmes so that they together contribute to the overall 32% target of the EU budget on climate-relevant spending. Climate contribution targets set an indicator of funding. The most important ones are (2021-2027): Just Transition Fund (€ 19.32bn), European Social Fund+ (€99.26bn), The Recovery and Resilience Facility (€732.82bn), Cohesion Fund (€48.03bn) Programme for Environment and Climate Action (€5.43bn), European Regional Development Fund (€226.06bn), Horizon Europe (€95.51bn).</p>	<p>Some examples and their relevance for ENCI: Just Transition Fund includes grants to regions expected to be the most negatively impacted by the green transition, supporting investments in SMEs, clean energy, up- and reskilling of workers and transformation of carbon-intensive installations, 100% climate contribution target; European Social Fund+ contributes to a skilled workforce for the transition; Recovery and Resilience Facility aims to prepare MS for the challenges and opportunities of the green transition through coherent plans of reform and public investment projects, 37% climate contribution target; Cohesion Fund supports MS with a gross national income per capital below 90% of the EU 27-average through investments in environment and transport infrastructure, tackling energy poverty and reducing GHG emissions, 37% climate contribution target; Programme for Environment and Climate Action (LIFE) facilitates the shift towards a sustainable, circular, energy-efficient, renewable energy-based, climate-neutral and resilient economy, 61% climate contribution; European Regional Development Fund enables investments to make Europe and its regions greener, low carbon and resilient, closer to citizens, supporting locally-led development and sustainable urban development across the EU, 30% climate contribution; Horizon Europe supports research and innovation, for example on ENCI, 35% climate contribution.</p>	<p>No</p>	<p>Types 1-9, especially type 3 and 4.</p>	<p>O: Financial empowerment of ENCI, across EU MS.</p> <p>T: A threat is the possibility of increasing inequalities between those who can, and those who cannot, for different reasons, seize these opportunities.</p>

<p>EC3.2. Access to financing: technical assistance and capacity building</p>	<p>Access to EU financing is important for ENCI, especially in terms of democratisation of the energy system. This determines whether others than the highly professionalised and/or well-staffed actors can benefit as well.</p>	<p>This factor influences ENCI since the absorption of EU funds is correlated to administrative capacity – which is unequally available among municipalities and regions. Access to EU funding is more challenging for small actors (NGOs, businesses) since they often lack the expertise and human resources to go through sometimes lengthy and administratively burdensome processes. Support mechanisms do however exist. For example, the Energy Community Repository was launched in April 2022 and is an initiative on behalf of the European Commission to assist local actors (citizens, local authorities, and businesses) with setting up and advancing clean energy projects driven by energy communities in urban areas across Europe through data collection and analysis, best practices and experience sharing, and technical assistance. The Rural Energy Community Advisory Hub is its counterpart for Rural communities. Another example is the H2020 project PROSPECT that enables capacity building of LRAs in order to finance and implement effective sustainable energy plans, including their proper monitoring and verification.</p>	<p>No</p>	<p>Types 1-9, especially type 3 and 4.</p>	<p>O: Increase equality of opportunity for the financial empowerment of ENCI, across EU MS. T: If support increasing inequalities between those who can, and those who cannot, for different reasons, seize these opportunities.</p>
<p>EC3.3. Inclusion and participation in the governance of EU funds</p>	<p>Another way that EU financing can contribute to increased democratisation of the energy system is through the way that funds are governed, for example, through ensuring that a broad range of stakeholders participate in the programming process.</p>	<p>In the European structural and investment funds (e.g., European Regional Development Fund, European Social Fund, Cohesion Fund etc.), the partnership principle is applied. This means that the partnership process is applied throughout the entire programming. In the 2014-20 programming period, the partnership principle has been strengthened even further, including not only Member States, but also stakeholders such as trade unions, employers, non-governmental organisations (NGOs), and other bodies that promote, for example, social inclusion, gender equality, and non-discrimination. When it comes to other funds, for example the Recovery and Resilience Facility, the development of national plans was heavily criticised for a lack of consultation with relevant implementing stakeholders (e.g., local and regional authorities, social partners, and civil society actors). By increasing democratisation in the governance of EU funds, ENCI could be strengthened.</p>	<p>No</p>	<p>Potentially all.</p>	<p>O: Increased democratic governance of EU funds that could strengthen ENCI across a wide range of stakeholders. T: Weak involvement in the governance of EU funds weakens support for and legitimacy of for the EU supported investments.</p>
<p>EC4. Economic growth</p>	<p>Economic growth sets constraints, and it may open up opportunities for investment. EU policy frameworks emphasize its importance: The energy transition requires continued growth, and is expected to allow for 'green growth' through so called 'de-coupling'. There is a certain pessimism and fear in Europe about the likelihood of stagnation and recession: Next to recent crises (e.g., Ukraine crisis, COVID crisis, energy price crisis, heavy inflation, populism and political instability) there are also middle and long-term trends (critical materials, geopolitics, innovative capacity, demographics) that raise doubts whether Europe will be able to stay competitive, and continue its economic growth. Next to business-as-usual, continued growth, ENCI may also develop in a context of economic decline.</p>	<p>Economic growth shapes the overall development of economy, society and environment - and by consequence, it matters to ENCI. Yet it is difficult to specify the linkage. 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 of degrowth, deceleration, dematerialization, decommodification etc. in which ENCI becomes needed, accepted, and normalized.</p>	<p>No</p>	<p>The causal linkages are highly complex and the effects of this factor are ambiguous. Still, it is arguable that high- and low-growth will grosso modo evoke different kinds of ENCI. The 'reformative' modes of ENCI seem to presuppose and relatively stable environment of continued growth, for example. By contrast, the relative turmoil of fast economic downturn seems more conducive to transformative ambitions. Regarding the agency dimension, one could consider how collective forms of ENCI, carried by organisations and institutions, may have a harder time under conditions of economic stagnation.</p>	<p>O: As far as ENCI forms part of ambitions towards 'Green Growth', continued economic growth poses an opportunity (or even a precondition) for it. T: Yet it can also be maintained that ENCI can only flourish after there has been a deeply resounding wake-up call of responsabilisation - in that sense, continued economic growth is rather a threat for ENCI.</p>

<p>EC4.1. Green industry development</p>	<p>The European Green Deal is Europe's ambitious strategy towards 'green growth'. "It is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use." (COM(2019) 640 final) 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 revitalized) economic growth.</p>	<p>The 'green industry development' subfactor influences ENCI arguably just as economic growth does more generally - positively, for the availability of resources. However, of course this depends on the distribution of resources among groups and sectors. A more specific influence could be that the overall shift towards green industry and green economy could come with a certain institutionalization of (environmental) values associated with ENCI.</p>	<p>No</p>	<p>Potentially all.</p>	<p>O: 'Green industry development' provides opportunities for ENCI – through the availability of resources, but also through the institutionalization of (environmental) values associated with ENCI T: However, of course this depends on the distribution of resources among groups and sectors.</p>
<p>EC4.2. Job creation and vulnerable workers</p>	<p>Apart from the economic growth in itself, there are also concerns about the degree to which the growth will bring along jobs - and whether these will be distributed evenly across member states, regions, sectors, and worker profiles. These issues of jobs distribution and vulnerability are important social-economic context factors for EU citizens (and for citizenship), as indicated in recent EU accounts of Just Transition.</p>	<p>The socio-economic issues of job creation and worker vulnerability are likely to impact ENCI in indirect ways. Vulnerability and disadvantage come with social cleavages and resentment, which may undermine ENCI. On the EU level there exists a number of initiatives to counter such consequences. For example, the Just Transition Mechanism aims at re-skilling workers towards green economy. Additionally, the newly proposed "temporary solidarity contribution" from oil, gas, coal and refinery sectors could also be used (among others) for re-skilling and upskilling the workforce.</p>	<p>No</p>	<p>Potentially all.</p>	<p>O: The job creation for particularly vulnerable workers is in line with ENCI ideals. As such it provides opportunities. T: The factor does not entail particular threats.</p>
<p>EC4.3. Innovation capacity and digital independence</p>	<p>An important component of economic growth is innovation, and specifically the capacity to catch up with the ongoing digital transition. As underlined in EU frameworks on the 'twin transition' (digital and climate transition), Europe is under pressure to not only stay competitive and maintain its innovation capacity - it also needs to ensure digital independence vis-a-vis the major market dominance built up by U.S. and Chinese enterprises. This factor indicates how the economic development of Europe may lead it to a standard-setting role, or put it in a subordinate role in which it needs to follow, comply, adopt, and purchase.</p>	<p>The main influence of this subfactor on ENCI is the same as that of economic growth more generally - it influences the resources available for the enactment of ENCI. Yet as also indicated under technological factors: The digital transition and its particular technological, social, economic and political implications are likely to influence ENCI in a multitude of ways. Innovation and digitalisation are key priorities of the European Commission and a number of strategies and financing programs exist to stimulate the EU's innovation capacity and digital independence. For example, the Digital Europe Program and the Recovery and Resilience Facility (20% digital contribution target).</p>	<p>No</p>	<p>Potentially all.</p>	<p>O: The factor comes with the general opportunities of economic growth T: Threats consist in the possibility of losing digital independence – which arguably constrains ENCI and the autonomous pursuit of the associated political ideals.</p>
<p>EC5. Spatial distribution of economic activity</p>	<p>This factor indicates the spatial dimension of economic developments. Just as the benefits of economic growth (factor EC4) can be distributed more and less unevenly across individuals and sectors, economic activity can also be distributed differently over space. EU policy frameworks display strong concerns about Europe's place in the globalized economy: How to keep up with Chinese attempts to gain economic-logistic dominance? How to become less dependent on other countries for critical materials? How to shorten supply chains and close material/energy loops? How to retain the favourable impacts of the re-territorialisation of the economy that had an impulse during the COVID19 pandemic?</p>	<p>Re-territorialisation, or a shift towards more locally concentrated economic activity, implies decentralization. It implies <i>-grosso modo</i> - a relative shift of power and opportunities from the large national-transnational actors towards the regional-local actors. As such it can be expected to be a favourable economic context to decentralization <i>of the energy system</i> as well - and by consequence, to ENCI. As examples of this favourable influence of reterritorialization one can think of synergies like the following: ENCI initiatives towards decentralized energy production may link these activities to the production of sustainable local products (providing additional revenues, expanding the range of sustainability impacts).</p>	<p>No</p>	<p>The factor does not constrain or enhance particular types of ENCI (more than others).</p>	<p>O: Indicating decentralization, this factor is generally considered as an opportunity, a favourable context for, ENCI. T: Economic decentralization, just as administrative administration (Cf. political factors), also comes with certain threats of fragmentation and uneven development.</p>
<p>EC5.1. Grassroots innovation and 'short circuit' alternative economic activities</p>	<p>The reterritorialization has for a long time been pursued actively by grassroots initiatives and social movements. The 'small is beautiful' philosophy has been elaborated through Transition Towns, Ecovillages, food sovereignty movements, seed exchange networks, sharing economy initiatives, and initiatives towards local alternative currencies. The rise of circular economy principles has given a further impulse to this 'bottom-up' movement towards local, small-scale economic activities.</p>	<p>These examples of grassroots innovation are often combined with initiatives towards decentralized energy production and sustainable, democratic energy systems. There are functional synergies (cooperatives, Ecovillages, Transition Towns are organisational forms that support broad ranges of activities), and there is a clear ideological-ethical convergence between these grassroots initiatives and the normative commitments associated with ENCI.</p>	<p>No</p>	<p>The factor enhances in particular the transformative-oriented forms of ENCI, and the collective forms.</p>	<p>O: This factor works quite unambiguously as an opportunity, as far as involves the rise of very like-minded initiatives. T: The factor does not entail particular threats.</p>

<p>EC5.2. Regional development plans</p>	<p>The reterritorialization can also be initiated by governmental actors. The motivations behind this will be partly overlapping with (and partly different from) those of the ideologically principled grassroots initiatives: Relevant considerations are also the safeguarding of local employment, political prestige, longings for regional independence and cultural identity.</p>	<p>These government-led initiatives add to the overall dynamic: Reterritorialization provides a <i>grosso modo</i> favourable context to ENCI but this largely depends on how such processes take place. In order to contribute to increased democratisation, re-territorialisation should go hand in hand with the allocation of adequate financial resources and capacity to take action, as well as ensuring equal access to decision-making and citizen participation. For example, Territorial Just Transition Plans must be submitted to the EC to access Just Transition Fund. These plans are drafted according to the partnership principle.</p>	<p>No</p>	<p>The factor does not constrain or enhance particular types of ENCI (more than others).</p>	<p>O: take the form of increased decentralisation and democratisation. T: Re-territorialisation risks shrinking resources allocated from the State to regions, while shifting more competencies and responsibilities to the local level, hence increasing inequalities among rich and poor municipalities / regions. T: At the local level, there is also a risk of "clientelism" i.e., strong local powers concentrated among a few people, like the mayor, which could hinder ENCI.</p>
<p>EC5.3. Regional innovation systems</p>	<p>Another element of reterritorialization is the development of regional innovation systems. This is a kind of reterritorialization in which academia and R&D institutes play an important part. Considerable efforts are being put in the formation of innovation 'ecosystems', creating synergies based on local institutional ties - regions may dream of creating their own Silicon Valley, or try to avoid falling behind. This risk of 'falling behind' is also a prominent concern in the European frameworks geared towards Just Transition.</p>	<p>These initiatives add to the overall dynamic: Reterritorialization provides a <i>grosso modo</i> favourable context to ENCI. Under the European Institute for Innovation and Technology (EIT) there exists a number of thematic hubs that are relevant for regional innovation systems, such as the EIT Regional Innovation Scheme, EIT Urban Mobility, EIT InnoEnergy, and EIT Climate-KIC. Innovation is furthermore a key component of EU cohesion policy, especially through support for Smart Specialisation Strategies.</p>	<p>No</p>	<p>This factor – revolving around collaboration and network development- may enhance in particular the collective forms of ENCI.</p>	<p>O: The factor mainly provides opportunities, in the form of supportive, empowering 'ecosystems' and intermediaries. T: The indicated initiatives do not <i>necessarily</i> favour ENCI: Innovation and regional development also follow logics of profit-seeking and regional competitiveness, for example.</p>
<p>EC5.4. Regional industrial symbiosis and economic clusters</p>	<p>Market actors themselves are of course main drivers of the spatial organisation of economic activities. Examples of explicit strategies to change the spatial organisation are the initiatives towards industrial symbiosis and the formation of economic clusters and business parks - typically coming with different names and brands.</p>	<p>These enterprise-led initiatives add to the overall dynamic: Reterritorialization provides a <i>grosso modo</i> favourable context to ENCI.</p>	<p>No</p>	<p>This factor – revolving around collaboration and network development- may enhance in particular the collective forms of ENCI, and the ENCI within organisations.</p>	<p>O: The factor mainly provides opportunities, in the form of supportive, empowering 'ecosystems' intermediaries. T: The indicated initiatives do not <i>necessarily</i> favour ENCI: The development of economic clusters also follows logics of profit-seeking and regional competitiveness, and they may actually seek to shut out citizens as far as they do not provide resources for these kinds of inter-firm collaborations.</p>

2.2.3 Considerations on the Economic factors

As underlined under the methodological specifications, the analysis does not provide a comprehensive analysis of energy system economics. Identifying the key economic factors that have an impact on energy *citizenship at the EU level*, the analysis rather comprises a sub-set of economic factors that somehow have a direct bearing on citizens' implication in energy systems.

The first factor, **energy prices (EC1)**, is rather self-evident. At least, as far as ENCI discourse and related political debates about energy poverty, energy security and energy consumption have gained prominence in the context of the dramatic rise of energy prices in 2021-2022. The second factor, **steering the European economy through market intervention (EC2)**, is closely related to EC1: The development of energy prices is partly the result of policy choices and interventions – and recent negotiations of price correction arrangements exemplify how influential this factor can be. Whereas the second factor indicates general interventions of market ordering and economic policy, the third factor indicates rather the direct mechanisms of economic empowerment and provision of financial resources: **The design of, and access to, financing and investments (EC3)**. This factor comes with relatively more clear-cut opportunities and threats. The link with the fourth factor, **economic growth (EC4)**, is that the very availability of financing is not a given. A key economic factor in any analysis of sustainability transition is economic growth. It sets constraints on the behaviours of possible actors enacting ENCI, and it may open up opportunities for investment. Whilst there are policy frameworks for continued and green growth, and hopes that ENCI will form part of such development, it is well conceivable that certain countries, regions, sectors and citizens will have to cope with recession and vulnerability – which would change the context for ENCI considerably. Finally, there is the **spatial distribution of economic activity (EC5)**. It is related to EC4, as far as it indicates different ways in which wealth and economic activity can be distributed, spread, concentrated. The key word is decentralization: ENCI forms part of a shift towards decentralization in energy systems, and this decentralization is related to broader processes of economic decentralization – whether resulting from market forces or from policies and initiatives towards this.

It is striking how difficult it is to establish clear-cut impacts on ENCI, and unambiguous opportunities and threats. Impacts of factors such as energy prices are clear as far as they provide incentives towards energy savings and energy conscious behaviour. There are also various economic factors that simply determine which means are available to whom to materialize ENCI ambitions – through investments in equipment, for example. Still, the circumstance remains that many opportunities are surrounded with threats. And where we may have a reasonably clear idea about the macro-effects of these economic factors on

energy transition dynamics, much less is clear about the micro-effects on individual citizens: Do exploding energy bills motivate, or rather create anxiety, resentment and resignation? Much of this arguably depends on other factors, notably social and political factors.

The analysis of the economic factors also displays how different configurations of factors drive towards different variations of ENCI. The consideration of economic factors reminds us of the very origins and socio-economic context underlying the ENCI concept: It has been coined to mark a shift away from energy consumerism, i.e., from economically-driven participation in energy systems (Devine-Wright 2007). Likewise, we can consider whether ENCI will flourish as “forms of civic involvement that pertain to the development of a more sustainable and democratic energy system”, i.e., as forms of implication in energy systems driven by institutional logics of state and civil society, or still mostly as a product of market logic (Radtke 2016). The analysis clarifies how, and through which economic factors, ENCI may thrive in very individualistic-consumerist (Cf. Lennon et al. 2020) forms, similar to the individual forms of renewable energy prosumerism. Or alternatively, depending on the development of these factors in combination with political and social factors, we may rather see collectivist forms, similar to the renewable energy cooperatives. Likewise, economic factors may lead to inequality and energy poverty, social unrest, politicization and transformation energy-related social movements – or alternatively, to institutionally more strongly embedded, institutionally hybrid forms of ENCI (Wittmayer et al. 2022). The analysis of economic factors is thus also deepening our understanding of the different kinds of ENCI – which may be driven by necessity, by opportunity-seeking, or by concerns and outrage over economic inequalities.

2.3 Social factors

2.3.1 Methodological specificities

Social factors are a somewhat special category within the PESTEL analysis of the EU context. Unlike the political, technological and legal frameworks, which are to a large extent uniform and valid for all EU member-states, and unlike the economic factors, which albeit diverging across the EU nevertheless follow the common trajectories and principles, the social factors represent a very mixed bag in terms of how they are manifested in different EU countries.

These factors include cultural norms, trends, traditions, established behaviours, attitudes, demographic aspects (such as age and gender), issues like trust and social mobilisation, environmental considerations, and social standing (education and income levels). While far less tangible and specific than for example EU political directives or legal regulations, these factors may have a profound effect on the way ENCI is formed, maintained and transformed in the EU, and consequently are an important aspect to be reckoned with when it comes to energy transition.

It comes as no surprise that the analysis of the social factors represented quite a challenge. To start with, the social factors tend to overlap with, interact with or depend on other factors (as mentioned in methodological specificities of other groups of factors). For example, subfactors such as green jobs, income and wealth have their domicile also in the group of economic factors. Energy poverty is rightly considered among the political, economic, legal and social factors. Certain aspects, such as climate anxiety/depression and environmentally conscious behaviour, could easily be considered as environmental factors.

The first task was therefore to establish which factors and subfactors should be examined in this section. The final list, included in the table below, was drawn as a result of fruitful discussions with teams working on other PESTEL letters. In some cases, for example energy poverty, a decision was taken to analyse it from different perspectives and thus this factor appears in several PESTEL categories. In other cases, certain factors (such as environmentally conscious behaviour) were moved from another category (in this case the environmental factors) and analysed here as one of the aspects constituting social and individual behaviour and habits that contribute to the development of ENCI.

The next step was the desk research and compilation of the body of relevant literature. Again, in contrast to other PESTEL categories, where the bulk of examined literature represented various EU documents (strategies, laws, treaties, regulations, pacts, communications, etc.), most of the information about social factors came from scholarly articles and papers, and from the research conducted by other EU funded projects.

The compiled literature was then analysed and the following information was distilled from it: a short description of each subfactor, its influence or impact on ENCI, the particular

ENCI types most likely to be affected by the subfactor, and a short assessment whether the subfactor represents an opportunity or a threat for ENCI.

2.3.2 Synthesis table of the Social factors

The information in the table below is based on a large number of reference texts. They can be roughly divided into the following groups:

- Case Studies;
- Analyses conducted on behalf of the EU institutions;
- Deliverables of EU funded projects;
- Scholarly articles;

The links to the sources are inserted in the table.

FACTORS & SUBFACTORS	DESCRIPTION	HOW IT WORKS AS A FACTOR FOR ENCI	MENTION OF ENCI	AFFECTED TYPES OF ENCI & OUTCOME-ORIENTATION	OPPORTUNITY and/or THREATS for ENCI
S1. Social standing (education, occupation, income and status)					
S1.1. Green jobs as a motivation to change attitudes and routines, and/or to act	Green jobs (environmentally sound and friendly jobs) contribute significantly towards the conservation of resources such as energy and raw materials, the energy transition, and preservation of the environment. but also act as an important catalyst and motivation for citizens to embrace a more sustainable living and working routines. In this way, green jobs can be an important factor contributing to the social transformation towards active energy citizenship.	A recent study (Bassi and Guidolin, 2021) has revealed a significant correlation between green jobs and embracing of circular economic practices. The large availability of different green jobs increases the number of workers with environmental skills, which inevitably has a positive effect on the development of social attitudes supportive of the ecological and environmental issues. While green jobs by themselves are not a sufficient motivating and educational factor for the employees (or wider society), they can make a considerable contribution to the building of ENCI habits (embracing circular economic practices, reducing energy consumption, implementing decarbonisation processes, etc.).	No	Type 1 and Type 3 - through the green jobs people comply with the energy transition and could also bring some energy saving practices at home, outside the organisation they work for.	Opportunity
S1.2. Level of income / Wealth disparity	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. Low-income households spend a much larger share of their income on energy bills as compared to other households, and at the same time have less access to energy efficiency services. Different studies have shown that there is a correlation between the households' propensity to invest in clean energy technologies and home ownership, income and social context - homeowners and high-income households are more likely to invest than renters and low-income households. Wealth disparity among citizens in Europe is expected to grow due to inflation and rising energy bills.	Higher level of income allows for more investments in ENCI actions (RES installations, energy communities, improving energy efficiency, etc.). Low-income households are typically unable to invest in energy efficiency measures - they have fewer savings and less favourable access (or lack thereof) to credits and loans, they are more likely to live as tenants and cannot afford or are not in position to make larger energy efficiency investments, they are more dependent on their monthly income to cope with daily expenditures and cannot afford large investments which will pay-off in uncertain future. Paradoxically, energy subsidies which many low-income households receive also create a problem, as they might lead to a higher consumption of energy and make investments in energy conservation technologies less attractive.	No	Type 1, Type 2, Type 7, Type 8 and Type 9	Both an opportunity and a threat - depending on the high/low level of welfare.
S1.3. Vulnerable energy consumers and the issue of energy poverty	Vulnerable consumers that are unable to cover their basic energy needs are considered energy poor. Energy poverty is manifested in low quality of life, unhealthy living conditions, high expenditure of disposable income on energy and inability to maintain energy efficient building stock. Energy poverty is present in all EU Member States, but is most common in Central and Eastern Europe. It is also widespread in Spain, Portugal, Italy, Greece and Cyprus, but also in countries like the UK and Ireland. In 2020, about 36 million Europeans were unable to keep their homes adequately warm , but different studies (as per the EU Energy Poverty Observatory) indicate that between 50 and 125 million EU citizens are energy poor.	Energy poverty is one of the forms of energy injustice that could be addressed through energy citizenship. Indeed, some of the transformative manifestations of ENCI, orientated towards achieving a radical change, aim at fighting energy poverty and inequalities. However, more often than not, participation in these and other forms of energy citizenship represents an immense challenge for vulnerable energy consumers, who seldom have at their disposal the resources, information and skills to actively shape the energy transition. The energy transition that seeks fairness and equity needs to empower those who are directly affected by energy-related injustices.	Yes	Type 1, Type 2, Type 7, and Type 8	T: (from the point of view of involvement of energy poor consumers) and Opportunity (as measure addressing the energy poverty)
S1.4. Energy literacy/awareness and the availability of information	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. Another definition describes it as consisting of three dimensions : knowledge, attitude and behaviour. In this interpretation, energy literacy entails not only basic energy-related knowledge, but a sound understanding of the impacts of energy production and consumption on the environment, and the adoption of energy-saving behaviours. No specific data about general levels of energy literacy at EU level is available, but several studies have been implemented about energy literacy in different European countries. Somewhat surprisingly, they indicate a rather low energy literacy in all of the studied countries (Bulgaria, Serbia, Germany, the United Kingdom, Finland and Switzerland).	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. The success of energy communities at the European level is highly dependent on the citizens' general support for the transition and their readiness to be involved. 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 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.	No	Type 1, Type 2, Type 7, and Type 8	Opportunity (high awareness level) & Threat (low awareness level)

S2. Demographic factors					
S2.1. Ageing population	The EU population has been steadily ageing with projections indicating that the percentage of the population aged 65 and more is expected to almost double over the next 50 years. This creates a significant challenge for energy systems and for the efforts to mitigate climate change. An ageing population is expected to result in increased energy consumption due to the fact that this population segment typically spends more time at home, and consumes more energy due to more pronounced needs and concerns about health and comfort. At the same time, the wealth accumulated over a lifetime and the change in consumption patterns might intensify the energy use of the elderly. This interpretation is challenged by an opposing point of view, highlighting that the elderly usually have lower income levels and therefore they mitigate their energy consumption.	In the green energy transition, older people may have distinct needs as energy citizens. On the one hand, they can be saving energy through consumer choices and making lifestyle decisions towards a reduced carbon footprint just like anyone else; on the other, they may be inactive or simply not in a position to take up alternative energy forms or adopt energy-efficient behaviours. For example, if they do not utilise grants available for energy renovations of their older and perhaps unmodernised homes, the reason may be related to the inability to manage the demanding and time-consuming renovation work or to the lack of accessible and understandable energy-related information, rather than their attitudes and intentions.	No	Type 1, Type 2, Type 7, and Type 8	O: Tailored energy policies addressing the elderly could enhance their ENCI. T: The absence of dedicated policies might on the contrary exclude the elderly from ENCI.
S2.2. Gender disbalance in energy initiatives	According to research , the average member of energy transition initiatives in Europe is highly educated, middle class, and male. Women are underrepresented as members of energy communities in Europe, and have a very low representation in the Boards of such communities. "The average 16% gender pay gap in the EU means that women have less income to invest as capital in RECs, and across Europe, women have invested less in and own smaller shares of RE cooperatives than men" (Hoicka et al., 2021). Not seeing good role models and not feeling represented, women are discouraged from the active participation in energy initiatives. At the same time, women are disproportionately often affected by energy poverty, meaning they have unequal access to and often lack the financial means to afford reliable energy services.	Gender disbalance in energy initiatives hinders women from becoming energy citizens.	No	Applicable to all types.	Threat
S2.3 Generation and education gap	A literature review indicates that higher levels of acceptance and awareness of energy transition processes, including renewable energy technologies, correlate positively with a higher level of education and a younger age. In contrast, individuals belonging to an older age group or those with lower level of education are significantly less willing to adapt their lifestyle and pay an increased price to reduce their ecological footprint. It was also noted that households with children are more likely to support the transition to a renewable energy community - possibly because they are more likely to plan for the longer term.	Knowing the size and composition of the target audience that is most likely to be biased or opposed to ENCI can help with the planning of appropriate measures, such as information campaigns, meetings and discussions with the community, panels, or other events where locals can express their opinions. Preliminary demographic studies could help overcome public opposition and better formulate a strategy for improving the acceptance of REP and promoting ENCI.	Yes	Applicable to all types.	Opportunity
S3. Social attitudes towards energy transition					
S3.1. Attitudes towards energy-efficient products, services, technologies and appliances	To achieve transition to decarbonized energy systems and move to cleaner and more sustainable production and consumption of energy, EU employs different technological innovations. However, sustainable energy innovations often have difficulty to obtain public acceptance . Decisions such as purchasing an electric vehicle or installing a home solar panel constitute a behavioural change and have a visible effect on the life, finances and habits of the consumers. The interest in and acquisition of energy-efficient products, services, technologies and appliances depends on consumer attitudes. Attitudes are especially important when these products are believed to be (or indeed are) more expensive than their non-energy-efficient counterparts. Attitudes favouring the purchase of energy-efficient products are formed by the consumers' personal beliefs and norms, trust in the information provided, as well as the quality and the potential benefits of the products. On the opposite end, weakening the willingness to buy energy-efficient and pro-environmental products is known as ' green scepticism .'	Consumers' acceptance of new technologies and innovations play a key role in the energy transition practices. Energy communities, prosumerism practices, sustainable transport are among the most popular energy citizenship manifestations. Their implementation would not be possible without the consumers' acceptance and trust in the innovative technological solutions that in turn lead to decarbonising the energy system. Any resistance to such technologies would hamper the development of the energy citizenship. At the same time, acceptance of innovation and technology is an ambivalent factor since it can also go along with the attitude that technology is the ultimate solution for all energy and climate issues. Such attitudes 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.	No	Type 1, Type 2, Type 7, and Type 8	O: an efficient information campaign could help shape the social attitudes and acceptance of new technologies, services and products, which would be beneficial for development of ENCI.
S3.2. Attitude toward social innovation	Climate-neutrality cannot be achieved through technology and markets alone. Social transformation in which civil society and citizens will play a crucial role is also important. A large variety of social innovations across Europe have supported the citizens' participation in the energy system, fostering people-centred changes in the ways of doing, thinking, and organising energy. Such social innovations range from energy cooperatives and local electricity exchange to energy gamification, campaigns and experimentation. There is also a variety of socially innovative actors, with citizen and collective action initiatives being the most relevant. The landscape of energy-related social innovations is not uniformly spread across the EU . The societies in certain regions appear to be less prone to accepting innovativeness and new solutions. Southern and Eastern European countries in particular lack the trust and cohesion that would facilitate energy-related innovations.	Social innovations are instrumental in citizen-based activities and actions aimed at reduction of emissions or increasing renewable energy production. Unlike the traditional interpretation of the term "innovation," which is technology-focused, the main agency of social innovation are citizens and communities . Social innovations utilise their knowledge and cultural assets to reconfigure the social relations and practices, and to create new ways of responding to crises and opportunities, including those dealing with the climate change and transition to low-carbon energy. Social innovations therefore provide ample opportunities for citizens to become active partners in the management of energy as a resource, rather than just passive consumers of energy. Social innovations therefore reinforce the role of citizens in energy transitions.	Yes	Applicable to all types.	O: Social innovations could help to accumulate citizens willingness to move to sustainable energy consumption and sustainable energy transition across Europe.

<p>S3.3. Social norms towards energy awareness</p>	<p>Social norms can be defined as informal understanding within a social group about what constitutes an acceptable behaviour. Most people have a strong desire to fit in and will conform to the behaviour of those around them. Social norms can therefore be an important factor influencing and shaping the behaviour of energy consumers. For example, if the energy conservation is set as a social norm within a community, the individuals belonging to the community could be expected to adopt a behaviour that seeks to reflect this norm. Also, energy communities can reinforce strong social norms and support citizens' participation in the energy system.</p>	<p>Behavioural aspects under social pressure could result in implementing energy conscious actions - saving energy, producing own energy, managing own energy consumption, etc.</p>	<p>Yes</p>	<p>Type 1, Type 2, Type 7 and Type 8</p>	<p>O: Introducing social norms about sustainable energy behaviour at EU level could motivate more consumers to be energy conscious and become energy citizens.</p>
<p>S3.4. Willingness to invest in energy transition - (not just financially but also in terms of effort, time, resources, etc.)</p>	<p>The decision to invest in RES is often based on the individual's evaluation of the expected profitability. The potential value of an opportunity, namely the profit, is a notable motive behind the decision, while accessibility of financial resources affects further investment willingness. However, the citizens' willingness to invest in RES could also be driven by their environmental concerns, not only economic reasons. According to literature examining the socio-psychological patterns of RES investments, in some countries in Europe (among which Austria, Italy, and Germany) the desire to make a contribution to environmental protection comprised a key factor for making investments favouring the environment (including RES). Other factors that could determine the willingness to invest in RES are confidence in the technology of renewable energy systems, previous experience in investments, age, place of residence, educational level, preference for comfort, social class, and house ownership.</p>	<p>Very often, the high investment costs are a barrier to people who want to move to sustainable energy. The willingness to overcome this barrier and invest in the renewable energy depends on numerous different factors. Environmental consciousness and determination to contribute to the energy transition are important motivational factors. Studies show that in countries which are known for their successful implementation of renewable energy, a desire to make a contribution to environmental protection comprised a key factor for citizens to invest in RES. Although the willingness to invest in RES might be itself considered a manifestation of ENCI, it can also be seen as a context factor supporting ENCI as a concrete and practical step between values/consciousness and action.</p>	<p>No</p>	<p>Type 1, Type 2, Type 7</p>	<p>O: Willingness to invest in energy transition, regardless of the reasons, is an important step towards ENCI.</p>
<p>S3.5. Trust (or lack thereof) in institutions and collective endeavours (including cooperatives)</p>	<p>In addition to differences in economic status, another factor which may impair participation in energy transition and in the energy citizenship initiatives in some countries are the perceived negative connotations associated with cooperatives and different institutionalised and collective forms of organisation in general. This is especially relevant for Eastern European countries, where the mark left by the socialist regime still influences the perceptions of citizens. Hence, the understanding of the terms "community energy" and "cooperative" can often be reminiscent of the communism and therefore flatly rejected by some people. The phrase "communal energy" is sometimes purposefully avoided to elude misconceptions. 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.</p>	<p>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 energy transition on a multinational scale.</p>	<p>No</p>	<p>Type 3, Type 3, Type 7, Type 8, Type 9 and Type 10</p>	<p>Threat</p>
<p>S4. Social and individual behaviour and habits</p>					
<p>S4.1. Climate anxiety/depression (eco-anxiety)</p>	<p>Climate change has major consequences for both physical and mental health. Beyond the direct challenges it poses to mental health, such as threats to accessing basic needs (water, fresh air, etc.) and the trauma associated with extreme weather events, the broader psychological and emotional effects of climate change are increasingly being recognised. This emerging field of study includes the phenomena of climate/eco anxiety. Eco anxiety has been defined by the American Psychological Association as "a chronic fear of environmental doom" while climate anxiety is recognised as the most common form of eco anxiety. It has been defined as "anxiety associated with perceptions about climate change", worrying about the potential scope of the impacts of climate change and the uncertainty of their specific nature, timing, and precise location.</p>	<p>Climate change concerns can have an impact on the development of ENCI from several directions. On one hand, concern can turn into action and drive forward the development. On other hand, it can make action more difficult by creating a sense of powerlessness.</p>	<p>No</p>	<p>Applicable to all types.</p>	<p>O: Climate anxiety could motivate citizens to join or establish a community of like-minded people, with energy conservation and transition being among the main goals. Also, energy citizenship and its practices could serve as a way for climate concerned people to feel they do something positive for mitigating the climate change. T: Climate depression can render people inactive and make them feel powerless to change the situation.</p>
<p>S4.2. Environmentally conscious behaviour</p>	<p>According to recent research, environmental considerations have become an important component of the consumer decision-making process. More and more consumers start acting in an environmentally conscious way, seeking to minimize the negative impact of their actions on the environment, though, for example, buying environmentally friendly (or local) products, recycling, consuming less, saving energy and using green transport alternatives.</p>	<p>Environmentally conscious consumers are more motivated to join or initiate energy citizenship initiatives.</p>	<p>No</p>	<p>Applicable to all types.</p>	<p>Opportunity</p>

<p>S4.3 Active citizen engagement and empowerment towards energy transition</p>	<p>Over the years and throughout its policies and programs, the EU has developed and confirmed its vision that citizens should have a central role in the energy transition. In the EU's "Clean Energy for all Europeans" package, two of the eight legislative acts centralise the role of citizens in the energy transition by promoting citizen co-owned energy production. The EU aims for a more decentralised and democratic system, in which citizens would move away from being passive consumers towards becoming active energy citizens, taking responsibility for both energy production and consumption.</p> <p>Public support for energy transition measures is greatly impacted by the personal, direct involvement of citizens in the process (e.g. in RES installations). In countries where citizens are not only informed about the importance of energy transition, but are also offered incentive to participate (personal agency and ability to make changes on a local level, financial gain, etc.), energy transition is facilitated.</p>	<p>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.</p>	<p>Yes</p>	<p>Applicable to all types.</p>	<p>Opportunity</p>
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2.3.3 Considerations on the Social factors

Among the six categories of factors shaping the energy citizenship in the EU, the social factors might be described as the proverbial silent water running deep. They are not clearly defined as the political objectives and commitments are, nor meticulously measured and evaluated as economic factors, nor tangible and concrete as the technological options, and they are most certainly not obligatory and all-embracing as the EU legal framework. Furthermore, they are rarely associated (with the exception of the issue of energy poverty) with the sense of urgency, which permeates most of the environmental factors. And yet, the social factors are the one indispensable piece without which the puzzle of ENCI can never be completed.

The social forces affect most of the other groups of factors. The long-established behaviour patterns, beliefs, opinions and social positions shape the decisions of citizens 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 turn, other groups of factors also shape the social ones, but this process is incomparably slower. While social forces can be mobilised into action (either of support or opposition) rather quickly, it often takes years, if not decades, to modify or change them.

The first factor in our analysis is the social standing. Under this aggregating term, we examined how various personal circumstances such as occupation, income and energy literacy shape the ENCI. Based on the studied literature, we can highlight several conclusions, none of which are particularly surprising.

People with the good energy literacy are more likely to become active energy citizens, while the lack of knowledge about the renewable energy and the energy efficiency measures leads to distrust and low level of acceptance of new technologies and innovative solutions in the energy field. High-income households are much more likely to invest in ENCI actions (purchase RES installations, form or participate in energy communities, improve energy efficiency of their housing, etc.) than the low-income households. The same correlation can be observed when comparing home-owners and tenants. An interesting observation is the ambiguous effect of energy subsidies – while they are undoubtedly an important measure for alleviating energy poverty, they may also lead to an increased energy consumption and make investments in energy conservation technologies less attractive for low-income households, thereby prolonging their exposure to energy poverty.

Speaking about energy poverty, we come to one of the main paradoxes related to the transformative manifestations of ENCI, which aim at fighting energy poverty and inequalities. Namely, the vulnerable energy consumers rarely, if at all, possess the resources, information and skills to actively participate in these (or other) forms of ENCI, and are usually included in the energy transition activities that aim to achieve fairness and

equity only as (passive) beneficiaries or recipients.

On a more encouraging note, we can highlight the positive influence of the increasing number and variety of the so-called green jobs on the development of social attitudes supportive of the ecological and environmental issues. Recent studies have shown that green jobs contribute to the building of certain ENCI habits (embracing circular economic practices, reducing energy consumption, implementing decarbonisation processes, etc.).

The second set of factors on our list are the demographic characteristics – age, gender and education. A number of studies highlight the special role and needs of elderly people as energy citizens. Compared to the younger generations, elderly are more often in risk of energy poverty and consequently unable to take up alternative energy forms or adopt energy-efficient behaviours. Usually, their energy consumption is higher than the average, as they stay longer hours indoors and are less able to make compromises regarding their health and comfort. This however does not mean that the elderly citizens are not willing to take energy-saving consumer choices and lifestyle decisions, but rather that specific efforts beyond the simple information campaigns should be undertaken to get them on board.

The studied literature is assertive that gender disbalances are a norm in energy initiatives, hindering many women from becoming energy citizens. The average member of energy transition initiatives in Europe is typically described as highly educated middle-class male. Not seeing female role models and not feeling represented, women are discouraged from the active participation in energy initiatives, while at the same time being disproportionately often affected by energy poverty.

The third group of factors in our study are different social attitudes towards energy transition. They include attitudes towards energy-efficient products, services, technologies and appliances, attitude toward social innovation, a variety of social norms that together shape the energy awareness of citizens, willingness to invest in energy transition, and finally – the general trust (or lack thereof) in institutions and collective endeavours.

Readiness to accept and take up new technologies and different types of innovations (from technological to social) is one of the important preconditions for the success of the energy transition. At the same time, acceptance of innovation and technology is an ambivalent factor. On the one hand, it can support ENCI in the form of, for example, energy communities, prosumerism and sustainable transport. On the other hand, the excessive reliance on technology as the ultimate solution for all energy and climate issues can easily lead to inaction and passivity. Additionally, the unquestionable approval of technological progress over the past 100 years can be actually considered as one of the main culprits for the climate crisis today.

Much less problematic are the different social innovations – many examples of such citizen-based activities and actions have been reviewed and described in the WP3 (Cases of ENCI). Social innovations reinforce the role of citizens in energy transitions, changing the

established social relations and practices and proposing innovative responses to the pressing societal challenges, including the climate and energy crises.

Behavioural aspects such as environmental consciousness and determination to contribute to the energy transition are important motivational factors for people to become energy citizens. Low-cost actions like energy saving and management of one's own energy consumption usually require lower voltage of motivational charge, but when it comes to the decision to invest in RES, the high investment costs can represent a considerable barrier. Studies show that a strong environmental consciousness and a determination to contribute to the protection of the environment in many countries mark the line separating the good intentions from the successful implementation of renewable energy.

Less relevant for most Western European and especially the Nordic countries, but quite salient in many post-communist EU member-states, is the issue of trust towards institutions, including political, economic and social ones. Even in the fourth decade since the start of the democratic processes, energy cooperatives and different other collective forms of organisation continue to be associated with negative connotations reminiscent of the recent past. This is in considerable contrast with countries, which have a strong tradition of social enterprises and community ownership.

The fourth and final group of social factors are social and individual behaviours and habits. Here we examined the phenomenon of climate anxiety (eco-anxiety), the environmentally conscious behaviour, and the general activity/passivity of the civil society (from the point of view of its effect on the energy transition).

A growing body of literature has in recent years studied two related problems – climate anxiety and eco-anxiety. Eco anxiety has been defined as “a chronic fear of environmental doom,” and climate anxiety as “anxiety associated with perceptions about climate change.” Both can cause considerable damage to the physical and mental health of people (cognitive, emotional, or functional impairment and somatic arousal). However, when assessing their impact on ENCI, the anxieties can work in two directions – they can become a driver for action and development, or a barrier, as they might create a sense of powerlessness.

Environmental considerations and a desire to limit the negative consequences of their daily lives on the environment are becoming an increasingly important driver for many people to act in a more responsible and sustainable way. This can include their consumer choices (purchasing environmentally friendly local products), recycling and/or reuse of products instead of their disposal, use of green transport alternatives, and cutback on consumption – including of energy. In addition, the environmentally conscious consumers are more motivated to join or initiate ENCI initiatives.

One of the main pillars of the energy transition in the EU is the vision of a more decentralised and democratic system, in which citizens would turn from passive consumers into active energy citizens, taking responsibility for both energy production and

consumption. The literature based on case studies from different European countries suggests that participation in energy decision-making, community or individual ownership of energy production (prosumerism), and participation in social movements or protests, are more likely to take root in those societies, which are in general characterised by higher levels of citizen engagement/activity. Citizen engagement and empowerment, and the efforts to establish and stimulate an active civil society, are therefore at the core of the ENCI concept.



2.4 Technological factors

2.4.1 Methodological specificities

Addressing technological factors as a separate set of factors is challenging, considering the fact that technology can hardly be understood as a factor separately or independently from related social, political or economic issues. Yet as part of such socio-technological configurations, technologies are potentially impacting the various forms of ENCI, which is why it is necessary to investigate those technological factors.

To solve this apparent contradiction, the technological factors identified in this PESTEL analysis correspond to *technological choices* as undertaken at the EU level by the EU institutions. Although inherently also political, economic and social choices, this technological-choices-approach enabled us to re-embed technologies in the specific social and institutional context in which some technological options are preferred over other existing or possible future options. For example, the factor "Technological pathways for European energy transmission and distribution infrastructure" refers to choices at EU level about the development of grid infrastructure. Following this logic, currently deployed infrastructure (e.g., the features of the physical European transmission grid as in operation now) is understood as a result of past technological choices.

With this approach, the methodology adopted was to identify the various technological components of the energy system promoted at the EU scale (as listed, for example, on the [energy dedicated EU commission website](#), and notably for reasons connected the European Green Deal, but also for other political, economic and environmental reasons. The analysis of the technological factors was thus undertaken firstly with an inductive perspective to identify the relevant factors, relying on the emphasis placed on specific technological development within the EU documentation and literature. Secondly, the draft factors were then further investigated with a more deductive perspective and analysed in order to grasp the impact that they might have on ENCI with regard to their scope, scale of development, and possible implications in terms citizens involvement in the energy system.

This approach also entails noticeable limits, notably when the technological choices are not clearly formulated at the EU level. This is, for instance, the case for the nuclear energy, which is addressed rather exclusively in terms of security of the existing nuclear power plant or in debates around its qualification as "green source of energy". Due to the absence of a clear technological choice at the EU level regarding nuclear power, this aspect is thus absent from the following table, in spite of its arguably negative impact on ENCI. Such factors will probably have to be addressed at the national levels, according to the country-specific technological choices.

2.4.2 Synthesis table of the Technological factors

The main texts of reference are summarised in the table below and complementary hyperlinks are added to the technological factors table.

EU Solar Energy Strategy Communication 2022
Annex to the EU Solar Energy Strategy
SET plan progress report 2021
Directive on the deployment of alternative fuels infrastructure 2014
Directive on Renewable Energy sources 2018
Directive on the EU electricity market 2019
REGULATION (EU) 2022/869 guidelines for trans-European energy infrastructure
Sustainable and Smart Mobility Strategy (COM, 2020)
Regulation on the Energy labelling and repealing Directive 2017
Directive on the energy performance of buildings 2010
Europe's Digital Decade: digital targets for 2030

FACTORS SUBFACTORS	DESCRIPTION	MENTION OF ENCI	HOW IT WORKS AS A FACTOR FOR ENCI	AFFECTED TYPES OF ENCI OUTCOME- ORIENTATION	OPPORTUNITY and/or THREATS for ENCI
T1. EU technological choices towards the decarbonisation of the energy sector	Development and accessibility of technologies towards the decarbonisation of the energy sector, notably through increase of the share of renewable energy sources and the development of Power-to-X technologies.	Y - Citizens and communities, small renewable enterprises, small renewable energy projects	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	1 and 3 as consumers, 2 and 4 as active energy producers Mostly reformative, yet possibly transformative	O: The decarbonisation of the energy sector and the renewable energy can potentially contribute to enhance energy citizenship. T: Yet, the ways these technologies are developed is conditioning a lot the potential citizen participation, and some of them are obviously out of the scope of ENCI (offshore wind) and do not promote energy models that are basically favourable for ENCI (centralisation of the grid)
T1.1. Solar thermal and photovoltaic energy	Solar Energy is supposed to help reduce European dependence on fossil fuels across all sectors the economy, from residential heating to industrial processes. The Solar Energy Strategy promotes innovative forms of solar energy deployment through research and innovation to enhance the EU PV industry leadership (e.g. large-scale Power-to-X), incentives for agri-PV, and set up an Energy Communities Facility to provide cascade funding to energy community projects. PV and solar thermal technologies can be rolled-out rapidly and reward citizens and businesses with benefits for the climate and their purses. Solar energy costs have decreased spectacularly over time, turning it into one of the most competitive sources of electricity in the EU. Solar energy protects European citizens from the volatility of fossil fuel prices. EU citizens appreciate this autonomy to produce their own energy, either individually or collectively. It is a huge opportunity for whole cities and regions, especially those transitioning to a new energy and economic model.	Y - Citizens and communities	Solar technology has the advantage of scalability and the possibility of small-scale deployment. Small renewable energy projects are more feasible for citizens who want to further the energy transition with producing energy themselves. Small renewable energy projects such as rooftop solar installations can promote public acceptance for renewable energy projects, in particular at a local level. Small-scale installations such as these benefit from specific conditions and simplified administrative procedures.	Type 1, 2, 3, 4, 7, 8 Mostly reformative yet in some case transformative	O: Broaden use of more efficient PV and thermal panels for individual or collective citizens use, and extend it through Power-to-X for e.g. for electric vehicle, storage and demand side flexibility. T: As underlined in the Solar EU Strategy (Annex) "Member states should in order to support energy communities (...) assess and remove unjustified barriers to the development of renewable and citizen energy communities". Those barriers are currently a threat to the development of small-scale installations.
T1.2. Offshore wind and ocean energy, related high voltage transportation infrastructures	To meet the requirements for a climate-neutral energy sector in 2050, the rate of installations in the wind sector will need to increase significantly. According to the Commission's long-term strategy, for wind, the capacity will need to increase from the 2018 level of 180 GW to 351 GW in 2030, corresponding to a doubling of capacity. (SET Action plan progress report 2021)	N	Rather centralised energy supply option, in which citizens are out of the scope, which might consequently foster citizen protests	Type 9 and 10 Reformative or transformative, depending on the social movements	O: Higher penetration of RES in the energy system. T: Citizens are out of the scope and might therefore be opposed to such technical choice.
T1.3. Renewable hydrogen	Hydrogen has a strong potential to bridge some of this gap, as a vector for renewable energy storage, alongside batteries, and transport, ensuring back up for seasonal variations and connecting production locations to more distant demand centres. (Directive on alternative fuels infrastructure 2014)	N	Important technology that contributes to the decarbonisation of the energy sector, ENCI mainly as consumers of renewable energy produced by this technology	Reformative: Type 1 and 3 because of the scope of the installations	O: More flexible use of energy, added RES. T: Environmental sustainability issues and resources consumption
T.1.4. small-scale installations	Small renewable energy projects such as rooftop solar installations can promote public acceptance for renewable energy projects, in particular at a local level. Small-scale installations such as these benefit from specific conditions and simplified administrative procedures. (Directive on Renewable Energy sources 2018)	Y - "microenterprises and small and medium-sized enterprises (SMEs) and individual citizens"	Small renewable energy projects are more feasible for citizens who want to further the energy transition with producing energy themselves	Mostly reformative Type 1, 3, 7	O: Enhance ENCI, notably through simplification of procedures. T: Not sufficient to widespread ENCI.

T2. Technological pathways for European energy transmission and distribution infrastructure (Trans-European Networks for Energy)	Decentralised and efficient generation and distribution of renewable energy across Europe combined with demand-response infrastructures	Y - consumers	People as consumers can profit of energy efficient infrastructure	Mostly reformative Type 1 and 3	O: Decentralisation and demand response technologies can contribute to the citizens involvement in the energy system T: Highly technological choices with lock-in effects (e.g. smart meters) and inducing increased resource consumption
T2.1. Smart grids deployment	Increase deployment of smart grids to help integrate renewable energy and allow consumers to better regulate their energy consumption. Member States should encourage the modernisation of distribution networks, such as through the introduction of smart grids, which should be built in a way that encourages decentralised generation and energy efficiency. (Directive on internal energy market 2019)	Y - consumers	Consumers are enabled to regulate their energy consumption	Type 1 and 3	O: Enable the development of new tools towards energy citizenship (P2P trading, local markets, etc.). T: Citizens remain mostly considered as consumers aimed at reacting to the energy markets. Privacy issues are also of a concern, as well as the resources overconsumption induced by high technological options - which can hardly be seen as deep environmentally sustainable.
T2.2. Demand response infrastructure deployment (smart-metering)	Engaging consumers requires appropriate incentives and technologies such as smart metering systems. Smart metering systems empower consumers because they allow them to receive accurate and near real-time feedback on their energy consumption or generation, and to manage their consumption better, to participate in and reap benefits from demand response programmes and other services, and to lower their electricity bills. (Directive on internal energy market 2019)	Y - Empower consumers	Empowerment of consumers through real-time feedback on their energy consumption associated with incentives and technologies such as smart metering systems	Type 1 and 3 The outcome orientation is definitely reformative since it addresses the citizen as consumers at the household and organisational level. Activation of the consumer thanks to technological innovations	O: Provide a better understanding of their consumption T: All threats potentially associated with smart metering systems in terms of privacy and also technological lock-ins. Confine active consumers in the demand response field.
T2.3. Electricity highways (Long-distance transmission grid deployment)	Construction of electricity highways – large grids that allow electricity to be transported over long distances across Europe (e.g. from wind farms in the North and Baltic Seas to storage facilities in Scandinavia and the Alps) (REGULATION (EU) 2022/869 guidelines for trans-European energy infrastructure)	N	Helps to integrate renewable energy sources into the energy system and distribute it across Europe	Reformative Type 1 and 3	O: Higher RES rate in the energy mix T: Not oriented towards citizens involvement.
T2.5. decentralised energy system and storage /	Distribution networks should be built in a way that encourages decentralised generation and energy efficiency. (Directive on internal energy market 2019)	Y - consumers and producers	Decentralised distribution networks are important pre-conditions for citizens to produce their own renewable energy and being able to distribute it	Reformative or transformative: Type 1,2,3,4	O: Enhancing prosuming and energy efficiency T: Affordability of such systems for citizens
T3.2. TSO and DSO regulation	Distribution system operators have to cost-efficiently integrate new electricity generation, especially installations generating electricity from renewable sources, and new loads such as loads that result from heat pumps and electric vehicles. (Directive on internal energy market 2019)	Y - citizens as consumers and producers	(Cost-)efficient integration into distribution systems is vital for small producers	Basically reformative: Type 1, 3 mostly Type 7 and 8 eventually	

T3. EU choices for integrated approaches towards energy efficiency	Technologies that support sustainability and energy efficiency	Y - citizens as consumers, buyers and tenants	These measures enable ENCI to make more sustainable choices in regard to their consumption	Mostly reformative, possibly transformative Type 1,2,3,4	O: Foster generalised citizen involvement in the energy system by monitoring their own consumption. T: Reduce citizen participation to an added layer of technology, which might be both unsustainable and hardly accessible for certain people.
T3.1. Smart mobility	People should enjoy a seamless multimodal experience throughout their journey, through a set of sustainable mobility choices, increasingly driven by digitalisation and automation, through smart digital solutions and intelligent transport systems (ITS) and Artificial intelligence (AI). (COM(2020), Sustainable and Smart Mobility Strategy)	Y - citizens as consumers	Multimodal and non-CO2 emitting transport offer made more accessible for all citizens, within the frame of a just transition	Mostly type 1 and 3 - individual use of new transportation means, mostly electric ones (thus considered as zero emissions)	O: Enhance the adoption of new mobility practices that are more climate friendly (no direct CO2 emissions) to replace the individual thermic cars T: Massive use of non-sustainable high-tech modes of transportation that are highly resource consuming instead of shifting for soft mobility and sustainable options.
T3.3. Energy Labelling	People should be able to make informed choices when buying energy-related products. Marking energy efficient products should contribute to energy saving, reducing energy bills and promote innovation und investments into production of energy efficient products. (Regulation on the Energy labelling and repealing Directive 2017)	Y - citizens as consumers	As consumers, energy labels help citizens to be more informed in what they buy and if it is energy saving or not	Reformative Type 1	O: Enhance energy efficiency thanks to energy labelling. T: Unequal access to efficient appliances, which could weight twice on vulnerable/poor households.
T3.4. Energy efficient buildings	Buildings account for 40% of total energy consumption in the Union , therefore: consequently, the reduction of energy consumption and the use of energy from renewable sources is vital for reducing emissions. Buyers and tenants of houses should be informed about the energy performance of buildings and necessary building renovations need to be increased.	Y - citizens as buyers and tenants	Starting with their homes or rentals can be a good starting point for citizens to save energy and live more sustainable	Basically reformative Type 1 and 3 (mostly)	O: Improvement of energy efficiency in building to reduce the energy bills. T: Accessibility of energy efficient building and renovation.
T4. Digitalisation of the Energy System	The digitalisation of the energy system	Y - digital citizenship	Digitalisation as a leverage to enhance citizen participation in the energy markets, to improve the feedback regarding consumption and raise awareness towards lower consumption.	Mostly reformative, yet possible transformative Type 1, 2, 3, 4 Types 7, 8	O: Better feedback on energy consumption and facilitate participation on energy markets. T: Increase inequalities related to the capabilities to use digital complex devices. Environmental sustainability of massive digitalisation is questionable.
T4.1. Digital Infrastructure	Secure and sustainable digital infrastructures Connectivity: Gigabit for everyone, 5G everywhere Cutting edge Semiconductors: double EU share in global production Data - Edge & Cloud: 10,000 climate-neutral highly secure edge nodes Computing: first computer with quantum acceleration	Y - digital citizenship	Digital infrastructure is necessary to enable citizens to trade energy they produce and helps managing it sustainably.	Mostly reformative Type 1,2,3,4	O: Better feedback on energy consumption and facilitate participation on energy markets. T: Environmental sustainability of massive digitalisation is questionable.
T4.2. Digital Citizenship	On 26 January 2022, the Commission proposed an inter-institutional solemn declaration on digital rights and principles for the digital decade . Rights and principles: people at the centre, solidarity and inclusion, freedom of choice, participation, safety and security, sustainability	Y - digital citizenship, citizens	being a digital citizen equips people in many ways to be energy citizens as well.	Mostly reformative Type 1,2,3,4	O: Better feedback on energy consumption and facilitate participation on energy markets. T: Increase inequalities related to the capabilities to use digital complex devices.
T4.3. Availability of ICT solutions for peer-to-peer energy trading/virtual power plants	‘Peer-to-peer trading’ of renewable energy means the sale of renewable energy between market participants by means of a contract with pre-determined conditions governing the automated execution and settlement of the transaction, either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator. The right to conduct peer-to-peer trading shall be without prejudice to the rights and obligations of the parties involved as final customers, producers, suppliers or aggregators (Europe’s Digital Decade: digital targets for 2030)	y - market participants, customers, producers, suppliers	Enables small scale citizen producers of renewable energy to trade it directly or indirectly with consumers	Both reformative and transformative possible outcome-orientations Type 1,2,3,4, 7, 8	O: Facilitate participation on energy markets, decentralisation of the energy market T: Increase inequalities related to the capabilities to use digital complex devices.

2.4.3 Considerations on the Technological factors

As expected, the process of identifying technological factors has demonstrated that “no technology is purely technological”. Technological choices are translating political, economic and social choices. Yet, they contribute also to lock-in effects in that they set a specific and rather enduring space of possibilities.

Technological choices that are dealing with ENCI often target individual and organisationally-embedded citizens or collectively organised citizens, notably through small-scale system that can be integrated at an individual or community scale – of which the solar panels are the most widespread technology. Furthermore, this applies to most of the subfactors of the first technological factor, i.e., **T1. EU technological choices towards the decarbonisation of the energy sector**. Although these subfactors are generally oriented towards reformative forms of ENCI, in some cases technological choices also pave the way to more transformative ENCI, depending on how technologies can be (re)appropriated by citizens and depending on other context factors such as existing policies and legal frameworks for energy communities for instance. In that respect, the possible impacts of technological choices on ENCI are diverse and interact with/depend on other factors aimed at promoting citizens’ ownership of energy facilities.

Technological choices usually concern large scale developments and thus do not have necessarily have a direct impact on ENCI. For instance, subfactor **T2.3. Electricity highways (Long-distance transmission grid deployment)** mainly addresses choices on the high-voltage transmission grid, which is only indirectly relevant to small-scale prosumers. However, such choices on large-scale infrastructure might also result in social movements, notably in opposition to them and considering such choices as contradictory to a citizen-based energy transition. An example for this is protest against the North-south highways in Germany, which aimed at bringing the electricity from the off-shore wind parks in the Baltic Sea to the industry-intensive south of the country. However, technological choices in energy grid infrastructure do not exclusively target at such large-scale level. Choices that affect the technological configuration and accessibility of distribution grids can have a direct effect on energy citizenship, especially in the form of new renewable energy producers. But this issue as well becomes relevant for energy citizenship an amalgam of technological choices resulting in different “hardware” of energy infrastructure and regulation thereof, as shown, for example with the subfactor “**T3.2. TSO and DSO regulation**”. Also, choices at EU-level on this often remain rather vague, while implementation at national level is the decisive factor.

Technological choices often present both opportunities and threats, such as the ones aimed at enhancing energy efficiency though labelling of appliances and buildings, and more generally the subfactor T3. **EU choices for integrated approaches towards energy**

efficiency. On the one hand, they can support the spread of ENCI. On the other hand, benefiting from or accessing such technological choices is often contingent upon a certain level of wealth and ownership. This risk excluding a part of the citizenry without such capacities that cannot afford it. Here once again, the ways technological factors are combined with political, economic and legal factors is decisive for their impacts on ENCI.

Finally, key technological factors are those related to the **T4. Digitalisation of the energy system.** This ongoing process can indeed be seen as the series of technological choices that are currently and will increasingly influence the energy citizenry in the near future. Basically, digitalisation of the energy system can be considered as oriented toward reformative forms of ENCI, notably in view of new barriers to the reappropriation of such systems by the citizens and of the environmental impacts that are associated to such processes.

2.5 Environmental factors

2.5.1 Methodological specificities

Defining the main factors and related subfactors for the environmental aspect of the PESTEL required continuous deliberation and coordination with the hosts of the other aspects (e.g. social, political, economic), as many initially proposed factors overlapped with, covered or served as a base for the factors set under those aspects. The environment related viewpoints seem to be more abstract and collective in their nature than of the other aspects of the PESTEL, and thus required an extensive and at the same time elaborate effort to set the boundaries of the individual factors and subfactors.

Categorisation of the factors and subfactors were also difficult due to the very diverse nature of the ENCI types (for details on the types see D2.2), as some factors/subfactors could be a barrier to certain types of ENCIs but could be an enabler for other types at the same time.

The expert team for the environmental aspect has identified five larger factor groupings out of which finally three remained due to either having some factors (or subfactors) transferred to other aspects (e.g. social) as they could be better suited in that environment, or combining subfactors that turned out to be more closely related considering their effects (being a barrier and/or an enabler) on ENCIs.

After setting up the main factors the subfactors were identified and described in detail, then bilateral discussions were held with the authors of the other factor groups to eliminate duplications as well as ensuring no major factor or subfactor were neglected. Finally, the environmental factors were concluded having been checked by the co-project partners.

2.5.2 Synthesis table of the Environmental factors

Texts of reference – the main EU documents and other sources that were used for defining the environmental factors and subfactors (in order of the factors for which they were conducted):

- European Climate Pact
- EASAC Statement Extreme Weather Events (March 2018)
- <https://www.eesi.org/policy/resiliency>
- www.eea.europa.eu
- European Climate Law
- The Renewable Energy Directive, Directive (EU) 2018/2001, (REDII)

- European Green Deal
- Ember's Europe Electricity Review 2022
- The Renewable Energy Directive, Directive (EU) 2018/2001, (REDII)
- ec.europa.eu/eurostat
- Medarac, H., Magagna, D., Hidalgo Gonzalez I., 2018. [Projected fresh water use from the European energy sector](#). European Commission: Joint Research Centre.
- energy.ec.europa.eu/topics/renewable-energy/hydropower_en
- https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Water_statistics
- <https://www.eea.europa.eu/highlights/water-stress-is-a-major>
- Directive 2012/19/EU
- [https://www.europarl.europa.eu/thinktank/en/document/04A_FT\(2013\)050705](https://www.europarl.europa.eu/thinktank/en/document/04A_FT(2013)050705)
- [https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU\(2018\)596846](https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU(2018)596846)



FACTORS SUBFACTORS	DESCRIPTION	HOW IT WORKS AS A FACTOR FOR ENCI	EXPLICIT MENTION OF ENCI	AFFECTED TYPES OF ENCI & OUTCOME-ORIENTATION	OPPORTUNITY and/or THREATS for ENCI
EN1. Climate change and climatic conditions	<p>From environmental aspect, the factors that clearly influencing ENCIs are phenomena related to climate and climate change. Impacts related to climate change have a major influence on the EU. Action against and adaptation to it are the underlying motivation for many ENCI initiatives.</p> <p>In many of its regulations, the EU emphasises the problems associated with climate change and the need for change is reflected in the targets. 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.</p>				
EN1.1. The impact of climate change as a global phenomenon	<p>European Climate Pact says climate change can be an opportunity to build a better future for all. Laws and policies aren't enough alone, climate action is an opportunity for everyone to improve our lives, economy and society.</p> <p>Environmental issues are also closely linked to social and gender issues, and are thus more closely related to ENCIs. As the European Environmental Law says, they "shall use all appropriate instruments, including the European Climate Pact, to engage citizens, social partners and stakeholders, and foster dialogue and the diffusion of science-based information about climate change and its social and gender equality aspects."</p>	<p>The fact of 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.</p> <p>As the European Climate Law says, "As citizens and communities have a powerful role to play in driving the transformation towards climate neutrality forward, strong public and social engagement on climate action should be both encouraged and facilitated at all levels, including at national, regional and local level in an inclusive and accessible process."</p>	<p>"Engage citizen" "social and equity issues" "citizens and communities have a powerful role"</p>	<p>Probably all types</p>	<p>O: The threat of climate change creates an atmosphere in which ENCIs can start and thrive.</p>
EN1.2. Increased incidences of extreme weather events	<p>EASAC (2013) report found evidence for overall increases in the frequency and economic costs of extreme events, which emphasised the importance of society's adaption. The review from 2018 confirms the earlier conclusions. "Ecosystems, people and economies in all regions of the Union will face major impacts from climate change, such as extreme heat, floods, droughts, water scarcity, sea level rise, thawing glaciers, forest fires, windthrows and agricultural losses. Preparing early for such impacts is cost-effective and can also bring considerable co-benefits for ecosystems, health and the economy. Nature-based solutions, in particular, can benefit climate change mitigation, adaptation and biodiversity protection." (Climate Act)</p>	<p>Extreme weather events such as flash floods and heat waves are becoming more frequent due to climate change. Adaptation to extreme events at all levels (residential, urban, national and even international) is increasingly unavoidable.</p> <p>These events often have a concrete personal impact on the citizens, so it can motivate them in this direct way, it can initiate local demonstrations, movements and community-building, ENCIs can be based on. One response to these increasing incidents of extreme weather is to adapt to them, by rethinking and updating current practices and standards for planning, design and building. Thus, extreme weather adaptation will make communities and societies more resilient. (From article: Support for climate adaptation and resilience) Here, alongside national and local governments, individuals must also play a role, which can also provide a good platform for ENCIs.</p>	<p>"Resilient communities"</p>	<p>Probably all types</p>	<p>O: these events can draw the attention of the general population towards the need for the appearance and expansion of already existing ENCIs.</p> <p>T: the extreme weather incidents can be a threat to ENCIs focusing on technical solutions (energy cooperatives, renewable energy projects).</p>
EN1.3. Increased atmospheric carbon dioxide and global temperature increase	<p>The total concentration of all greenhouse gases reached 460 parts per million CO2 equivalents in 2019. This is already within the range of the peak level that the IPCC states should not be exceeded if the global temperature increase is to be limited to 1.5oC above pre-industrial levels by 2100.</p> <p>Climate Law states, "Union-wide greenhouse gas emissions and removals regulated in Union law shall be balanced within the Union at the latest by 2050, thus reducing emissions to net zero by that date, and the Union shall aim to achieve negative emissions thereafter."</p>	<p>The increase in atmospheric carbon dioxide is itself a contributing factor to the development of ENCIs. Reducing carbon emissions, calculating one's own carbon footprint, and making individual actions (e.g. energy consumption at home, mobility) carbon neutral, become the basis for a conscious lifestyle.</p> <p>Carbon footprint calculations and the dissemination of knowledge on the sustainable footprint could be one of the ENCIs' awareness-raising pillars. The metric can provide an important basis for working towards a sustainable lifestyle.</p> <p>In the Climate Law it is written that EU needs to help the society with "enable and empower them to take action towards a just and socially fair transition to a climate-neutral and climate-resilient society."</p>	<p>"Enable and empower the society"</p>	<p>Mainly Transformative</p>	<p>O: The continuous increase in atmospheric carbon dioxide could lead citizens to take action and become more aware</p>

<p>EN2. Energy related resources (geological, geographical)</p>	<p>Renewable energy and innovative methods are all closely linked to the development of ENCIs. Related factors can encourage or threaten the development of energy communities and the transformation of a decentralised, democratic energy system. As the Renewable Energy Directive says: "When favouring the development of the market for energy from renewable sources, it is necessary to take into account the positive impact on regional and local development opportunities, export prospects, social cohesion and employment opportunities, in particular as concerns SMEs and independent energy producers, including renewables self-consumers and renewable energy communities."</p>				
<p>EN2.1. Opportunities and threats of the necessary and potential renewable sources on the path to decarbonisation</p>	<p>The Renewable Energy Directive (2018) established a common framework for the promotion of energy from renewable sources in the EU and set a binding target of 32 % for the overall share in 2030. European Green Deal emphasized the need for more ambitious action to address climate change, e.g. it is prioritising energy efficiency. Europe's diversity can help to move forward in developing a sustainable energy mix by applying different solutions and earn our goals. The Renewable Energy Directive highlights that the Member States have different renewable energy potentials and operate different support schemes at national level.</p>	<p>The Renewable Energy Directive specifically highlights small-scale investments, which can have a positive impact on public acceptance, and also mentions that investments can provide environmental, social and health benefits as well as major opportunities for employment and regional development, especially in rural and isolated areas, which is also closely connected to the developments of ENCIs. It also pays attention to empower jointly acting renewables self-consumers, because it provides opportunities for renewable energy communities to advance energy efficiency at household level and helps fight energy poverty through reduced consumption and lower supply tariffs.</p>	<p>"Empower jointly acting self-consumers" "Small scale investments"</p>	<p>Probably all types Mainly Reformative outcome orientation, but in certain cases Transformative outcome orientation is relevant too (e.g. distribution of renewable energy, transforming the energy system to a more democratic one)</p>	<p>O: To achieve the set goals, a coherent network and a diverse system are needed. Geographical diversity can ensure the use of different types of renewable energy (offshore power plants on the coast, geothermal energy where available, etc.) O: As an objective, a decentralised and democratic system can promote the empowerment of citizens and contribute to reducing energy poverty. T: where renewable potentials are scarce (or centralized) the existence and functioning of some ENCI types can be endangered. Here's an extra threat related question: is the available potential even enough (see solar farm in Morocco)?</p>
<p>EN2.2. Differences and gaps in the existing renewable energy grid</p>	<p>The current situation of renewables varies widely across Member States. As the 2022 review shows, both the percentage of renewables used and their growth rate are still very different across the EU (e.g. Spain, Netherlands and Greece have been deploying wind and solar the fastest in recent years. The growth is being driven by supportive policy frameworks, falling costs and ambitious targets. This is in sharp contrast to countries such as Poland and Italy, where renewables are still not expanding fast enough, or countries such as Bulgaria, Czechia and Romania which have failed to deploy almost any wind and solar.)</p>	<p>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). Initiatives from other countries can also serve as examples, but due to local conditions (e.g. regulation, geography), frontrunner projects within countries have particular importance. 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.</p>	<p>NO</p>	<p>Probably all types Mainly Reformative outcome orientation, but in certain cases Transformative outcome orientation is relevant too (e.g. distribution of renewable energy, transforming the energy system to a more democratic one)</p>	<p>T: In countries where local conditions (geography, regulation) currently are not ideal for the use or installation of renewable energy (no access to green electricity, it is not financially viable to install solar panels, no permission are issued to build wind farms, there is no tradition of community energy), the development of ENCIs is also limited. O: Of course, it could be an opportunity in those countries, where local conditions (geography, regulation) currently are ideal, and it can help maintain and develop the vitality of existing ENCIs.</p>
<p>EN2.3. Impact of the use of existing non-renewable resources on the system</p>	<p>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.</p>	<p>Centralization and inflexibility of the energy system can be a barrier to the development of ENCIs (e.g. it cannot work well with a smart grid). But, 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.</p>	<p>NO</p>	<p>Probably all types</p>	<p>T: The fossil-based part of the energy system tends to be centralised and less democratic, it is not flexible and may block the emergence of ENCIs that require flexibility. O: The decreasing amount of available non-renewable resources serves as an opportunity for ENCIs to function and multiply (e.g. more energy use conscious citizens who are willing to join different ENCIs, multiplication opportunity for RES communities)</p>
<p>EN2.4. The impact of water resources in energy production</p>	<p>Water in energy production can be approached in two main ways, firstly as hydropower plants themselves, and secondly as a use of water for other kind of energy production (e.g. cooling a nuclear power plant). The use of water by renewable energy sources is very small, around 5% of the water withdrawals are actually consumed. In 2015 the EU energy sector consumed 3.8 billion m³, and by 2050 consumption is expected to decrease up to 2.7 billion m³. But, overall, hydropower continues to be an important energy source. According to Eurostat, it accounted for 33% of the EU's renewable electricity production in 2020.</p>	<p>From this perspective, water-related environmental issues can be linked to the movement type of ENCIs, as a lot of initiatives are based on protests connected to this topic. In recent years, for example, there have been numerous protests and actions all over Balkans against hydroelectric dams in the region under slogans such as "Let's keep our rivers clean." In addition, the question of how to cool nuclear power plants in low-flow conditions is becoming an increasingly important issue, for example in France. These problems are also present outside the EU, for example in several regions of Turkey, where there are movements against newly installed hydroelectric power plants that have led to the drying up of agricultural land. This has given rise to many local, grassroots initiatives.</p>	<p>NO</p>	<p>Type 9, Type 10</p>	<p>O: Social movements can be motivated by the environmental problems caused by water use linked to energy production. Here, too, the appearance of personal involvement can be an important aspect.</p>

<p>EN2.5. Increasing scarcity of drinking water</p>	<p>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. Europe needs to strengthen the resilience of its ecosystems and use water more efficiently.</p> <p>There was already a decrease in abstraction in many of the Member States as a result of reduction of water losses through improved maintenance of the networks, the introduction of water-saving household appliances and an increasing level of awareness concerning the cost or value of water and the environmental consequences of wasting it.</p>	<p>Fresh water scarcity can be linked to ENCIs in two main ways.</p> <p>As water is one of the most important resources, its sustainable use can be an extra motivating factor, specifically for households, where green thinking and proactiveness are closely linked to sustainable living, of which sustainable water use is an inevitable part.</p> <p>Furthermore, the scarcity of fresh water directly affects households (although Europe is well supplied, there are already minimal restrictions, such as no watering), which can be an incentive to start ENCI-type initiatives.</p>	<p>"Population is affected" "Strengthen the resilience"</p>	<p>Type1, Type2</p>	<p>O: For those who can be initiators and leaders of ENCIs, green considerations are important in all aspects of life. As water is an environmentally important resource, sustainable use can be an extra motivation.</p>
<p>EN3. Environmental damages (pollution, emission, threat to biodiversity)</p>		<p>The environmental theme is heavily infused with pollution and protection issues. These factors are partly related to the pollution caused by the energy sources currently used and the environmental conflicts that may arise during the energy transition. The subfactors are a motivational driver for the development of ENCIs, as pollution and energy use are linked to our daily lives and the need to change can create the basis for becoming a conscious and empowered citizen.</p>			
<p>EN3.1. Noise pollution connected to mobility developments</p>	<p>Switching from regular cars (petrol or diesel car) to other, more sustainable ways of transport (e.g. bike, electric cars) can make a big impact on reducing noise pollution. (This mainly affects cities, but could be extended.)</p>	<p>The effort to reduce noise pollution can also be a motivating factor for the development of certain types of ENCI (e.g. using a bike-sharing or car-sharing systems).</p>	<p>No</p>	<p>Probably all types</p>	<p>O: Noise pollution from mobility and transport is a growing problem in both urban and rural environments, which can motivate vehicle use change (e.g. electric vehicles)</p>
<p>EN3.2. Air pollution as a "red button"</p>	<p>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.</p>	<p>Existing sustainable "air greening solutions" can serve as examples for ENCIs (more sustainable mobility systems, green energy production).</p>	<p>No</p>	<p>Probably all types</p>	<p>O: Air pollution affects the population more and more directly, so as a red button it can be an incentive to develop ENCIs</p>
<p>EN3.3. Visual pollution due to the installation of renewable energy (especially windmills)</p>	<p>The concept of "visual pollution", which includes the degradation of the landscape, arises in the context of newly developed renewable energy systems, but especially wind farms.</p>	<p>Where the concept of visual pollution is socially accepted, it can be a serious disadvantage for the development of ENCIs, for example when thinking about energy communities or green energy choices.</p>	<p>No</p>	<p>Mainly Reformative outcome orientation</p>	<p>T: Concerns about vison pollution are often raised in connection with wind farms, which can create discomfort in the local community and thus prevent the development of ENCIs.</p>
<p>EN3.4. Waste associated with energy production</p>	<p>Problematic waste associated with solar photovoltaics: As the directive of WEEE says, "In the case of products which have a long-life cycle, such as photovoltaic panels, the best possible use should be made of existing collection and recovery systems, provided that they meet the requirements." Nuclear energy associated waste and pollution: "Nuclear power stations currently produce around one third of the electricity and 14% of the energy consumed in the EU. (...) However, in the aftermath of the 1986 Chernobyl disaster and the 2011 nuclear catastrophe in Fukushima, Japan, nuclear energy has become highly controversial." (EU fact sheets about nuclear energy)</p>	<p>Waste management should be part of the circular economy. Where the management of some renewable energy-related waste (typically, for example, used solar panels or electric car batteries) is not transparently and comprehensively managed everywhere, it can create a lack of confidence and could undermine ENCI initiatives.</p> <p>The doubts, pollution and waste associated with nuclear energy gave rise to the anti-nuclear movement, fighting for the phase-out of nuclear energy.</p> <p>"The results of the recently carried out assessment show that most of the analysed petitions still relate to deficits in the waste management system, the operating of existing installations (mainly landfills) and the permitting procedure for new facilities."</p>	<p>No</p>	<p>Mainly Rerformative outcome orientation Type 9, 10</p>	<p>T: The problematic waste associated with renewable energy production can be discouraging for ENCIs' initiators, especially if their management is unresolved and non-transparent.</p> <p>O: Nuclear waste is linked to a number of movements, in this sense it represents an opportunity to ENCIs</p>

	<p>EN3.5. Biodiversity protection issues connected to renewable installation</p>	<p>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.</p> <p>"Conflicting public goods are the second main source of obstacles for the deployment of renewable installations. This is particularly the case for wind power, geothermal power and hydropower as well as solar photovoltaics. The most prominent among them concern environmental protection (biodiversity and protection of endangered species and protection of water bodies)."</p> <p>But, renewable energy plays an essential role in achieving greenhouse gas targets, thus indirectly contribute to biodiversity loss prevention.</p>	<p>Doubts about renewables may be increased by inadequate environmental assessment and non-transparent communication. ENCIs may face obstacles if they cannot find a suitable site for themselves.</p>	<p>No</p>	<p>Probably all types</p>	<p>T: The potential for threats to biodiversity is a barrier to the development of ENCIs.</p>
	<p>EN3.6. Conflicts and opportunities about land use connected to renewable energy</p>	<p>Land use change can be a conflict for the installation of renewable energy systems, especially if they are planned on former agricultural land.</p> <p>"Conflicting public goods are the second main source of obstacles for the deployment of renewable installations. This is particularly the case for wind power, geothermal power and hydropower as well as solar photovoltaics. (...) other land uses and military/ air defence issues."</p> <p>"Public authorities indicate the lack of availability of sites on land or at sea as the main challenge to the expansion of renewable energy in their jurisdiction."</p>	<p>Finding suitable land for renewable energy can lead to many conflicts, especially on whether it is more appropriate to use it for agricultural purposes. This can be a difficult decision for local people and stakeholders, who are an important basis for ENCIs, and may delay their development.</p> <p>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.</p>	<p>No</p>	<p>Probably all types</p>	<p>T: Potential conflicts in land use between the agricultural use and the installation of renewable energy systems</p> <p>O: The conversion of some areas can be particularly beneficial, for example polluted soils also can be covered with solar panels</p>

2.5.3 Considerations on the Environmental factors

Some of the factors and subfactors indeed have a larger impact on the ENCIs, while others have a smaller one, an urgent but careful consideration should be given to the former ones as they influence the sheer existence of ENCIs.

Factors also vary in their sheer nature, whereas they can be altered in a short or a long (many decades) time. Those environmental factors that are difficult to influence within a short period of time – EN1. Climate change and climatic conditions – must be observed carefully, how we can adapt to them and how, if at all, they are changing in the course of time. Those that can be changed more rapidly – EN2. Energy related resources (geological, geographical); EN3. Environmental damages (pollution, emission, threat to biodiversity) – should be mapped carefully and used in strategy and other policy making processes, thus creating a more supportive, enabling environment for ENCIs.

Significant amount of difference could be observed among some of the environmental factors and subfactors from a geographical point of view within the EU. In some case there is an abundance of resources (e.g. renewable potential due to geological advantages) in certain areas, while scarcity is more typical in others, thus the national level PESTEL analysis of the environmental factors will provide a better understanding and also possibility of response in relation to these specific factors/subfactors.

2.6 Legal factors

2.6.1 Methodological specificities

In accordance with the general methodology, the legal aspects were mostly studied on the basis of texts that are legally binding for member states, i.e., EU regulation and directives. As a first step, a series of legal sources were investigated in detail to feed a bottom-up approach, which consisted in collecting all the items that could relate to ENCI in our corpus and that proved to be intrinsically related to the output of the legislative process⁷ toward the achievements of the Clean energy for all Europeans package.

Theme	Official journal publication
Directive on the Energy performance in buildings 2018	19/06/2018 - Directive (EU) 2018/844
Directive on Renewable energy 2018 (REDII)	21/12/2018 - Directive (EU) 2018/2001
Directive on Energy efficiency 2018	21/12/2018 - Directive (EU) 2018/2002
Governance of the energy union 2018	21/12/2018 - Regulation (EU) 2018/1999
Directive on the regulation of the internal Electricity market 2019	14/06/2019 - Regulation (EU) 2019/943
Directive on the internal Energy Market 2019	14/06/2019 - Directive (EU) 2019/944
Risk preparedness	14/06/2019 - Regulation (EU) 2019/941
ACER	14/06/2019 - Regulation (EU) 2019/942

This first bottom-up step was necessary to avoid erroneous interpretations and misunderstandings that could have been induced by focusing on too specific parts of the texts. This concerned not least the danger of unreflectively adopting concepts of ENCI as formulated in EU law, not only as a factor, but as the very definition of ENCI as the object of factors and thus only examining those legal frameworks that explicitly focus on such conceptualisations of ENCI.

In a second stage, the identified items related to ENCI were ordered according to a set of main themes and formulated in a way to work as factors impacting ENCI.

⁷ The legislative process is described in more detail here: https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en

A particularity of analysing this letter at the EU-level was that the EU as a law-making body is often relevant to other letters (e.g., technology) through its regulatory, legislative function (e.g., through regulation of technology). Therefore, the identification of factors within this 'cross-cutting' letter posed major demarcation challenges. We have solved this through various solutions:

- First and foremost, by adopting a rather distal perspective, that of law-making and law enforcement and its potential impact on ENCI;
- Second, by examining the expected performativity of the legal texts, especially in terms requirements they set in constraining member state's energy law and policy (and the level of detail required in the translation process in the internal legal order of the member states);
- Third, by ensuring a rather direct impact of legislation on ENCI at the EU level, notably for the EU energy market.

This approach made it possible to distinguish between the different sorts of impacts the European body of law may have on ENCI across Europe.

2.6.2. Synthesis table of the Legal factors

Completing the table above, the links have been directly inserted into the table.

FACTORS & SUBFACTORS	DESCRIPTION	HOW IT WORKS AS A FACTOR FOR ENCI	MENTION OF ENCI	AFFECTED TYPES OF ENCI & OUTCOME-ORIENTATION	OPPORTUNITY and/or THREATS for ENCI
L1. Legal framings and specific enhancement of ENCI forms	There are heterogeneous conceptions of ENCI in the EU legislation, ranging from the information of citizens to the energy communities to the consultative and participative processes. The legal framings of ENCI at the EU level tend to focus on active ENCI forms that are to be enhanced by awareness-raising information and actualised either through REC/CEC or through the figure of the citizen as consumer	Gives a legal status to former "alternative" practices; acknowledges the citizen as consumer in the private sphere; improves legal security; might simplify regulatory processes; but may also limit the scope for action for ENCI	Energy citizen / active consumers/ end users	Type 7 and 8 for the collective forms. Type 1 and 2, 5 for the individual forms.	O: recognition of collective forms of ENCI through the REC and CEC. T: High degree of individualization of ENCI and focus on the figure of the active "neoclassical" consumer as core citizen.
L1.1. Framework (to be elaborated by member states) for enabling Renewable Energy Communities REC & Citizen Energy Communities CEC as defined by the EU	Definition of the two models of energy communities REC and CEC with eligibility criteria and attributed rights (see below) with the purpose of strengthening the role of citizens. Eligibility criteria include: - being constituted as legal entities whose main purpose must not be financial gain - participation should be open and voluntary - specifications on the internal governance (effective control by citizens) and on the admitted member/shareholder types "Member States shall provide an enabling framework to promote and facilitate the development of renewable energy communities. That framework shall ensure, inter alia, that regulatory and capacity-building support is provided to public authorities in enabling and setting up renewable energy communities, and in helping authorities to participate directly" RED II, Art. 22, Internal electricity market 2019	Members state are requested to elaborate an enabling framework on the basis of the EU definition of CECs and RECs. The two models serve as the object of privileged rights and support measures (especially the REC, while the CEC model is more about enforcing the equal treatment of citizens' projects). The eligibility criteria aim to ensure that there is no co-option of the idea of energy communities and that citizens maintain effective control.	Yes, citizen mentioned as participants in in the energy transition, taking ownership of the energy transition, benefiting from new technologies to reduce their bills, and participating actively in the market.	Mostly Type 8 as the two models are by definition about energy communities with majority citizen control. But some of the prescribes rights address the individual participants in the energy communities and not the community itself (requirement for voluntary and open participation, entitlement for household to become participants), thus there might also be type 1.	O: Equal or even preferential treatment of energy communities in energy policy/economy. Strengthening effective citizen voice beyond economical shareholding. T: Dilution of the idea of energy communities and co-optation of the models by established actors - especially after transfer of the models into national legislation. Overloading energy communities with responsibilities and exploiting volunteer labour.
L1.2. Consultation and Participation in RES infrastructure planning to enhance public acceptance	RES infrastructure planning should take into account policies relating to the participation of those affected by the projects, in particular local populations. (RED II, Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, in particular as implemented through Directive 2003/4/EC)	In reference to the directive on "Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters", (Directive 2003/4/EC), the focus is mostly made on the accessibility of information. Increasing opportunities for citizens to express their views on infrastructure planning. However, usually without binding effect.	NO "Those affected by the project" "Local population"	Type 5 (eventually type 6)	O: opens-up the information and participation to all "those affected by the project", which provides a possible broadening of the consultation process. T: Mostly informative and eventually consultative processes, in which citizens' voice is hardly heard.
L1.3. Information and empowerment of citizens to become active consumers on the energy market to be ensured by member states	Member States, where appropriate with the participation of local and regional authorities, shall develop suitable information, awareness-raising, guidance or training programmes in order to inform citizens of how to exercise their rights as active customers, and of the benefits and practicalities, including technical and financial aspects, of developing and using energy from renewable sources, including by renewables self-consumption or in the framework of renewable energy communities. (REDII, Internal electricity market 2019)	Series of measures targeting the EU electricity consumers, by raising awareness of electricity consumption and opening up to the possibility to act as "neoclassical" market actors	YES - citizens as (active) consumers	Mostly Type 1, through devices and incentive towards demand response and flexibility of consumption (reactivity to electricity prices). The agency is basically individual and households-oriented and the outcome orientation reformative.	O: recognition of the necessity of active consumers in the energy markets T: limited empowerment of citizens subsumed under their active consumption
L1.4. Renewables self-consumers, renewables self-consumption and jointly acting renewables self-consumers, notably through Peer-to-peer trading	"Renewables self-consumer" means a final customer (...) who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity, provided that, for a non-household renewables self-consumer, those activities do not constitute its primary commercial or professional activity" "jointly acting renewables self-consumers" means a group of at least two jointly acting renewables self-consumers (...) who are located in the same building or multi-apartment block" Necessity to establish a regulatory framework which would empower renewables self-consumers to generate, consume, store, and sell electricity without facing disproportionate burdens. Member States are allowed to differentiate between individual renewables self-consumers and jointly acting renewables self-consumers due to their different characteristics to the extent that any such differentiation is proportionate and duly justified. (RED II)	Defines and gives a legal status to renewable self-consumers, renewables self-consumption and jointly acting renewable self-consumers, and Peer-to-peer trading. Necessity for member states to establish a regulatory framework empowering self-consumption.	YES "Citizens" "Households" "Self-consumers" "Final customer"	Type 1 and 2 Type 7 and eventually 8	O: recognition of self-consumption at the individual and collective level, and member states required to establish a regulatory framework empowering self-consumption. T: Regulatory framework little specified ("no disproportionate burdens") which may result in various degrees of empowerment.

<p>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</p>	<p>Regional and local authorities often set more ambitious renewable targets that exceed national targets. Regional and local commitments to stimulating development of renewable energy and energy efficiency are currently supported through networks, such as the Covenant of Mayors, Smart Cities or Smart Communities initiatives, and the development of sustainable energy action plans. Such networks are essential and should be expanded, as they raise awareness and facilitate exchanges of best practices and available financial support. In that context, the Commission should support interested innovative regions and local authorities to work across borders by assisting in setting up cooperation mechanisms, such as the European Grouping of Territorial Cooperation, which enables public authorities of various Member States to collaborate and deliver joint services and projects, without requiring a prior international agreement to be signed and ratified by national parliaments. (RED II)</p>	<p>Acknowledges the role of the local/regional initiatives and networks that promote ENCI and commit the EU Commission to support cooperation mechanism across the borders.</p>	<p>NO (Focus on local and regional initiatives and networks)</p>	<p>Type 7 and 8</p>	<p>O: increased support for local/regional initiative, especially across borders through cooperation mechanisms. T: focus on local and regional authorities rather than on grassroots citizens movements.</p>
<p>L2. Energy market-related rights (and duties) of consumers, prosumers and new producers</p>	<p>This factor encompasses various aspects dedicated to the rights of consumer/final users with regard to the energy markets. The focus here is clearly limited to the “active” ENCI, i.e. that of the prosumer, of consumers reacting to price signals and to the REC as newcomers in the energy markets.</p>	<p>This factor considers quite exclusively the “active” ENCI and tends to put it mostly in relation with energy market activities.</p>	<p>Mostly “(active) consumers” citizens mentioned basically in the frame of the RECs/CECs</p>	<p>Type 1 and 3 mostly Type 7 and 8</p>	<p>O: Widespread ENCI through the adaptation of the laws of the energy market T: Focus on the active ENCI as a participant in the energy markets</p>
<p>L2.1. Rights relating to transparent information of users (billing, consumption, implementation of submetering - incl. cost allocation for heating, cooling and domestic hot water)</p>	<p>Improved information of consumers through electricity bills, which: - have to provide transparent and accurate data on individual household consumption and costs - can also convey other information that helps consumers to compare their current arrangements with other offers. Bills have to be made clearer and easier to understand, and bills and billing information shall prominently display a limited number of important items of information that are necessary to enable consumers to regulate their energy consumption, compare offers and switch supplier. (Directive on Energy efficiency 2018 / Directive on internal electricity market 2019)</p>	<p>Clear information on consumption and costs to enable the consumers to act accordingly (regulating their consumption, compare offers, switch supplier) For heating, cooling and hot water: Individualisation of energy consumption in collective buildings</p>	<p>No "Consumers" "End-customers" "Final users"</p>	<p>Type 1 and 3 mostly: focus on the consumer and individualised information about the energy consumption within the household</p>	<p>O: raise awareness towards individual energy consumption through more understandable billing information and a possible better management of ones’ consumption. T: deeply market oriented approach, which reduce the scope of empowerment of the users. Individualisation of energy consumption that is limiting collective leverages?</p>
<p>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)</p>	<p>"Easy" grid access procedures, entitlements for access as well as stable, cost-covering remuneration for energy fed into the grid are crucial elements for a self-sustaining business model of ENCI cases that involve renewable energy generation. Right of all consumers to become active in the electricity market by reacting to price signals and other incentive (neoclassical consumer) All consumers should be able to benefit from directly participating in the market, in particular by adjusting their consumption according to market signals and, in return, benefiting from lower electricity prices or other incentive payments. The benefits of such active participation are likely to increase over time, as the awareness of otherwise passive consumers is raised about their possibilities as active customers and as the information on the possibilities of active participation becomes more accessible and better known. Consumers should have the possibility of participating in all forms of demand response. (RED II 2018 (37); Directive on internal electricity market 2019)</p>	<p>"Easy" grid access procedures, entitlements for access as well as stable, cost-covering remuneration for energy fed into the grid are crucial elements for a self-sustaining business model of ENCI cases that involve renewable energy generation. Right of all consumers to become active in the electricity market by reacting to price signals and other incentive (neoclassical consumer)</p>	<p>No "Consumers"</p>	<p>Type 1 and 3 mostly: focus on the consumer</p>	<p>O: raise awareness and turning the consumer into an active one. T: active participation confined in the figure of the reactive consumer.</p>

<p>L2.3. Entitlements for market activities and access for Citizen Energy Communities (CEC) and Renewable Energy Communities (REC) (cf. L1)</p>	<p>CEC: "This Directive empowers Member States to allow citizen energy communities to become distribution system operators either under the general regime or as 'closed distribution system operators'". REC: Entitlement to generate, consume, store, and sell renewable energy as well as share renewable energy generated within the community with other participants; Entitlement to non-discriminatory access to electricity markets and treatment (REDII, art. 22, Directive on internal electricity market 2019, art. 16)</p>	<p>EU directive requires national regulatory frameworks to establish certain entitlements regarding equal treatment of CEC and REC, as well as market access - yet only for CECs.</p>		<p>Mostly Type 8 as the REC/CEC are by definition about energy communities with majority citizen control. But some of the prescribes entitlements address the individual participants in the energy communities and not the community itself (requirement for voluntary and open participation, entitlement for household to become participants), thus there might also be type 1.</p>	<p>O: Energy communities constituted as RECs encounter better conditions in the national regulatory framework</p>
<p>L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion</p>	<p>Law enforcement of policy concern dealing with a key social factor, i.e. vulnerable people and energy poverty. The focus is mostly the recognition of energy poverty as an issue to be addressed by members states, and firstly by assessing the situation of vulnerable people.</p>	<p>Not directly focused on ENCI (somehow a preliminary step towards ENCI), yet the goal is to include vulnerable people in ENCI and enable them to be part of empowering forms of action related to ENCI (such as renewable self-consumption)</p>	<p>No – energy poor, customers, consumers, households</p>	<p>Basically type 1</p>	<p>O: First step towards tackling energy poverty and enable vulnerable people to access the various forms of ENCI. T: Socio-economic focus rather than citizenship-oriented one.</p>
<p>L3.1. Enhancement of national policies in favour of vulnerable and energy poor customers</p>	<p>Member states should assess and adopt policy measures to face the issues related to energy poverty and ensure the necessary supply for energy vulnerable and poor customers (include social policies or energy efficiency improvements for housing). (Directive on internal electricity market 2019)</p>	<p>Dedicated policies to tackle energy poverty issues</p>	<p>No - "Vulnerable and energy poor customers"</p>	<p>Type 1</p>	<p>O: Increased awareness and enhancement for member states to address energy vulnerability and poverty. T: Focus on "customers" let them embedded in market framings, thus hindering long term solutions by empowering vulnerable people.</p>
<p>L3.2. Inclusiveness of energy efficiency policies</p>	<p>"The Union's energy efficiency policies should be inclusive and should therefore ensure accessibility to energy efficiency measures for consumers affected by energy poverty. Improvements to the energy efficiency of buildings should, in particular, benefit vulnerable households, including those affected by energy poverty, and, where appropriate, those living in social housing. Member States can already require obligated parties to include social aims in energy-saving measures in relation to energy poverty and this possibility should be extended to alternative policy measures and Energy Efficiency National Funds and should be transformed into an obligation, while allowing Member States to retain full flexibility with regard to their size, scope and content. If an energy efficiency obligation scheme does not permit measures relating to individual energy consumers, the Member State may take measures to alleviate energy poverty by means of alternative policy measures alone." (Directive on energy efficiency 2018)</p>	<p>Accessibility of energy efficiency measure to vulnerable people</p>	<p>No - "vulnerable households, including those affected with energy poverty" "Consumers affected by energy poverty"</p>	<p>Type 1</p>	<p>O: Better integration of vulnerable households in energy efficiency policies T: Focus on consumers, rather little empowering</p>
<p>L3.3. Empowerment of vulnerable consumers and tenants through jointly acting renewables energy consumption</p>	<p>Empowering jointly acting renewables self-consumers also provides opportunities for renewable energy communities to advance energy efficiency at household level and helps fight energy poverty through reduced consumption and lower supply tariffs. Member States should take appropriate advantage of that opportunity by, inter alia, assessing the possibility to enable participation by households that might otherwise not be able to participate, including vulnerable consumers and tenants. (REDII 2018)</p>	<p>Enable participation by households that might otherwise not be able to participate, especially vulnerable consumers and tenants</p>	<p>No - "Vulnerable consumers and tenants"</p>	<p>Types 1 and 7 Eventually 8</p>	<p>O: Opportunities for REC to address energy poverty issues. T: Drop the responsibility on REC to address energy poverty issues at the household level.</p>

L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc)	<p>Legal uncertainties deal with various aspects of the current body of law regarding the energy system and the way it's considering energy citizenship. Amongst them, the absence of the citizen in the mobility transition, the high expectations put on REC and the more traditional bureaucratic barriers compose some of the most salient part of this factor.</p>	<p>ENCI is out of the scope of the law, or the law is putting too much expectations on some specific ENCI forms (such as ENCI), making uncertain the willingness to address the related issues.</p> <p>Similarly, the bureaucratic hurdles and the importance of their removal are acknowledged, yet considered procedurally</p>	<p>Not fully relevant</p>	<p>Type 1 and 3 Type 7 and 8 mostly</p>	<p>O: Fuzzy body of law at the EU level might let more margins to the member states to address ENCI issues.</p> <p>T: Yet uncertainties are mostly impacting negatively the development of ENCI, since it does not provide a secure framework for its spread and tends to confirm the status quo rather than the in-depth changes need for a large ENCI.</p>
L4.1. Mobility	<p>Basic focus on electric mobility without mention of citizens or users (only in terms of accessibility of public charging points). The citizens are rather absent from the laws aimed at regulating the mobility transition, which is in itself quite remarkable. (REDII 2018)</p>	<p>Users/citizens are quite excluded from the electric mobility</p>	<p>NO</p>	<p>Type 1 and 3</p>	<p>O: No real opportunity related to the absence of citizens...</p> <p>T: Mobility offer developed out of the scope of potential users, as well as disregarding environmental sustainability issues.</p>
L4.2. Expectations put on REC to address a large set of problems?	<p>"Empowering jointly acting renewables self-consumers also provides opportunities for renewable energy communities to advance energy efficiency at household level and helps fight energy poverty through reduced consumption and lower supply tariffs. Member States should take appropriate advantage of that opportunity by, inter alia, assessing the possibility to enable participation by households that might otherwise not be able to participate, including vulnerable consumers and tenants." "The participation of local citizens and local authorities in renewable energy projects through renewable energy communities has resulted in substantial added value in terms of local acceptance of renewable energy and access to additional private capital which results in local investment, more choice for consumers and greater participation by citizens in the energy transition. Measures to allow renewable energy communities to compete on an equal footing with other producers also aim to increase the participation of local citizens in renewable energy projects and therefore increase acceptance of renewable energy." (REDII 2018)</p>	<p>REC as a key way to address issues regarding acceptance of RES, of citizen participation and as a way to address energy poverty</p>	<p>YES "Local citizens and local authorities" "consumers" "Participation by citizens in the energy transition"</p>	<p>Type 1, 3 Type 5 Type 7, 8</p>	<p>O: Set REC as a key component of the energy transition, enhancing energy citizenship and addressing a large set of issues.</p> <p>T: Devolve key energy issues to REC, and create uncertainty about the REC role and that of member states.</p>
L4.3. Simplification of bureaucracy for permits for renewable energy projects, manual of proceedings for transparency	<p>"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 (...) should stimulate a more efficient handling of procedures, thereby reducing administrative costs. A manual of procedures should be made available to facilitate the understanding of procedures for project developers and citizens wishing to invest in renewable energy. In order to foster the uptake of renewable energy by microenterprises and SMEs and individual citizens, (...) a simple-notification procedure for grid connections to the competent body should be established for small renewable energy projects, including those that are decentralised, such as rooftop solar installations. In order to respond to the increasing need for the repowering of existing renewable energy plants, streamlined permit-granting procedures should be provided for." (EU Commission - Recommendation on speeding up permit-granting procedures for renewable energy projects and facilitating Power Purchase Agreements 2022; Proposal for a Directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency 2022)</p>	<p>Simplification of administrative procedures and publication of a manual of procedures to facilitates the understanding of procedures for citizens to invest in RES.</p>	<p>YES "Citizens" "Individual citizens"</p>	<p>Type 1, 2, 3, 4 Type 7, 8</p>	<p>O: Removal of a barrier for citizens energy projects, by simplifying and making more understandable the administrative procedures, and the set-up of a simple notification procedure for small RE projects such as solar rooftop.</p> <p>T: Accelerating administrative procedures often goes along with the reduction of participative measures.</p>

2.6.3 Considerations on the Legal factors

Combining inductive and deductive approaches, the identification of the legal factors required a narrow focus on ENCI forms, on purpose of identifying as precisely as possible how ENCI is addressed within the existing EU legal frameworks. This proved to be rather challenging considering the number of legal texts that are regulating the Energy union. Another difficulty consisted in the various levels of action encompassed within the EU body of law.

A particularity of the analysis of legal factors at EU level is that EU law (in energy) usually entails obligations for Member States, which must be transposed into national law before becoming directly relevant for ENCI.

An important function of EU law is to establish definitions of key notions and approaches that are intended to provide an EU-wide shared-understanding of energy issues;

There are numerous interactions with the other factors since EU law aims at governing energy policies, energy markets, technological priorities, security of supply and that of installations, environmental protection, etc.

The legal factors thus cover both the “umbrella” role of the law and, at the same time, the discrepancy between energy political orientations (e.g. from the EU Commission) and their enforcement through their integration within the EU body of law. Indeed, any EU law is preceded by (and embedded in) political debate and the undertaken decisions in the many realms of policy-making (e.g. EU Commission recommendations or communications), which the EU law sets in stone and enforces after a certain lap of time due to the EU procedures.

Recent years have witnessed the consolidation of various forms of energy citizenship in the European body of law, including by addressing the growing concerns about vulnerable people and energy poverty, the legal status given to renewable and citizen energy communities at EU level, and the rights and obligations established for individual consumers at EU level. However, enactment and implementation thereof remain in many ways uncertain, whether because of the loose obligations imposed on member states or the lack of a clear view on energy citizenship that the EU body of law is supposed to rule and support.

The way in which ENCI is incorporated in EU law involves first of all a shift/strengthening of the role of individuals as economic actors, be it as consumers, prosumers or as part of community organisations that then engage as actors in the energy market. On the other hand, an approach to ENCI that foresees individuals as participating political actors has so far been less pronounced in EU energy law.

3 Pairwise assessment and weighting of the factors through the AHP/DEMATEL methods

After establishing the list of the PESTEL letters-main factors and the factors within each letter, it seemed as particularly relevant to try to assess the weight of those factors in the support and/or development of ENCI at the EU level. To do so, two tools that belongs to the multi-criteria decision-making (MDCM) have been adopted here: The Analytic Hierarchy Process (AHP) and the Decision-Making Trial and Evaluation Laboratory (DEMATEL) methods. The Analytic Hierarchy Process (AHP) method was implemented to identify the most important factors and subfactors impacting ENCI. However, the AHP method could not identify the influence among the factors, since it is lacking in knowing the interrelationship among factors. To solve this, it is completed with the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method. The objectives of this study are to identify the most impacting factors by determining the interrelationship between the factors and by identifying the influences of each factor to other factors. Considering the number of subfactors, the DEMATEL method was only implemented at the letters- main factors level (*i.e.* P, E, S, T, E, L), whilst the AHP method also addresses the various factors within each letter (P1-P5, Ec1-Ec5, S1-S4, T1-T4, En1-En3, L1-L4) – see figure 5 below.



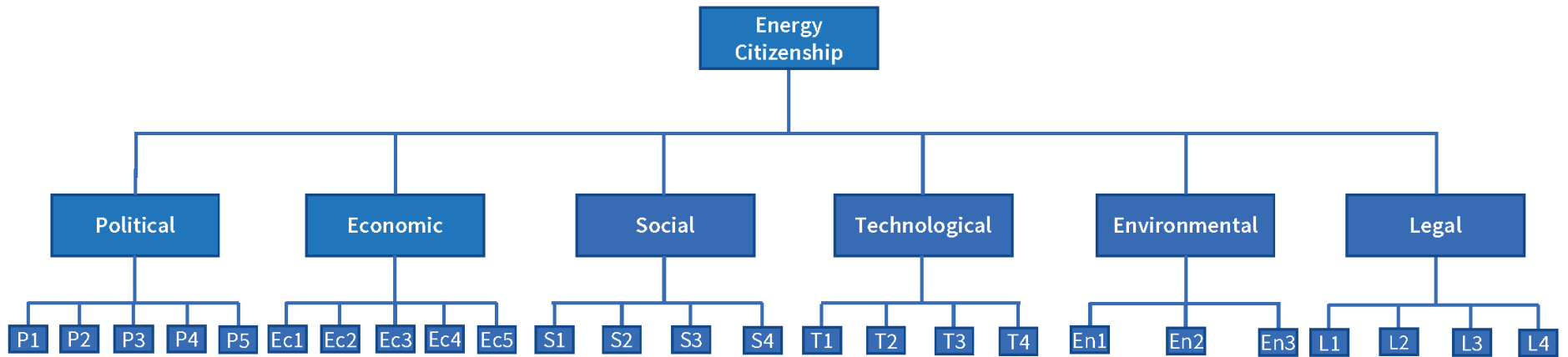


Figure 5: AHP PESTEL Hierarchy of factors

The outputs of this assessment process call for a very cautious consideration for various reasons:

- First and foremost, the apparent “quantitative” results are coming from highly qualitative – and even subjective – inputs. As such, the numbers provided in this chapter shall not be considered as meaningful values by themselves. They are reported here for the global understanding of the process and the methods we used, and never intended to provide any “quantification” of the factors.
- Second, the results are based on the 6 expert assessments among the 7 assessment that we received (9 possible experts that were solicited). As such, they do not claim of any representativity or objectivity and any input may induce some variations in the final outputs. However, the collected expert's assessments clearly show some relevant trends that can be considered as valid results of this assessment process. Furthermore, the inputs provided by the experts have been carefully examined, and sometimes the values had to be adjusted to 1-2 points lower or higher when the value was not guaranteeing a relevant inconsistency ratio of the related matrix. Inconsistency ratio of the matrix from all the 6 experts are all <10%. For the last expert, the IR was mostly > 40%, which did not make it possible to integrate the matrix with very minor adaptations.

3.1 AHP Method results from the expert assessments

The AHP method relies first on the decomposition of the PESTEL letters-main factors as operated in the previous section and which is summarized in the figure 5 above. On this basis, the templates to be filled by the experts (see Annex) were prepared, sent out and the expert inputs were collected. To simplify the computing process, these inputs were imported on an online software (<https://onlineoutput.com/>), which provided the following results.

The AHP method enables getting some insights on rather complex issues by using a simpler step (Vaishnavi et al., 2017). The pair-wise comparison in the AHP method is convenient since it allows to approximate the weight of the factors.

Yet, the AHP method presents some obvious drawbacks, first since it relies on human judgment: though operated by experts, the numerical assessment can hardly be considered as providing any robust quantitative inputs. That said, the AHP method makes it possible to determine the rank of the factors that are part of a system by weighting them pairwise – which does not include their interactions.



The tables and graphics below are thus displaying the ranking of the factors within each of the 6 letters and then among the 6 letters/main factors – to follow up the way the experts had to fill-in the template.

3.1.1 Political factors

The 5 political factors are ranked with rather low differences in values, which does not impact the relevance of the ranking itself.

Table II: Weighting of the (independent) Political subfactors

Rank	Factor name	Factor weight
4	P1. EU-level political unification in the energy sector	0,198
1	P2. Agreed upon climate and energy policy targets with current strategic developments	0,204
2	P3. Commitments to participative governance	0,201
5	P4. Non-governmental initiative towards energy transition	0,196
3	P5. Empowerment policies	0,200

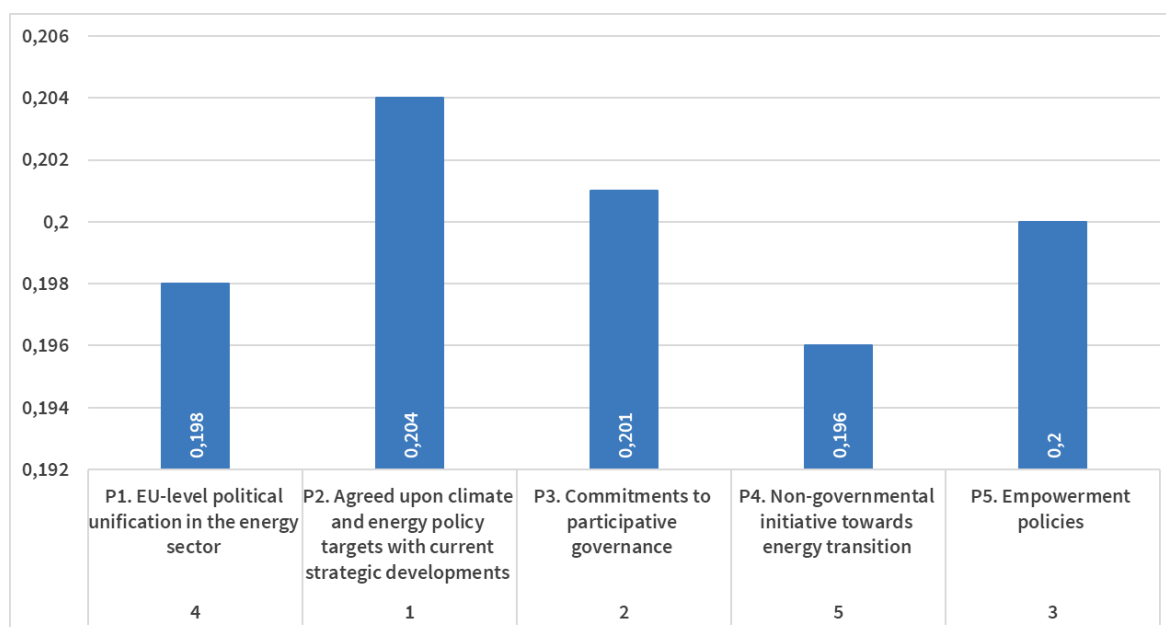


Figure 6: Weighting of the (independent) Political subfactors

As shown in the table and graphic above, within the Political field, *P2. Agreed upon climate and energy policy targets with current strategic developments* has been assessed by our expert panel as the most important factor for ENCI. The EU-context is thus given a significant

importance for the development of ENCI in Europe. The next factor, rank 2, *P3. Commitments to participative governance* can be seen as somehow less EU-specific, yet it clearly points out the renewal of the governance practices required for the enhancement of ENCI.

Quite surprisingly, the factors *P1. EU-level political unification in the energy sector* and *P4. Non-governmental initiative towards energy transition* have been considered as the two least decisive political factor, since they are ranked respectively at the third and fourth places in term of importance for ENCI.

3.1.2 Economic factors

The ranking of the economic factors presents larger differences between the values, whilst two factors have been seen as of equal importance by the expert panel.

Table III: Weighting of the (independant) Economic subfactors

Rank	Factor name	Factor weight
3	EC1. Energy prices	0,197
1	EC2. Steering the European economy through market intervention	0,208
2	EC3. Design of and access to financing and investments	0,206
4	EC4. Economic growth	0,183
2	EC5. Spatial distribution of economic activity	0.206

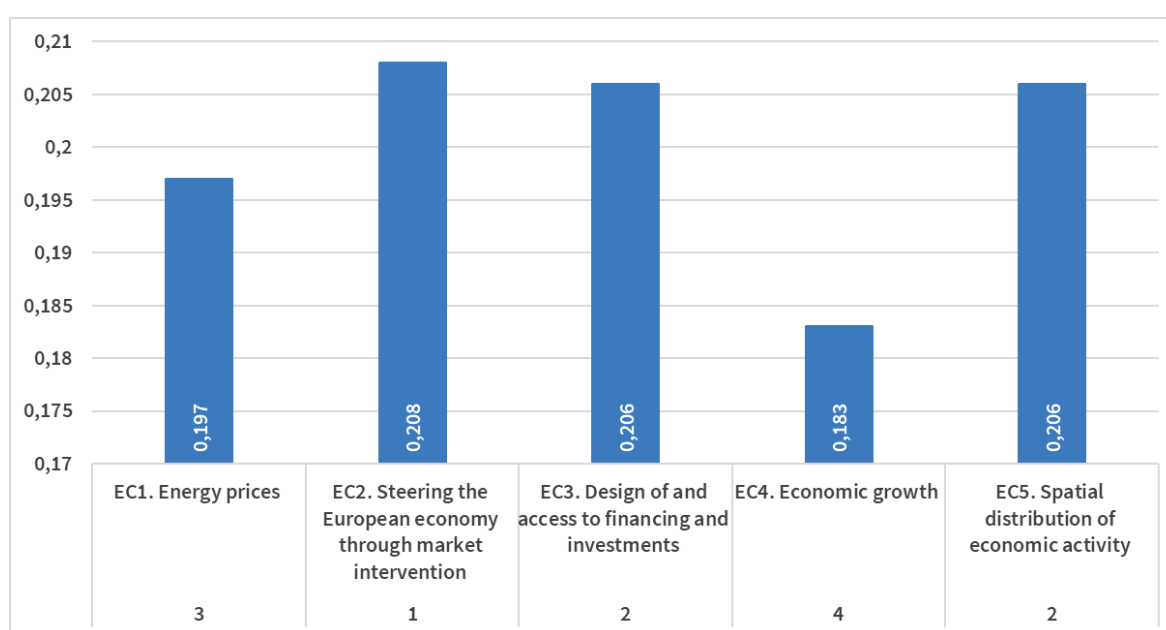


Figure 7: Weighting of the (independant) Economic subfactors

As shown in the table and graphic above, within the Economic field, *EC2. Steering the European economy through market intervention* has been assigned the first rank, which underlines the importance of the regulation of the markets at the EU-level for the development of ENCI. Next priority is assigned to *EC3. Design of and access to financing and investments* and *EC5. Spatial distribution of economic activity*, which are ranked 2. Whilst *EC3*, just like *EC2*, stresses the role played by market and incentives policy in supporting ENCI economically, the factor *EC5* confirms the importance of the economic decentralisation process underlined in the considerations on the economic factors (section 2.2.3). Here again, quite surprisingly, the factors that could *a priori* be seen as the most “obviously economic” ones i.e., *EC1. Energy prices* and *EC4. Economic growth* is considered as the less important economic factors and ranked respectively at the 3rd and 4th places.

3.1.3 Social factors

The assessment of the social factors also provides a clear ranking, disclosing distinct pairs of factors.

Table IV: Weighting of the (independent) social subfactors

Rank	Factor name	Factor weight
3	S1. Social standing (education, occupation, income and status)	0.259
4	S2. Demographic factors	0.211
1	S3. Social attitudes towards energy transition	0.266
2	S4. Social and individual behaviour and habits	0.263

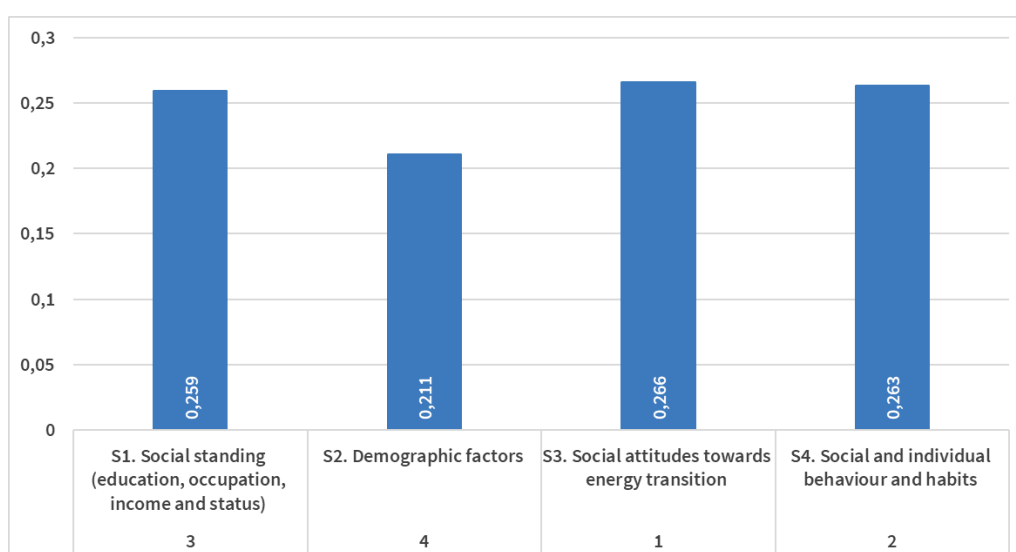


Figure 8: Weighting of the (independent) Social subfactors

As shown in the table and graphic above, within the Social field, third set of factors described in section 2.3.3 is considered as the most important for ENCI. Rank first has been assigned to factor *S3. Social attitudes towards energy transition*. The factor *S4. Social and individual behaviour and habits* comes up as the second one. Our expert panel gives thus priority in the assessment of the social factors to social norms, practices, and values sustaining the awareness of the citizens with regard to the energy transition issues. It is remarkable that these two rather “immaterial” factors are given a greater importance than more “objective” - *i.e.* statistically stated – factors such as the social standing or the demography (S1 and S2).

3.1.4 Technological factors

As for the economic factors, the technological factors were rather clearly ranked out of the computation of the expert assessments, with significant differences in the factors’ weights.

Table V: Weighting of the (independant) Technological subfactors

Rank	Factor name	Factor weight
2	T1. EU technological choices towards the decarbonisation of the energy sector	0.299
3	T2. Technological pathways for European energy transmission and distribution infrastructure (Trans-European Networks for Energy)	0.262
1	T3. EU choices for integrated approaches towards energy efficiency	0.312
4	T4. Digitalisation of the Energy System	0.127

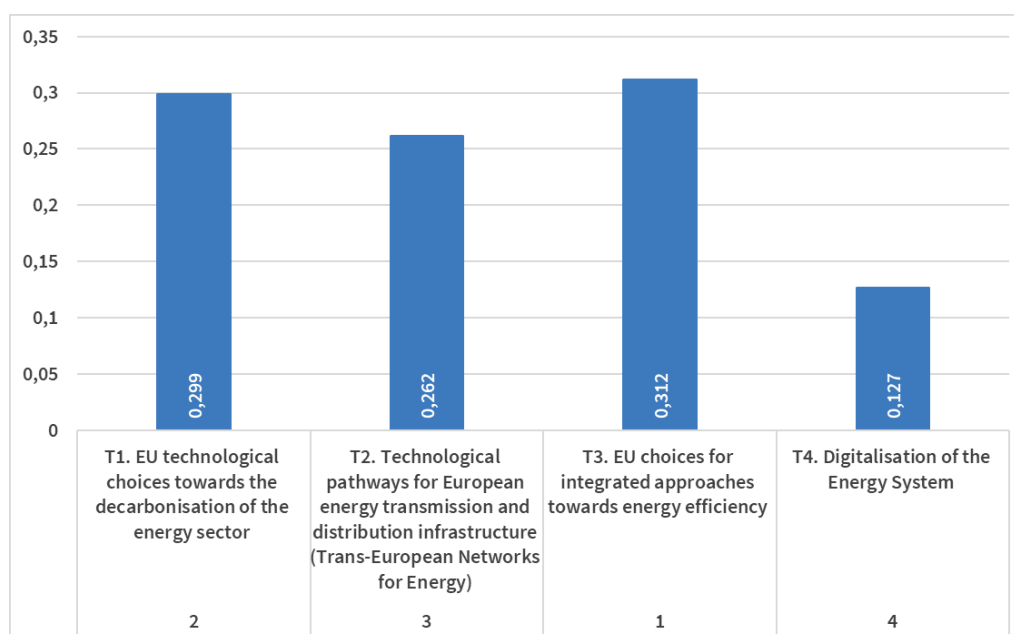


Figure 9: Weighting of the (independant) Technological subfactors

As shown in the table and graph above, within the Technological field, the most important factor according to the experts is *T3. EU choices for integrated approaches towards energy efficiency*. The first rank assigned to T3 might result from its greater proximity to the citizens, which would therefore explain why it has been considered as the most important for the development of ENCI at the EU-level. The factors ranked 2 and 3 do not directly target the individual citizens and encompass a large number of aspects that are designing the energy system way beyond the scope of the citizens. More surprising is the rank 4 assigned to the *T4. Digitalisation of the energy system*, which might take a growing importance for ENCI – but is still currently a potentiality rather than a fully operative factor and, furthermore, it seems that the digitalisation processes take place currently mostly at the national level.

3.1.5 Environmental factors

Among the environmental factors, two of them present very similar values and seem to be more important than the last one.

Table VI: Weighting of the (independant) Environmental subfactors

Rank	Factor name	Factor weight
1	EN1. Climate change and climatic conditions	0.337
3	EN2. Energy related resources (geological, geographical)	0.327
2	EN3. Environmental damages (pollution, emission, threat to biodiversity)	0.336

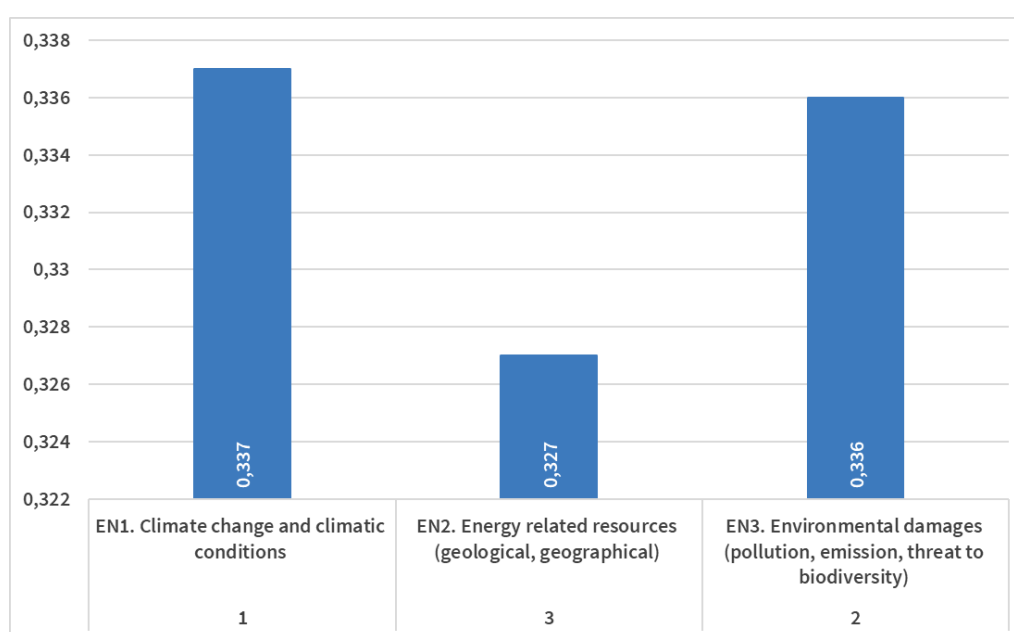


Figure 10: Weighting of the (independant) Environmental subfactors

As shown in the table and graph above, within the Environmental field, *EN1. Climate change and climatic conditions* is considered as the most important factor for ENCI, immediately followed by *EN3. Environmental damages (pollution, emission, threat to biodiversity)*. These two factors might be of particular importance considering their proximity to the citizens - i.e. the predominance of the narratives related to climate change as a key motivation for the energy transition on the one side, and on the other side, the extent to which the citizens are directly affected and concerned by the environmental damages. *EN2. Energy related resources* is ranked third, which might be due to the “geo-physical” properties it underlines, which are not easily reappropriated by citizens.

3.1.6 Legal factors

Among the legal factors, two of them are clearly identified as the most important, whilst the differentiation between the two others is very narrow (if meaningful).

Table VII: Weighting of the (independent) Legal subfactors

rank	Factor name	Factor weight
3	L1. Legal framings and specific enhancements of ENCI forms	0.242
2	L2. Energy market-related rights (and duties) of consumers, prosumers and new producers	0.255
1	L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion	0.268
4	L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc.)	0.235

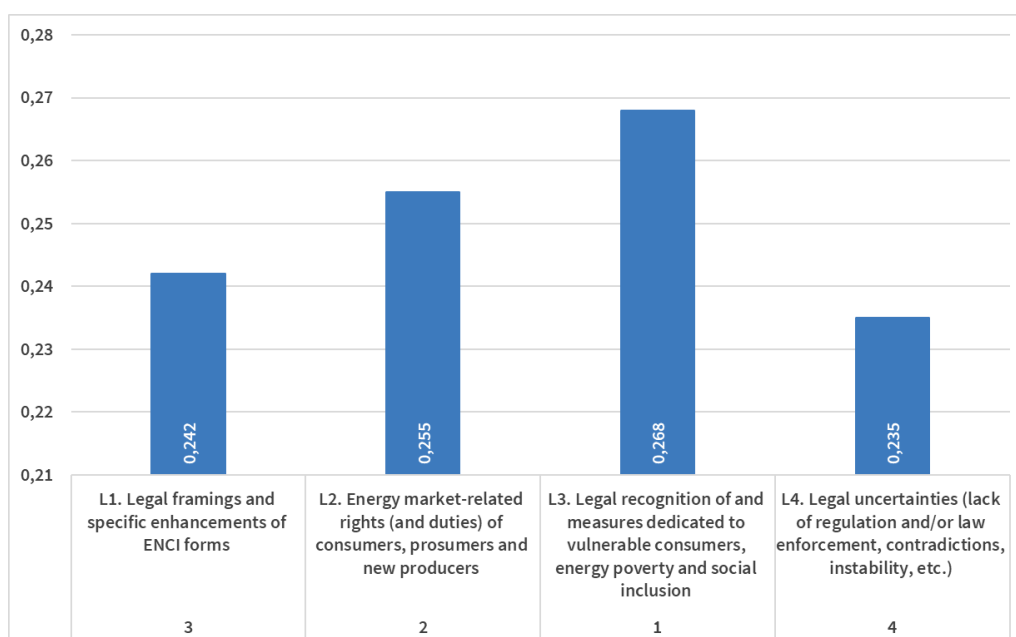


Figure 11: Weighting of the (independent) Legal subfactors

As shown in the table and graphic above, within the Legal field, *L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion* is the most important factor on ENCI according to our expert panel. Next comes the factor *L2. Energy market-related rights (and duties of consumers, prosumers and new producers)* which is assigned to rank 2. Quite surprisingly, the *L1. Legal framings and specific enhancement of ENCI forms* is assigned to rank 3 though addressing energy communities and cooperatives. Then the legal uncertainties at the EU-level are ranked 4, which is somehow understandable considering that the legal uncertainties are mostly occurring at the national level, even among the EU countries.

3.1.7 Weighting of the 6 main “letters” (factors)

Following the weighting of the factors of each PESTEL letter, the experts were asked to provide an overview by weighting the importance of each letter/main factor.

Table VIII : Weighting of the (independent) PESTEL factors with respect to ENCI

Rank	Factor name	Letter weight
2	Political	0.182
4	Economic	0.163
1	Social	0.185
6	Technological	0.143
3	Environmental	0.172
5	Legal	0.155

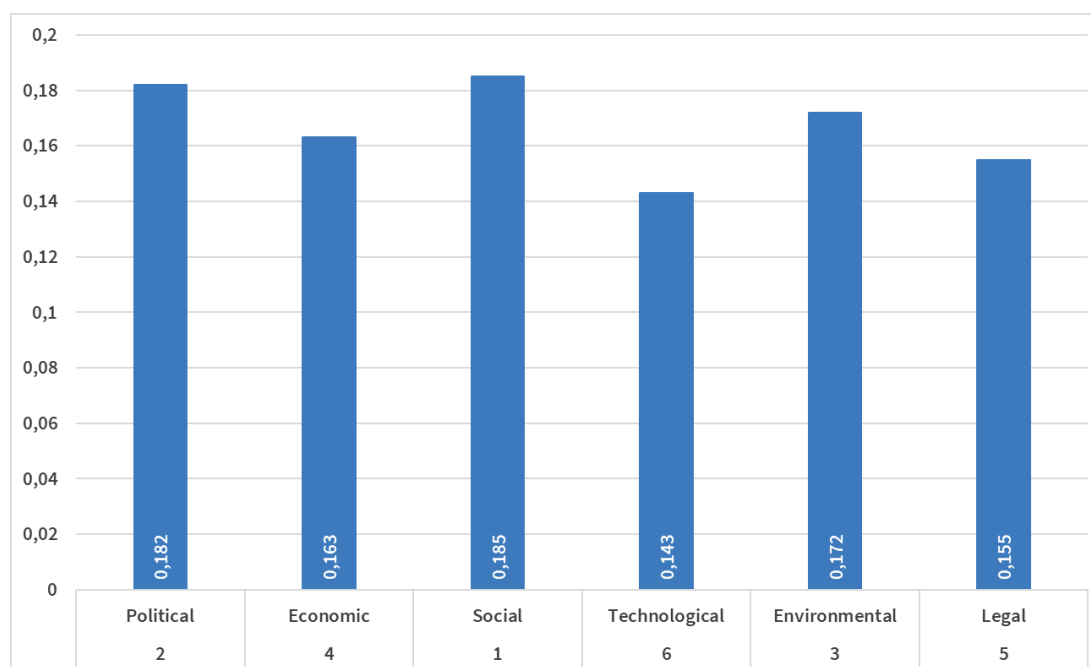


Figure 12 : Weighting of the (independent) main PESTEL factors with respect to ENCI

As shown in the table above, within the 6 PESTEL letters/main factors that are impacting ENCI, the Social is considered the most important by our expert panel. This does somehow make sense since the citizenship firstly refers to the social realm. This is somehow confirmed by the rank 2 assigned to the political letter, in that citizenship can be considered as a social-anchored set of practices that relates firstly to the political realm. The next factors in terms of importance are then the Environmental, Economic, Legal and Technological according to the obtained weights.

3.2 The steps of the fuzzy DEMATEL method

Within the traditional multi-criteria decision-making (MCDM) methods, the AHP method assumes the factors to be mutually independent and consequently, the interrelationship among them remains unknown. Yet, the analysis of the factors' impact requires identifying which factor is a cause and has an effect on the system, and which factor is more affected by the system than it influences it. The DEMATEL method can provide the cause-and-effect group in the form of a causal digraph (Falatoonitoosi et al., 2013) and it also utilizes the experts' knowledge to understand interdependences and interrelations between factors better compared to other MCDM methods (Dalvi-Esfahani et al., 2019).

3.2.1 Step 1: Generate the fuzzy direct- relation matrix

In order to identify the model of the relations among the n criteria (here the PESTEL letters/factors), an $n \times n$ matrix is first generated. The influence of the element in each row exerted on the element in each column of this matrix can be represented a fuzzy number. If multiple experts' opinions are used, all experts must complete the matrix. Arithmetic mean of all of the experts' opinions is used to generate the direct relation matrix z .

$$z = \begin{bmatrix} 0 & \dots & \tilde{z}_{n1} \\ \vdots & \ddots & \vdots \\ \tilde{z}_{1n} & \dots & 0 \end{bmatrix}$$

The table below indicates the direct relation matrix, which is the same as pairwise comparison matrix of the experts.

Table IX: The direct relation matrix

	Political	Economic	Social	Technological	Environmental	Legal
Political	(0.000,0.000, 0.000)	(0.650,0.900, 1.000)	(0.450,0.700, 0.900)	(0.350,0.600, 0.800)	(0.550,0.800, 0.950)	(0.500,0.750, 0.900)
Economic	(0.700,0.950, 1.000)	(0.000,0.000, 0.000)	(0.450,0.700, 0.900)	(0.500,0.750, 0.900)	(0.250,0.450, 0.700)	(0.300,0.550, 0.800)
Social	(0.450,0.700, 0.900)	(0.550,0.800, 0.950)	(0.000,0.000, 0.000)	(0.300,0.500, 0.700)	(0.550,0.800, 0.950)	(0.200,0.350, 0.600)
Technological	(0.100,0.300, 0.550)	(0.300,0.550, 0.800)	(0.200,0.400, 0.650)	(0.000,0.000, 0.000)	(0.450,0.700, 0.850)	(0.150,0.300, 0.550)
Environmental	(0.150,0.300, 0.550)	(0.200,0.350, 0.600)	(0.500,0.750, 0.900)	(0.250,0.400, 0.650)	(0.000,0.000, 0.000)	(0.150,0.300, 0.550)
Legal	(0.350,0.600, 0.800)	(0.250,0.500, 0.700)	(0.250,0.500, 0.750)	(0.150,0.400, 0.650)	(0.350,0.600, 0.800)	(0.000,0.000, 0.000)

The following table shows the fuzzy scale used in the model.

Table X: Fuzzy Scale

Code	Linguistic terms	L	M	U
1	No influence	0	0	0.25
2	Very low influence	0	0.25	0.5
3	Low influence	0.25	0.5	0.75
4	High influence	0.5	0.75	1
5	Very high influence	0.75	1	1

3.2.2 Step 2: Normalize the fuzzy direct-relation matrix

The normalized fuzzy direct-relation matrix can be obtained using the following formula:

$$\tilde{x}_{ij} = \frac{\tilde{z}_{ij}}{r} = \left(\frac{l_{ij}}{r}, \frac{m_{ij}}{r}, \frac{u_{ij}}{r} \right)$$

Where:

$$r = \max_{i,j} \left\{ \max_i \sum_{j=1}^n u_{ij}, \max_j \sum_{i=1}^n u_{ij} \right\} \quad i, j \in \{1, 2, 3, \dots, n\}$$

Table XI: The normalized fuzzy direct-relation matrix

	Political	Economic	Social	Technological	Environmental	Legal
Political	(0.000,0.000, 0.000)	(0.143,0.198, 0.220)	(0.099,0.154, 0.198)	(0.077,0.132, 0.176)	(0.121,0.176, 0.209)	(0.110,0.165, 0.198)
Economic	(0.154,0.209, 0.220)	(0.000,0.000, 0.000)	(0.099,0.154, 0.198)	(0.110,0.165, 0.198)	(0.055,0.099, 0.154)	(0.066,0.121, 0.176)
Social	(0.099,0.154, 0.198)	(0.121,0.176, 0.209)	(0.000,0.000, 0.000)	(0.066,0.110, 0.154)	(0.121,0.176, 0.209)	(0.044,0.077, 0.132)
Technological	(0.022,0.066, 0.121)	(0.066,0.121, 0.176)	(0.044,0.088, 0.143)	(0.000,0.000, 0.000)	(0.099,0.154, 0.187)	(0.033,0.066, 0.121)
Environmental	(0.033,0.066, 0.121)	(0.044,0.077, 0.132)	(0.110,0.165, 0.198)	(0.055,0.088, 0.143)	(0.000,0.000, 0.000)	(0.033,0.066, 0.121)
Legal	(0.077,0.132, 0.176)	(0.055,0.110, 0.154)	(0.055,0.110, 0.165)	(0.033,0.088, 0.143)	(0.077,0.132, 0.176)	(0.000,0.000, 0.000)

3.2.3 Step 3: Calculate the fuzzy total-relation matrix

In step 3, the fuzzy total-relation matrix can be calculated by the following formula:

$$\tilde{T} = \lim_{k \rightarrow +\infty} (\tilde{x}^1 \oplus \tilde{x}^2 \oplus \dots \oplus \tilde{x}^k)$$

If each element of the fuzzy total-relation matrix is expressed as $\tilde{t}_{ij} = (l_{ij}^{\tilde{t}}, m_{ij}^{\tilde{t}}, u_{ij}^{\tilde{t}})$, it can be calculated as follows:

$$\begin{aligned} [l_{ij}^{\tilde{t}}] &= x_l \times (I - x_l)^{-1} \\ [m_{ij}^{\tilde{t}}] &= x_m \times (I - x_m)^{-1} \\ [u_{ij}^{\tilde{t}}] &= x_u \times (I - x_u)^{-1} \end{aligned}$$

In other words, the normalized matrix the inverse is first calculated, and then it is subtracted from the matrix I, and finally the normalized matrix is multiplied by the resulting matrix. The following table shows the fuzzy direct-relation matrix.

Table XII: The fuzzy total-relation matrix

	Political	Economic	Social	Technological	Environmental	Legal
Political	(0.066,0.246, 0.958)	(0.196,0.428, 1.190)	(0.159,0.396, 1.190)	(0.129,0.346, 1.085)	(0.183,0.429, 1.224)	(0.147,0.339, 1.032)
Economic	(0.195,0.404, 1.099)	(0.068,0.249, 0.969)	(0.151,0.376, 1.146)	(0.153,0.358, 1.063)	(0.124,0.355, 1.143)	(0.108,0.294, 0.981)
Social	(0.145,0.345, 1.045)	(0.168,0.377, 1.101)	(0.059,0.229, 0.942)	(0.112,0.299, 0.994)	(0.172,0.392, 1.139)	(0.083,0.243, 0.914)
Technological	(0.053,0.213, 0.848)	(0.093,0.267, 0.929)	(0.076,0.245, 0.918)	(0.028,0.142, 0.724)	(0.127,0.306, 0.970)	(0.053,0.182, 0.778)
Environmental	(0.066,0.208, 0.824)	(0.080,0.229, 0.872)	(0.136,0.298, 0.931)	(0.082,0.216, 0.824)	(0.041,0.168, 0.787)	(0.056,0.176, 0.755)
Legal	(0.108,0.293, 0.952)	(0.092,0.289, 0.980)	(0.092,0.289, 1.001)	(0.065,0.247, 0.909)	(0.115,0.320, 1.032)	(0.028,0.143, 0.727)

3.2.4 Step 4: Defuzzify into crisp values

The CFCS⁸ method proposed by Opricovic and Tzeng (2004) has been used to obtain a crisp value of total-relation matrix. The steps of CFCS method are as follows:

$$l_{ij}^n = \frac{(l_{ij}^t - \min l_{ij}^t)}{\Delta_{min}^{max}}$$

$$m_{ij}^n = \frac{(m_{ij}^t - \min l_{ij}^t)}{\Delta_{min}^{max}}$$

$$u_{ij}^n = \frac{(u_{ij}^t - \min l_{ij}^t)}{\Delta_{min}^{max}}$$

So that

$$\Delta_{min}^{max} = \max u_{ij}^t - \min l_{ij}^t$$

Calculating the upper and lower bounds of normalized values:

$$l_{ij}^s = \frac{m_{ij}^n}{(1 + m_{ij}^n - l_{ij}^n)}$$

$$u_{ij}^s = \frac{u_{ij}^n}{(1 + u_{ij}^n - l_{ij}^n)}$$

The output of the CFCS algorithm is crisp values.

Calculating total normalized crisp values:

$$x_{ij} = \frac{[l_{ij}^s(1 - l_{ij}^s) + u_{ij}^s \times u_{ij}^s]}{[1 - l_{ij}^s + u_{ij}^s]}$$

⁸ Converting Fuzzy data into Crisp Scores.

Table XIII: The crisp total-relation matrix

	Political	Economic	Social	Technological	Environmental	Legal
Political	0.359	0.532	0.507	0.449	0.536	0.437
Economic	0.498	0.366	0.487	0.457	0.47	0.396
Social	0.447	0.483	0.347	0.404	0.5	0.349
Technological	0.317	0.374	0.355	0.241	0.412	0.282
Environmental	0.311	0.337	0.4	0.317	0.274	0.274
Legal	0.394	0.398	0.401	0.351	0.429	0.242

3.2.5 Step 5: set the threshold value

The threshold value must be obtained in order to calculate the internal relations matrix. Accordingly, partial relations are neglected and the network relationship map (NRM) is plotted. Only relations whose values in matrix T is greater than the threshold value are depicted in the NRM. To compute the threshold value for relations, it is sufficient to calculate the average values of the matrix T. After the threshold intensity is determined, all values in matrix T which are smaller than the threshold value are set to zero, that is, the causal relation mentioned above is not considered.

Here the threshold value is equal to 0.393. All the values in matrix T which are smaller than 0.393 are set to zero, that is, the causal relation mentioned above is not considered. The model of significant relations is presented in the following table.

Table XIV: The crisp total- relationships matrix by considering the threshold value

	Political	Economic	Social	Technological	Environmental	Legal
Political	0	0.532	0.507	0.449	0.536	0.437
Economic	0.498	0	0.487	0.457	0.47	0.396
Social	0.447	0.483	0	0.404	0.5	0
Technological	0	0	0	0	0.412	0
Environmental	0	0	0.4	0	0	0
Legal	0.394	0.398	0.401	0	0.429	0

3.2.6 Step 6: Final output and create a causal relation diagram

The next step is to find out the sum of each row and each column of T (in step 4). The sum of rows (D) and columns (R) can be calculated as follows:

$$D = \sum_{j=1}^n T_{ij}$$

$$R = \sum_{i=1}^n T_{ij}$$

Then, the values of D+R and D-R can be calculated by D and R, where **D+R represent the degree of influence of a letter/factor in the entire system and D-R represent net effects of a letter/factor's contribution to the system.** The table below shows the final output.

Table XV: The final output

	R	D	D+R	D-R	result
Political	2.327	2.82	5.148	0.493	Cause
Economic	2.49	2.674	5.164	0.184	Cause
Social	2.497	2.529	5.026	0.033	Cause
Technological	2.219	1.981	4.2	-0.238	Effect
Environmental	2.876	2.112	4.988	-0.763	Effect
Legal	2.291	2.546	4.837	0.254	Cause

The following figure shows the model of significant relations. This model can be represented as a diagram in which the values of (D+R) are placed on the horizontal axis and the values of (D-R) on the vertical axis. The position and interaction of each factor with a point in the coordinates (D+ R, D-R) are determined by coordinate system.

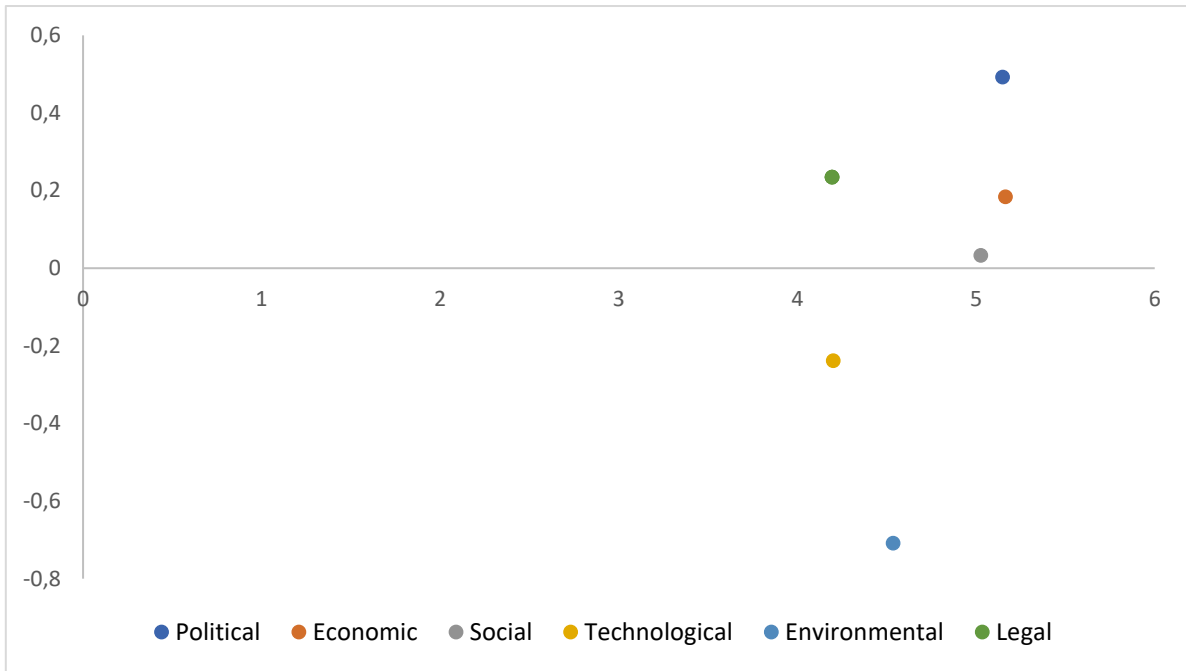


Figure 13: Cause-effect diagram

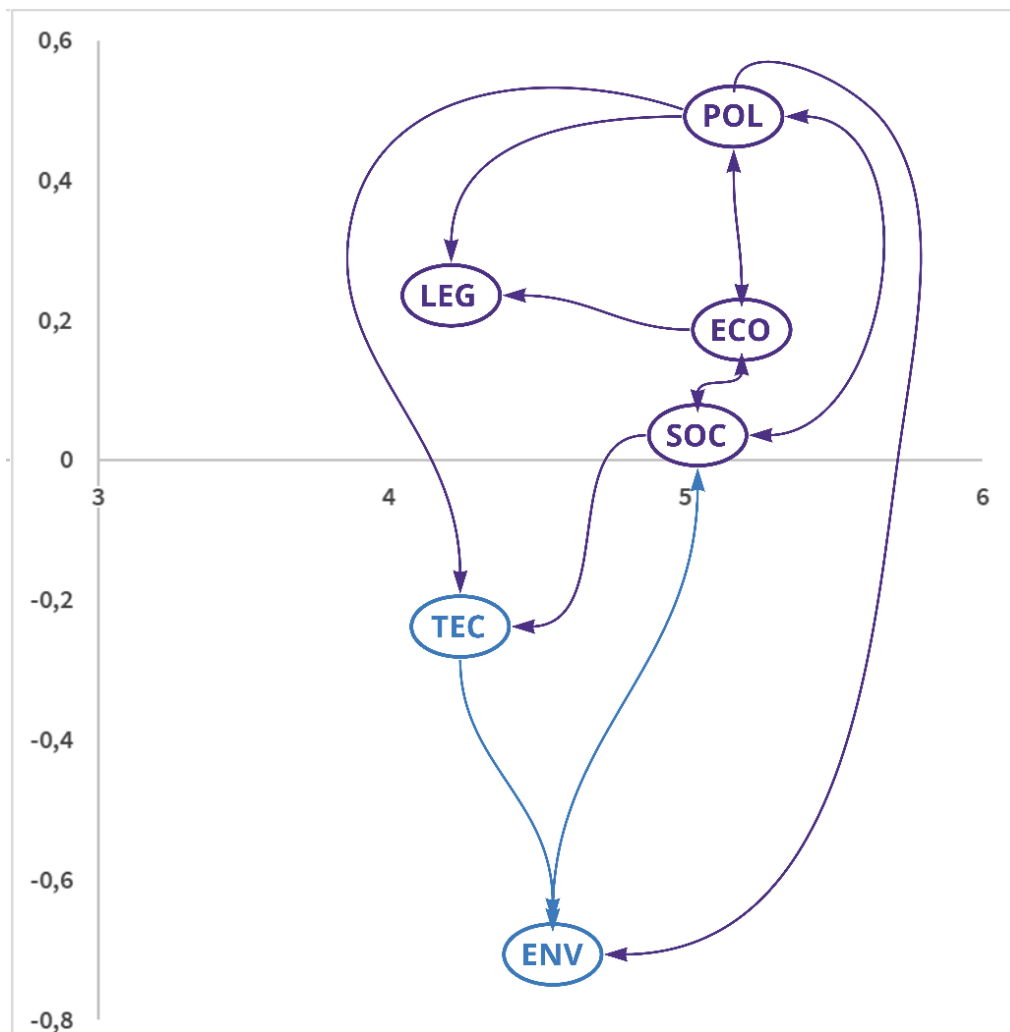


Figure 14: The Digraph of showing causal relations among PESTEL factors

3.2.7 Step 7: Interpret the results

According to the diagram and table above, each factor can be assessed based on the following aspects:

- **Horizontal vector (D + R) represents the degree of importance each PESTEL letter plays in the entire system.** In other words, (D + R) indicates both the factor's impact on the whole system and the factors system's impact on the factor. In terms of degree of importance, Economic is ranked in first place and Political, Social, Environmental, Technological and Legal, are ranked in the next places. Here, the Political, Economic, Social, Legal factors are considered to be as a causal variable, Technological, Environmental factors are regarded as an effect variable.
- **The vertical vector (D-R) represents the degree of influence of a letter/factor on the system.** In general, the positive value of D-R represents a causal variable, and the negative value of D-R represents an effect. In terms of degree of importance, Political is ranked in first place and Legal, Economic, Social, Technological and Environmental, are ranked in the next places. Here, Political, Economic, Social, Legal are considered to be as a causal variable, Technological, Environmental are regarded as an effect.

3.3 Insights on the PESTEL factor weights from crossing the AHP and DEMATEL methods

The following table recapitulates the main outputs from both the AHP and DEMATEL methods for the PESTEL letters. It is worth bearing in mind that the two methods applied pursue distinct research interests. While the AHP method is interested in the direct importance/weight of independent factors for ENCI, the DEMATEL method investigates the influence that factors (resp. letters) have on each other within the system and the extent to which the factors are influencing the whole system (which also results in a kind of "importance", yet with a slightly different meaning). Nevertheless, it is worth comparing the results of the two methods.

Table XVI: AHP and DEMATEL outputs

AHP Ranking	DEMATEL D+R	DEMATEL D-R
1. Social	1. Economic	1. Political
2. Political	2. Political	2. Legal
3. Environmental	3. Social	3. Economic
4. Economic	4. Environmental	4. Social
5. Legal	5. Technological	5. Technological
6. Technological	6. Legal	6. Environmental

Comparing the AHP and DEMATEL outputs displays differences in the ranking of the letters. Due to the distinct research interests of the two methods explained above, these differences should not be dismissed as inconsistencies but rather seen as a result that grounds several key insights about the relevance and function of the PESTEL letters for ENCI at the European level.

The **Political letter-main factor** clearly appears as the most important factor. Evaluated both as independent factor (AHP ranking) and as whole system factor (D+R), it is ranked second. And, with regards to its net influence on the system of factors, it is even ranked first. Overall, this implies a consistent importance of the EU-level political factors for ENCI across methods.

In the comparison of the results of the two methods, the main letter-main factor Economic has varying degrees of importance, depending on whether it is considered independently or in connection with the entire system of factors influencing ENCI. On the one hand, the Economic letter-main factor is the most important of the 6 PESTEL letters with regard to the entire system of factors - i.e., including the ways it is influenced itself by the system (D+R). On the other hand, it is a middle range factor when considered independently or with regard to its net impact on the system – since it is ranked 4 in the AHP and 3 in the D-R.

Also, the **Social letter-main factor comes with diverging** results, which coincides in some way with the characteristics of this letter and the factors composing it. Indeed, it appears to be the main factor when taken independently. When regarded in the whole system of factors, however, it does not seem to have the same degree of importance, especially in terms of its net influence on the system of factors impacting ENCI (ranked 4 for D-R). The Social letter-main factor appears to be the functional opposite of the Economic letter-main factor, which is less important as a direct, independent factor, but very important as a factor in the overall system.

The results indicate that the **Technological letter-main factor** is the factor with the lowest influence, whether taken independently (AHP) or with regard to the whole system of factors (D+R and D-R). It can thus be considered as being more affected by the other factors than it affects them itself, which might explain why its direct impact on ENCI was not considered to be decisive according to our expert assessments.

The **Environmental letter-main factor** seems to be more important when considered independently than when considered with regard to its net influence on the factors system - it is ranked 6 in the D-R column. Nevertheless, the Environmental letter-main factor undoubtedly plays a role for ENCI as it does exert a low influence when it comes to its place in the system of factors that are influencing the development of ENCI.

The **Legal letter-main factor** appears to be similar to the Environmental one. In fact, it seems to have low importance, both when considered independently or within the whole system. Yet, its net influence on the system of factors impacting ENCI seems to be way more important since it is ranked 2 behind the political letter-main factor. In a way, the Legal main factor does not represent in itself a key factor impacting ENCI, yet it does exert a significant influence on the system of factors, which corresponds to the ambivalent role played by the body of law on the development of a social commitment such as ENCI.



Conclusion

Coming from the management/marketing realm, the PESTEL analysis entail several limits for its use in social science research, which the team tried to address as much as possible. First and foremost, and though the search for factors has been leaning on a detailed and precise methodological process, a certain lack of rigor remains in the identification of the factors. This is partly due to the artificiality of the distinction between the various letters, of which impreciseness has been limited through an in-depth work on the formulation of the factors and by linking the factors as closely as possible to ENCI.

At the end of the process, the set of factors and subfactors that have been collected seem to make sense and can fruitfully contribute to a better understanding of the contextual causes and effects that are impacting ENCI.

The expert assessment of the factor completes this research process by giving some qualitative-based weighting of the respective importance and influence of the PESTEL letters and factors, both taken independently (AHP) and considering their influence on each other (DEMATEL). This enables to refine the approach of the PESTEL by underlining the key leverages for the development of ENCI – such as the Political and the Legal –, but also to relocate some other factors – such as the Economic ones – at their effective place in terms of influence on ENCI.



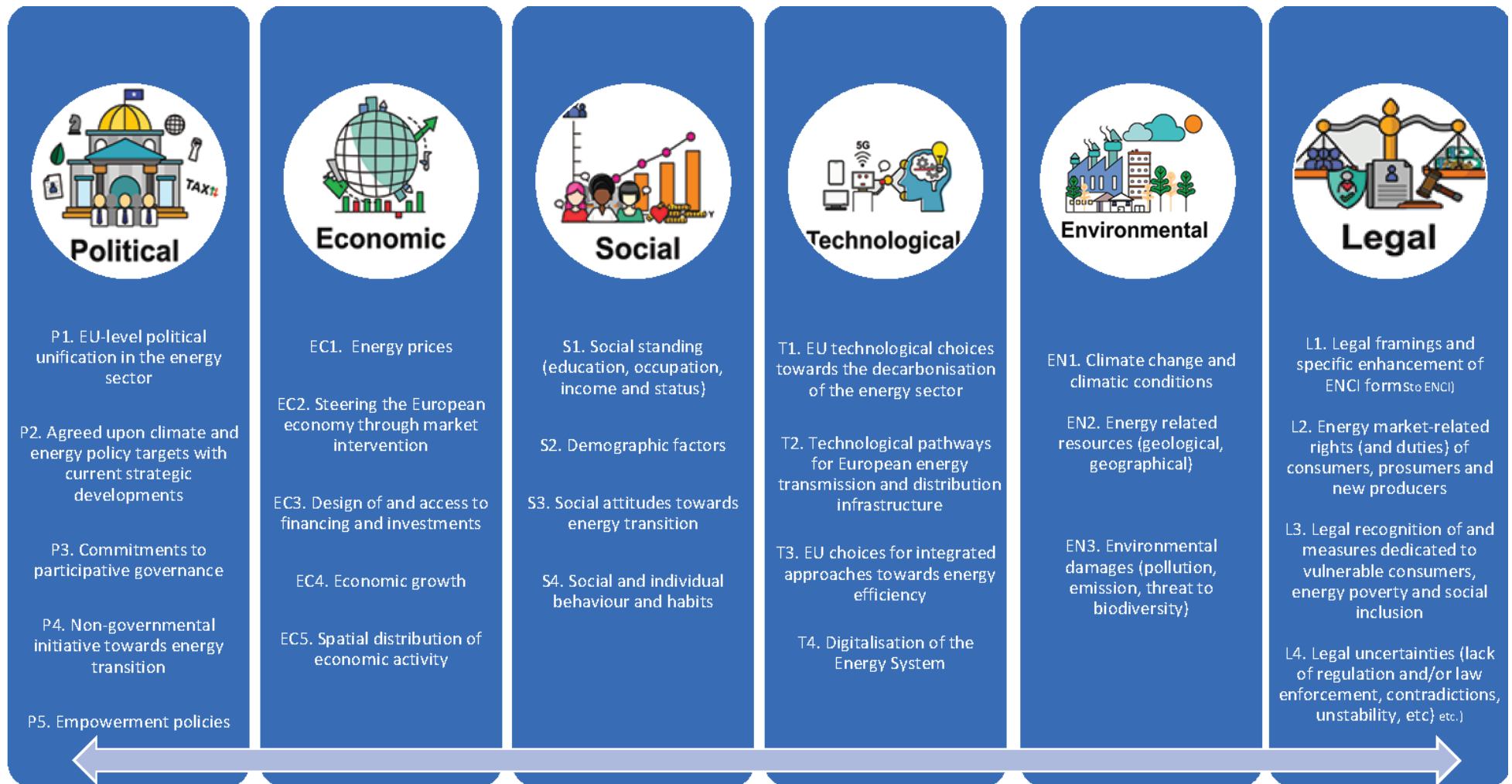


Figure 15: Main PESTEL factors impacting ENCI in the EU Context

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Annex: AHP/ DEMATEL expert assessment template

Introduction of the assessment process of the EU PESTEL factors

This short introduction aims at indicating the assessment process of the various PESTEL factors that influence Energy citizenship in the context of the European Union. The various steps composing this process are visible in the tabs below (from the left to the right). Each main step is identified with a dedicated colour and consists in:

(1) The first step of this assessment process consists in familiarising with the whole set of factors as displayed in the pdf document and summarized in the next tab. First sheet synthesises all the factors and subfactors identified. If you need more details, please refer to the other document (PESTEL factors synthesis.pdf) with all the factors and their description. You don't need to read the table extensively, just to get familiar enough with its content to proceed to the weighting of the identified factors.

Importantly, we only ask you for this "quantitative" feedback, not to review extensively the set of factors qualitatively.

(2) As second step, we are interested in the relative importance of the factors within each of the letters [Political, Economic, Social, Technological, Environmental and Legal]. Please follow the indications provided at the beginning of the various sheets/tabs.

(3) As a third step, we expect you to focus on the letters themselves and then to assess their relative importance but also the interaction between them.

Please fill everything out; it is required for the computation of your inputs.

For each of the factors and subfactors assessment, the following scale was provided:

Intensity of difference in importance	Definition	Explanation
1	Equally important	The two factors contribute equally to the objective
3	Slightly more important	Experience and judgment slightly favor one factor over another
5	Moderately more important	Experience and judgment strongly favor one factor over another
7	Strongly more important	One factor is favored very strongly over another, its dominance is demonstrated in practice
9	Extremely more important	The evidence favoring one factor over another is of the highest possible order of affirmation
2,4,6,8 can be used to express intermediate values		

Objective: Assessment of the political subfactors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship.

Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

Subfactors	
1	P1. EU-level political unification in the energy sector
2	P2. Agreed upon climate and energy policy targets with current strategic developments
3	P3. Commitments to participative governance
4	P4. Non-governmental initiative towards energy transition
5	P5. Empowerment policies

Name of the expert:

		Subfactors	more important ?		Scale
A			B	A or B	(1-9)
P1. EU-level political unification in the energy sector	}	P2. Agreed upon climate and energy policy targets with current strategic developments			
		P3. Commitments to participative governance			
		P4. Non-governmental initiative towards energy transition			
		P5. Empowerment policies			
		P3. Commitments to participative governance			
P2. Agreed upon climate and energy policy targets with current strategic developments	}	P4. Non-governmental initiative towards energy transition			
		P5. Empowerment policies			
		P4. Non-governmental initiative towards energy transition			
P3. Commitments to participative governance	}	P5. Empowerment policies			
		P5. Empowerment policies			
P4. Non-governmental initiative towards energy transition	}	P5. Empowerment policies			

Objective: Assessment of the economic subfactors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship. Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

Subfactors	
1	EC1. Energy prices
2	EC2. Steering the European economy through market intervention
3	EC3. Design of and access to financing and investments
4	EC4. Economic growth
5	EC5. Spatial distribution of economic activity

Name of the expert:

		Subfactors	more important ?	Scale
	A		A or B	(1-9)
	EC1. Energy prices	EC2. Steering the European economy through market intervention		
		EC3. Design of and access to financing and investments		
		EC4. Economic growth		
		EC5. Spatial distribution of economic activity		
		EC2. Steering the European economy through market intervention		
	EC2. Steering the European economy through market intervention	EC3. Design of and access to financing and investments		
		EC4. Economic growth		
		EC5. Spatial distribution of economic activity		
	EC3. Design of and access to financing and investments	EC4. Economic growth		
		EC5. Spatial distribution of economic activity		
	EC4. Economic growth	EC5. Spatial distribution of economic activity		

Objective: Assessment of the social subfactors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship.

Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

Subfactors	
1	S1. Social standing (education, occupation, income and status)
2	S2. Demographic factors
3	S3. Social attitudes towards energy transition
4	S4. Social and individual behaviour and habits

Name of the expert:

	A	Subfactors	B	more important ? A or B	Scale (1-9)
	S1. Social standing (education, occupation, income and status)	}	S2. Demographic factors		
			S3. Social attitudes towards energy transition		
			S4. Social and individual behaviour and habits		
	S2. Demographic factors	}	S3. Social attitudes towards energy transition		
			S4. Social and individual behaviour and habits		
	S3. Social attitudes towards energy transition	}	S4. Social and individual behaviour and habits		

Objective: Assessment of the technological subfactors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship.

Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

Subfactors	
1	T1. EU technological choices towards the decarbonisation of the energy sector
2	T2. Technological pathways for European energy transmission and distribution infrastructure
3	T3. EU choices for integrated approaches towards energy efficiency
4	T4. Digitalisation of the Energy System

Name of the expert:

		Subfactors	more important ?	Scale
	A	B	A or B	(1-9)
	T1. EU technological choices towards the decarbonisation of the energy sector	T2. Technological pathways for European energy transmission and distribution infrastructure T3. EU choices for integrated approaches towards energy efficiency T4. Digitalisation of the Energy System		
	T2. Technological pathways for European energy transmission and distribution infrastructure	T3. EU choices for integrated approaches towards energy efficiency T4. Digitalisation of the Energy System		
	T3. EU choices for integrated approaches towards energy efficiency	T4. Digitalisation of the Energy System		

Objective: Assessment of the environmental subfactors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship.

Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

Subfactors	
1	EN1. Climate change and climatic conditions
2	EN2. Energy related resources (geological, geographical)
3	EN3. Environmental damages (pollution, emission, threat to biodiversity)

Name of the expert:

		Subfactor		more important ?	Scale
	A		B	A or B	(1-9)
	EN1. Climate change and climatic conditions	}	EN2. Energy related resources (geological, geographical)		
			EN3. Environmental damages (pollution, emission, threat to biodiversity)		
	EN2. Energy related resources (geological, geographical)	}	EN3. Environmental damages (pollution, emission, threat to biodiversity)		

Objective: Assessment of the legal factors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship.

Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

Subfactors	
1	L1. Legal framings and specific enhancements of ENCI forms
2	L2. Energy market-related rights (and duties) of consumers, prosumers and new producers
3	L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion
4	L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc)

Name of the expert:

		Subfactors		more important ?	Scale
	A		B	A or B	(1-9)
	L1. Legal framings and specific enhancements of ENCI forms	{ { {	L2. Energy market-related rights (and duties) of consumers, prosumers and new producers		
			L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion		
			L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc)		
	L2. Energy market-related rights (and duties) of consumers, prosumers and new producers	{ {	L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion		
			L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc)		
	L3. Legal recognition of and measures dedicated to vulnerable consumers, energy poverty and social inclusion	{	L4. Legal uncertainties (lack of regulation and/or law enforcement, contradictions, instability, etc)		

Objective: Pairwise comparison of the main PESTEL factors

In this analysis, we are interested in how important individual factors/PESTEL Letters are compared to others for the emergence and development of energy citizenship.

Please compare the importance of the individual factors/PESTEL Letters by filling in the table below: In a direct comparison, is the factor/PESTEL-Letter mentioned in **A or B more important** and **how strong is this difference** in importance (scale of 1-9, see below for explanation).

When you are finished, 1-3 comparisons, if any, will be shown that indicate inconsistency with the other comparisons and that you may adjust (inconsistencies occur when, for example, factor 1 is evaluated as more important than factor 2 and factor 2 is evaluated as more important than factor 3, but then factor 3 is evaluated as more important than factor 1)."

PESTEL letters / Main factors	
1	Political
2	Economic
3	Social
4	Technological
5	Environmental
6	Legal

Name of the expert:

	Factors	more important ?	Scale
A	B	A or B	(1-9)
Political	Economic		
	Social		
	Technological		
	Environmental		
	Legal		
Economic	Social		
	Technological		
	Environmental		
	Legal		
Social	Technological		
	Environmental		
	Legal		
Technological	Environmental		
	Legal		
Environmental	Legal		

Intensity of difference in importance	Definition	Explanation
1	Equally important	The two factors contribute equally to the objective
3	Slightly more important	Experience and judgment slightly favor one factor over another
5	Moderately more important	Experience and judgment strongly favor one factor over another
7	Strongly more important	One factor is favored very strongly over another, its dominance is demonstrated in practice
9	Extremely more important	The evidence favoring one factor over another is of the highest possible order of affirmation

2,4,6,8 can be used to express intermediate values

Objective: Assessment of the interaction between the main EU PESTEL factors

Name of the expert:

Please assess the correlation between the main factors based on the influence of each criteria with the scale below. Consider the factors in the rows and assess how they impact the factors in the column.

- 1 - No influence
- 2 - Low influence
- 3 - Medium influence
- 4 - High influence
- 5 - Very high influence

Influence on	Political	Economic	Social	Technological	Environmental	Legal
Political						
Economic						
Social						
Technological						
Environmental						
Legal						