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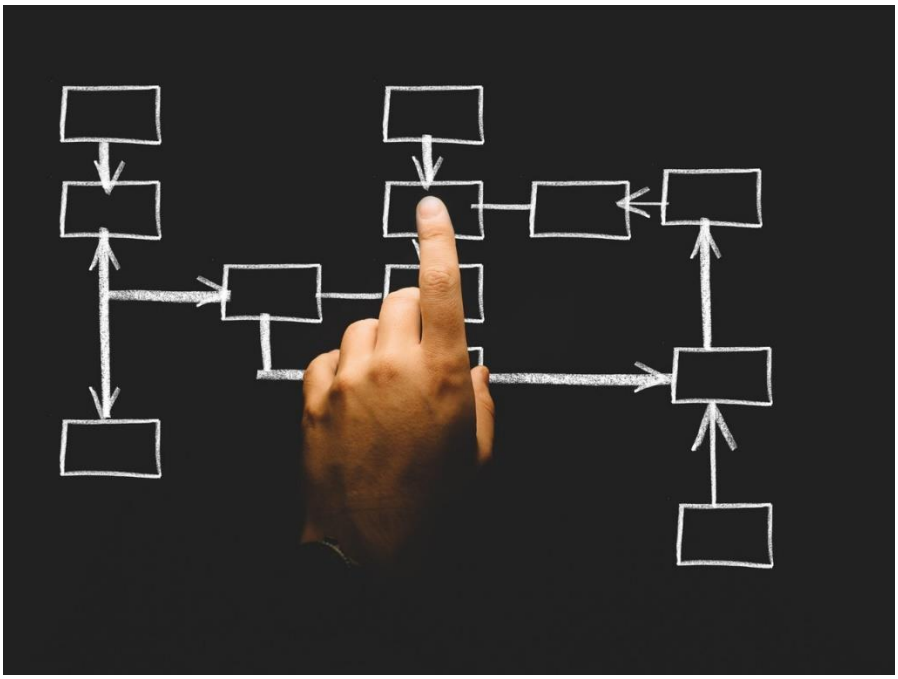
ECHOES Report

An analysis of the parameters that determine the similarities and differences regarding the energy choices and energy related behaviour between different types of formal social units



ECHOES Report

An analysis of the parameters that determine the similarities and differences regarding the energy choices and energy related behaviour between different types of formal social units

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ABSTRACT
This report presents an analysis of the parameters regarding the energy choices and energy related behaviour for different levels of decision-making, concerning the energy transition to low-carbon economy in the European Union and associate countries. The analysis is based on three levels of decision-making units, namely, formal social units, collective decision-making units, and individuals engaging in joint contracts. The key factors, variables, and parameters regarding the energy choices and energy related behaviour are identified through qualitative inquiries: (1) 15 Focus groups and 67 In-depth Interviews conducted in six countries, and (2) a-state-of-the-art and comprehensive literature review. This study showed that the collective decision-making processes in general follow a standardized structure, while parameters and related factors at work in each stage vary with regard to collective levels.

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EXTENDED SUMMARY

This report presents an analysis of the parameters regarding the energy choices and energy related behaviour for different levels of decision-making, concerning the energy transition to low-carbon economy in the European Union and associate countries such as Norway and Turkey. The analysis is based on three levels of decision-making units, namely, formal social units, collective decision-making units, and individuals engaging in joint contracts. This structure also allows a comparative analysis regarding the identification of similarities and differences between the levels of decision-making units.

The key factors, variables, and parameters regarding the energy choices and energy related behaviour are identified through qualitative inquiries: 15 Focus groups and 67 In-depth Interviews conducted in six countries, namely Austria, Bulgaria, Finland, Norway, Spain, and Turkey. The themes utilized in the design of focus group studies and in-depth interviews were obtained through a comprehensive literature review.

The structure of the analysis is based on the decision making process associated with energy transition including the phases as follows;

Phase 1 - Policy and target-setting: Considering the EU and the national governments as the authorities that hold the legislative and decision making power, the process is triggered by the international agreements and policies set forth by the EU, with the participation of the member states. The overarching policies, thus are the EU directives and international agreements, such as the Paris Agreement and the Kyoto Protocol.

- One key factor at this phase of the process is conflict between priorities and interest of member countries. The policies undersigned by the representatives of the member states are outputs of a collective decision making process that, by definition, does not totally match the sole preferences of any of the member states.
- Another important aspect is related with the associate countries such as Norway and Turkey. These countries are not represented in the decision boards of the EU, however, the resulting policies could be binding for them. Therefore, the associate countries are occasionally faced with the disadvantage of not having their voices adequately heard in the decision-making processes of the EU.

Phase 2 – Policy Deployment: The next phase of the process involves policy deployment, whereby the international agreements and EU level policies are transposed into national policies and targets. These are further utilized in order to develop their regional and local counterparts, to be implemented by local authorities. There are two main challenges associated with policy deployment:

- First, it is a critical phase since it involves the joint consideration of the overarching international priorities and domestic considerations. The governments of the member states and associate countries have to design the framework through which the policies will be implemented. This framework is constructed through the policy toolbox, including the legislations, incentives, tax regulations as well as measures and tools for monitoring the implementation.
- This is the second main challenge associated with policy deployment is related with the key players for policy deployment, the politicians. The politicians have to establish a balance between their own political agendas, and the demands and priorities of various interest groups within their countries. In general, the perception is that the politicians act in the interests of one particular group and neglect others in expectation of gaining support from the former, no matter what their political orientation is. However, it turns out that it is generally the question of an optimal allocation of resources with respect to multiple conflicting interests; which eventually might not fully satisfy any of the parties involved.

Phase 3 – Execution: The progress towards energy transition requires the implementation of the strategic policies set forth by the governments. This is the execution phase and it calls for employing various mechanisms for the realization of policy targets. The execution phase is more complex, and involves a greater variety of factors, owing to the fact that all decision-making levels interact in the course of the execution. The key variables at this phase are related with how

the other decision making levels, namely **i)** collective decision making units and **ii)** individuals engaging in joint contracts, interact with these policies and their implementation frameworks.

i) Collective decision-making units: Regarding the collective decision-making units that involve industries, companies, NGOs, and associations the main drivers associated with energy choices and energy related behaviour turn out to be:

- market structure and
- the level of conformity between the interests and priorities of collective decision making units and government strategies related with energy transition.

The outstanding representatives of the collective decision making units are the industrial companies. These are intensive users of energy, hence have energy related costs as an important issue in their agendas. Moreover, acting in a global competitive environment, the companies have a spectrum of priorities, based on a multitude of factors. Their overall strategies are constructed with respect to these factors and the decisions are based on these strategies. Therefore, the perceptions of energy transition and related decisions by collective decision-making units are affected by the level of conformity with their strategies. For instance, investments are typically evaluated with respect to:

- initial capital costs
- payback period
- lifecycle costs,
- environmental benefits,
- conformity with national policies

The variables that are expected to provide considerable contribution in this area are:

- market deregulation,
- rapidly emerging technologies,
- renewables,
- smart grids,
- energy-intensive industries.

ii) Individuals engaging joint contracts: Individuals have utmost importance in the execution phase. Regardless of the policies or implementation mechanisms designed by the policy makers, it is the individuals as actors that have be involved in order to realize the planned processes. Therefore, a considerable number of parameters regarding individuals emerge as relevant to decision-making processes concerning energy transition such as:

- demographic characteristics,
- backgrounds,
- perceptions,
- priorities,
- habits, and
- beliefs

All these parameters determine how individuals respond and react to the policies and their counterparts regarding the execution process.

Individuals also act as members of their societies and groups they belong, or identify with. In terms of energy transition, the decisions and their execution are very much dependent on social characteristics. Thus, a related set of parameters are related with social characteristics, such as:

- level of awareness,
- perceptions regarding advantages and disadvantages of energy investments, and
- demand profiles

These turn out to be outstanding social characteristics relevant to this issue.

Social acceptance of policies and goals related with energy transition is critical to the execution of associated processes. Therefore, any energy-related policy should include strategies for social deployment and acceptance.

The phases of the energy transition process rely on the active involvement of all levels of decision-making units. Each phase, from policymaking to policy deployment and execution, is implemented through the contributions and interactions of these decision-making units. A number of disablers (barriers) and enablers (motivators) in turn affects each phase.

Barriers (disablers): The most important barriers are:

- inconvenience of circumstances
- mismanagement
- operational mistakes
- lack of awareness and information
- short term costs
- administrative barriers
    - organizational deficiencies
    - lack of expert capacity
    - procedural problems
    - intra-organizational conflicts
    - trust and transparency issues
    - difficulties in collective decision-making
    - mismatch of political interests
- perceived value of energy as a low-cost, low-priority issue
- social and individual barriers
    - habits
    - resistance to change
    - desire to maintain status quo
    - cultural norms
- uncertainty and perceived risk

- technological uncertainty
- regulatory uncertainty
- political uncertainty

In many cases, it is very common that the *inconvenience of circumstances, mismanagement, or operational mistakes* may cause potential motivators to become barriers. On the formal social units' level, *lack of awareness and information* about other decision-making levels, for instance, turn into barriers regarding energy transition. The consideration of *short term costs* of energy investments as opposed to the lifecycle costs are also such examples.

The policy makers trigger the processes for energy transition. Therefore, the *administrative barriers* emanating from formal social units also affect collective decision-making units and individuals. The administrative barriers can be due to a variety of factors, including organizational deficiencies, lack of expert capacity, procedural problems, intra-organizational conflicts, trust and *transparency issues, difficulties in collective decision-making, and mismatch of political interests*.

The *perceived value of energy as a low-cost, low-priority issue* is also a major barrier that is active on the collective decision making level and the individual level. *Social or individual constructs* such as *habits, resistance to change, desire to maintain status quo, cultural norms* may also act as disablers. One important set of barriers is related with the *uncertainty and perceived risk* associated with energy transition. *Technological uncertainty, regulatory uncertainty, political uncertainty* all contribute to the perception of uncertainty and risk associated with energy transition, and act as barriers.

Motivators (Enablers): The main motivators are:

- globalization
- energy efficiency
- energy savings.
- incentives
- tax benefits
- climate-related goals
- environmental concerns
- reputation of the companies
- drive for responsible behaviour to the environment
- cost savings
- good examples
- best practices
- energy self-sufficiency,
- prosumerism
- local production
- correct and unbiased information
- communication

- information
- awareness

On the formal social units and collective decision makers' levels, the main motivator turns out to be the *globalization* that makes transition inevitable for the stakeholders. In order to remain competitive within the global economy, the collective decision making units need to implement practices of *energy efficiency and energy savings*. Formal social units, that is, the policy makers utilize this motivator to promote the involvement of collective decision-making units in their strategies concerning energy transition. To this end, policy makers commonly employ another set of enablers, that is, the *incentives or tax benefits* to support energy transition.

As the energy transition is closely interconnected with *climate-related goals* of the EU and international agreements, the association of policy makers with the energy transition is mainly through *environmental concerns*. Thus, environmental factors act as enablers for formal social units. These are also important for the collective decision making units, generally in the sense that valuing environmental concerns contributes to the *reputation of the companies*. The *drive for responsible behaviour to the environment*, and hence, society is a similar enabler that is important both on the collective level and on the individual level.

Cost savings are generally in effect as motivators for collective decision-making units and individuals. These refer to the short term or long-term earnings associated with energy transition. On the local and individual levels, *good examples and best practices* play key roles as enablers. The contemporary trends of *energy self-sufficiency, prosumerism and local production* act as other motivators at the collective and individual levels. The top-down flow of *correct and unbiased information* is crucial in terms of disseminating the rationale behind energy transition, as well as the goals and benefits of energy transition. Hence, *communication, information and awareness* are significant enablers across all decision-making units.

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INTRODUCTION

This report, as a part of WP6 of ECHOES project, delivers a set of parameters that determines the similarities and differences towards energy choices and energy related behaviour between different levels and different types of the formal social units, concerning the energy transition to a low-carbon economy in the European Union and associated countries such as Norway and Turkey.

The analytical focus of this report is on the three varying levels within formal social units under the Macro level perspective of ECHOES project:

a) *Formal social units* which act as policy makers and/or energy providers, with a wider reach of influencing energy choice decisions, such as states, public authorities, municipalities, Transmission System Operators (TSOs), National Regulatory Authorities (NRAs), and Power exchanges (PXs).
b) *Collective decision-making units*, which are more formally structured and with relatively lower information and power asymmetries (eg. TSOs, PXs, energy producer and consumer associations, commerce and industrial chambers, and organized industrial zones)
c) *Individual consumers engaging in joint contracts* to increase their power of negotiation with the above bodies such as larger group of households, condominium management and association of households.

Moreover, similar to the common focus of ECHOES project, it also covers three different technological focus:

a) *Smart energy technologies* are at the core of what the integrated roadmap for realizing the SET-plan describes as an energy revolution. This includes distributed, small-scale renewable energy production technologies, but also a range of technologies for the traditional "demand side" and energy storage.
b) *Electric mobility* as one of the core technologies to be implemented and developed further to increase road transport efficiency.
c) *Buildings* - including construction activities, insulation, energy efficiency upgrading, heating, cooling, illuminating, and energy use behaviour in buildings.

The results of this report are derived from two different phases:

a) *Identification of variables and dimensions:* A state-of-the-art and extensive literature review is conducted to identify dimensions, variables and factors that affect the decision making process for target stakeholders, exploring the power dynamics within and between decision making bodies and stakeholders involved in the process. Moreover, the type of assessment on regional, national, and local levels and with respect to the type of the stakeholders is analysed.
b) *Implementation of Focus Groups and in-depth interviews:* 15 Focus Groups and 67 in-depth interviews were conducted in total in six countries, namely Austria, Bulgaria, Finland, Norway, Spain and Turkey, employing dimensions, variables and factors that affect the decision making processes for target stakeholders from the perspectives of the three types of formal social units.

The overall objective of this report is to:

a) identify parameters, including key factors and variables,
b) reveal the components and dynamics of the decision-making processes,
c) pinpoint the motivators and barriers that interact with the parameters and process components

Regarding the energy choices and energy related behaviour between different levels and different types of the formal social units.

LITERATURE REVIEW

The first phase of the literature review conducted has identified and extracted information from the literature via two templates: (1) literature review (methods, aims etc.) and (2) attitude dimensions and variables, allowing us to map and categorize the sources in an enhanced fashion.

These sources range from peer-reviewed journal articles (mainly from the journals listed under Web of Science, ScienceDirect, Scopus, and ResearchGate) to business and project reports, EU directives and published research from academic institutes, NGOs, international agencies, and EU institutes. Around 2,000 sources were identified. After an initial screening for relevance, more than 431 sources were included for analysis.

Moreover, the main keywords used for this review were: “energy behaviour”, “energy efficient buildings”, “smart mobility”, “smart energy technologies”, “smart grid”, “low-energy buildings”, “passive houses”, “smart meter”, “green building”, “building energy management”, “occupant behaviour”, “electric vehicles”, “automobility”, “electric bus”, “hybrid vehicles”, “smart charging”, “e-mobility”, “eco-driving”, “low carbon transport”, “low-carbon electricity”, “demand-side management”, “collaborative networks”, “feed-in”, “sustainable cities”, “urban sustainability”, “ICT”, “prosumers”, “electricity consumption monitoring”, “smart control”, “power distribution”, “green electricity”, “energy self-sufficiency”, “consumer awareness”, “energy transition”, “energy feedback”, and “load management”.

The majority of the studies are focused on the European Union and/or its member states and associated countries, including Norway and Turkey, in line with the scope of the ECHOES project. The remaining studies cover China, United States, South Korea, Canada, or multiple countries, which could also shed a light on our analysis. These reviewed studies cover a range of different levels of decision-making and technologies, but the primary focus is on collective decision-making units listed under the objectives of WP6, with a technological focus on buildings, electric mobility, and smart energy technologies related to ECHOES’ overall objectives.

The reviewed studies utilized varying methodologies involving qualitative methods, quantitative methods, or a mixed approach employing both qualitative and quantitative techniques. These methodologies cover a broad range including, but not limited to, case studies, surveys, scenario analysis, statistical methods, focus groups, comparative method and in-depth interviews. The methods with the highest frequency of implementation are surveys, in-depth interviews and focus group analyses, directing us to use these methodologies in WP6. Accordingly, following the literature review, focus groups and in-depth interviews were conducted to derive fresh and insightful data on formal social units. This fresh data allowed us to identify parameters, including key factors and variables, making it possible to reveal the components and dynamics of the decision-making processes and to pinpoint the motivators and barriers that interact with the parameters and process components in this report.

The second phase of the literature review established the interlink between the three levels of decision-making with respect to the three technological foci. Considering each focus, factors, including dimensions and variables, which affect the decision-making process for the respective level are identified, delineating also similarities and differences between varying levels. For each category, existing research regarding factors that play a role in decision-making at this level is presented. In addition, for each level, motivators and barriers that affect the identified variables and factors and the technological foci are also discussed.

The following literature review, which has been conducted in WP6, also contributed previously to the D3.1 - ECHOES 2017 Report Social Science Perspectives on Electric Mobility, Smart Energy Technologies, and Energy Use in Buildings – A comprehensive Literature Review of the ECHOES project. Hence, it is redesigned and restructured, according to the construction of the current study, visualizing factors, barriers and motivators that play a role in the aforementioned decision-making units and technological foci.

Buildings

Figure 1 below summarizes factors that play a role in decision-making units at different levels related to buildings. Accordingly, it is identified that two issues that are strongly related to all three decision-making levels are “energy transition” and “energy efficiency”. In view of that, economic and financial factors such as cost, risks, initiatives, and taxation also emerged as important common factors for all levels, since success in energy transition and energy

efficiency requires investment and funding (Šahović & Silva, 2016; Tuominen et al., 2012, Jung et al., 2016; Podgornik et al., 2016; Van Doren et al., 2016).

While there are existing common factors as reckoned, there are also distinguishing factors related to different levels. For instance, due to the policy-maker nature of the formal social units, level of competence, expert capacity, adequate use of policy tools, monitoring and measuring appear as important factors (Romano et al., 2017; BUILD UP Skills EU-Italy, 2012; BUILD UP Skills EU-Norway, 2012; Šahović and Silva, 2016; Rotmans et al., 2001; World Business Council for Sustainable Development (WBCSD), 2007; Asensio & Delmas, 2015). On a collective level, further determining factors are market structure, available infrastructure and regulations. In contrast, demographics, perceptions and psychological factors are found to be key determinants of decision making in individual level (Persson & Grönkvist, 2015; Ástmarsson et al., 2013; Energy Saving Trust, 2007; UNEP DTIE Sustainable Consumption & Production Branch, 2009; World Business Council for Sustainable Development (WBCSD), 2007; Šahović & Silva, 2016; Van Doren et al., 2016; Wittenberg & Matthies, 2016, Tuominen et al., 2012, Jung et al., 2016; Pyrko & Darby, 2011; Persson & Grönkvist, 2015).

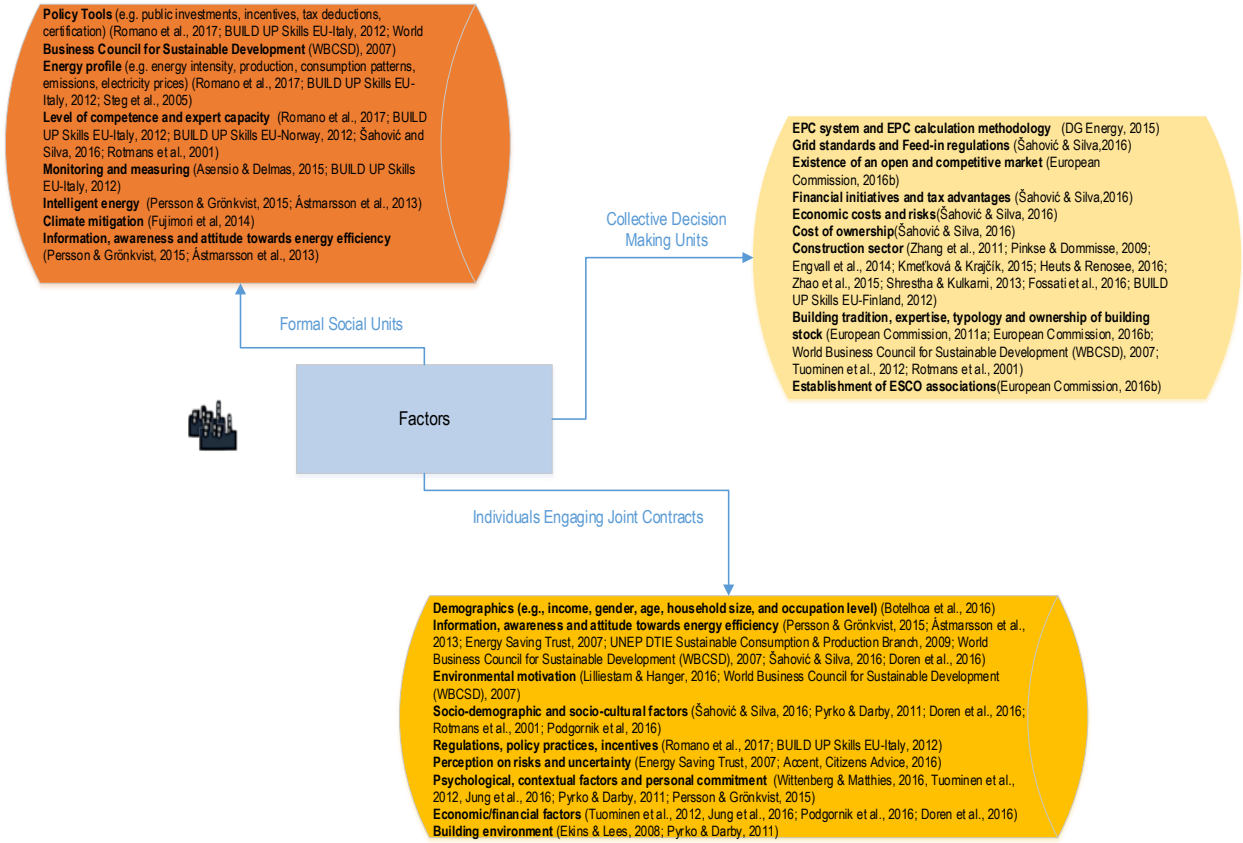

Figure 1: Factors that play a role in the decision-making units related to buildings

Figure 2 provides an overview of barriers pertaining to the building technology focus. While most of the barriers identified are context-specific, a number of the studies underline the importance of applying an integrative perspective when examining barriers to scale-up, as such processes require facilitative conditions related to the socio-cultural, market, policy, and geographical context (Van Doren et al., 2016).

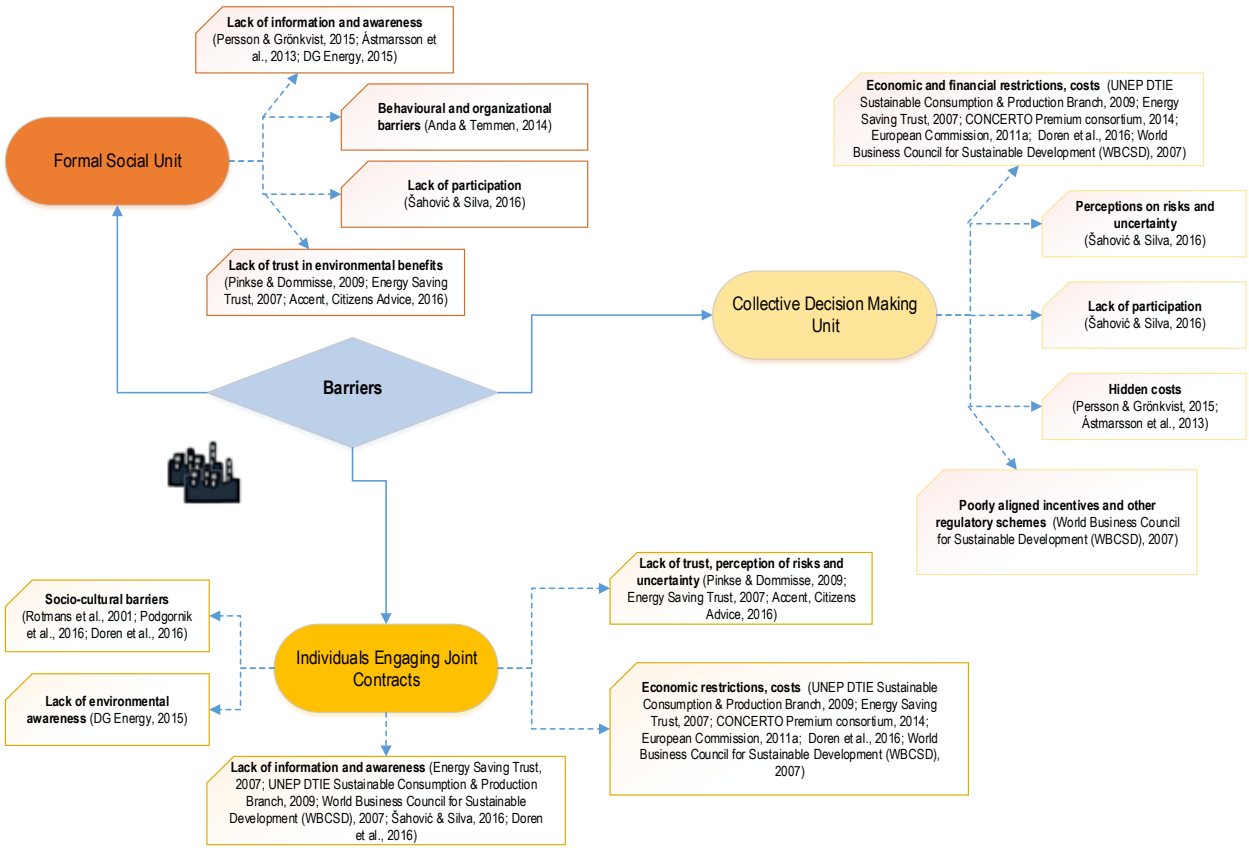

Figure 2: Barriers that play a role in the decision-making units related to buildings

There are varying existing barriers, however, lack of information and awareness, and lack of participation are found to be mutual for all levels (Persson & Grönkvist, 2015; Åstmarsson et al., 2013; DG Energy, 2015; Šahović & Silva, 2016; Energy Saving Trust, 2007; UNEP DTIE Sustainable Consumption & Production Branch, 2009; World Business Council for Sustainable Development (WBCSD), 2007; Van Doren et al., 2016). Especially, in the policy making level, these mutual barriers added to lack of trust in environmental benefits, and behavioural and organizational setbacks, translating into a negative impact (Pinkse & Dommisse, 2009; Energy Saving Trust, 2007; Accent, Citizens Advice, 2016; Anda & Temmen, 2014). Moreover, in the collective and individual level, economic and financial restrictions and costs are key barriers (UNEP DTIE Sustainable Consumption & Production Branch, 2009; Energy Saving Trust, 2007; CONCERTO Premium consortium, 2014; European Commission, 2011a; Van Doren et al., 2016; World Business Council for Sustainable Development (WBCSD), 2007).

Motivators regarding the building technology focus are also significant. These are summarized in Figure 3. As demonstrated, environmental concerns are the primary motivator regarding all levels (Linden et al, 2015; Steg et al., 2005; Zhao et al., 2015). There is also an existing interlink between the effective use of policy and instruments in formal social units level, and incentives. The policy implementations of the formal social units triggers the main motivator in collective and individual level – incentives. Here, incentives cover monetary and non-monetary ones. Therefore, without a doubt, incentives are the key motivator for individuals and collectives to utilize their investment potential (World Business Council for Sustainable Development (WBCSD), 2007; European Commission, 2016b).

Moreover, smart cities' authorities need smart citizens who are aware of their environmental impact, to use smart solutions to their full potential in buildings (Hong et al., 2015). Local government can play an important role in supporting informative and cooperative strategies, and proactively searching for financial and regulative strategies.

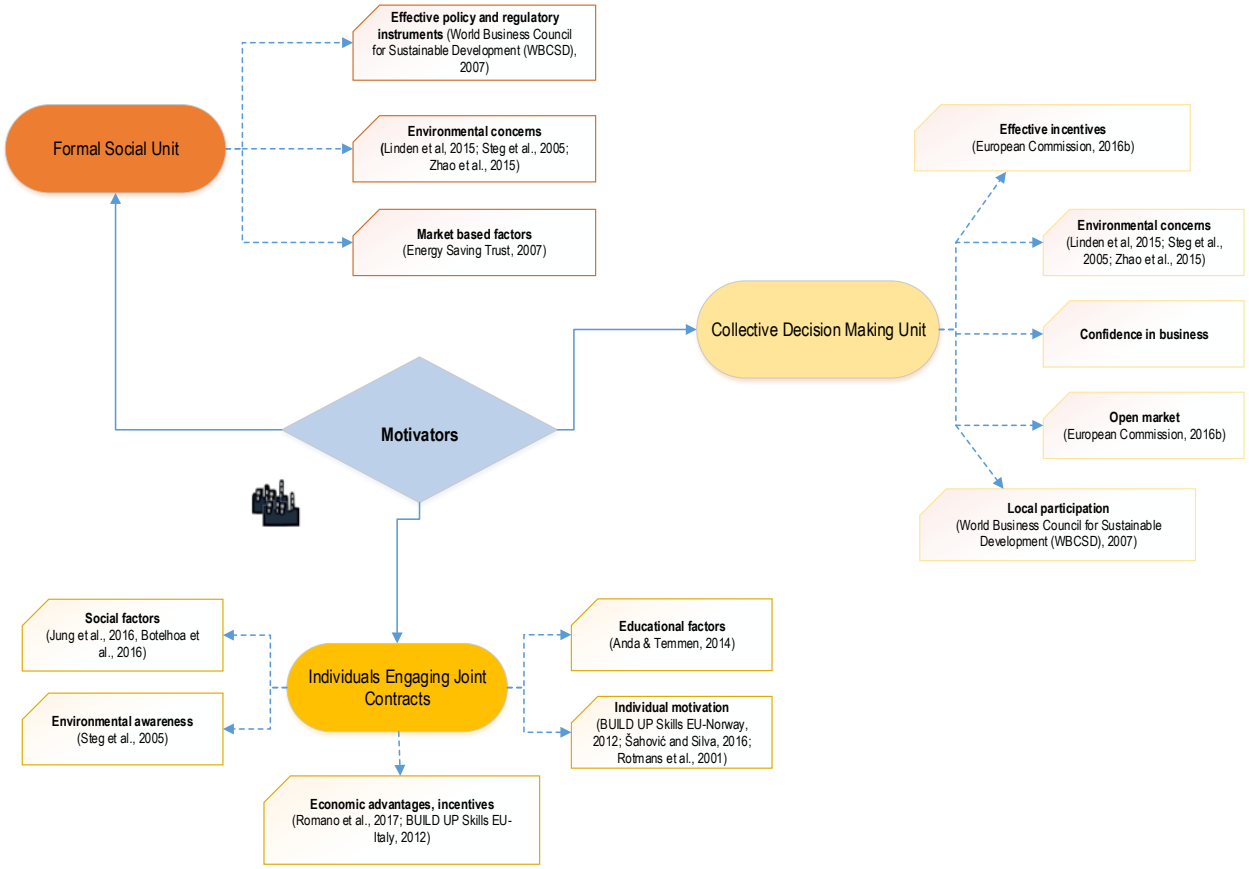

Figure 3: Motivators that play a role in the decision-making units related to buildings

Homeowners cannot be considered as a homogeneous group, but must be addressed as individuals. The key parameters for determining the motivation factors are related to the homeowner's current position in life: age, presence and age of children, time of ownership, occupation and income - demographics. Residents' needs must be highlighted, but tenants should also be given the opportunity to understand the housing company's interests and subcontractors' situation in a renovation. Although residents are likely to have dissimilar interests regarding a major renovation, and it is not possible to get full acceptance from everyone, the aim should be to satisfy the majority (Blomsterberg & Pedersen, 2015).

Electric Mobility

Main factors for all three levels are mainly transport-related. Transport is responsible for a quarter of Europe's GHG emission and is the major source of air pollution and climate change (European Commission, 2016). Light and heavy-duty commercial vehicles in particular contribute to a major extent to GHG emissions, air pollution, noise and traffic (Kaplan et al., 2016; European Environment Agency). For example, although light and heavy-duty commercial vehicles account for only 13% of the vehicles in Europe, their GHG emissions contribute more than one third to the total GHG emissions in road transport (ICCT, 2017). The electrification of transport (electric mobility) contributes significantly to the reduction of energy consumption and GHG emissions. In addition, public health can be improved due to the reduction of air pollution. The shift towards electric mobility also offers many opportunities for European car manufacturers because a new market is established for which they need to modernize their technologies and embrace innovations. Besides car manufactures, also energy companies and service providers can benefit from the shift. With the development of modernized technologies throughout the different sectors, also new jobs will be created (e.g., Haddadian et al., 2015; European Commission, 2016). Electric mobility is hence the focus of discussions concerning sustainable and energy-efficient means of transportation (Peters et al., 2011; Faria et al., 2013).

Figure 4 provides a summary of the variables and factors that play a role in decision-making at the formal social unit level, collective decision-making unit as well as the individual unit. The table allows to gain broad insights into the similarities and differences in the decision making process at the different levels.

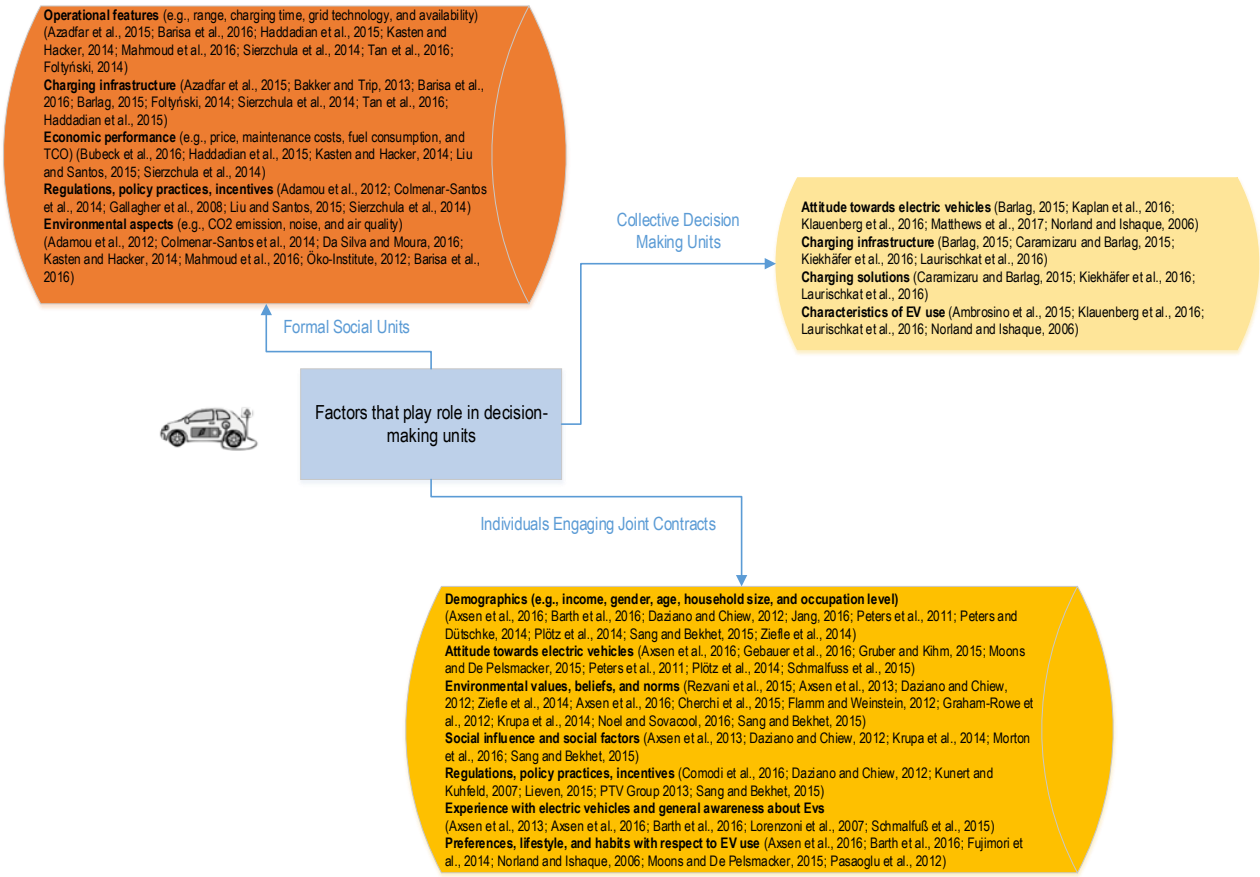

Figure 4: Factors that play a role in the decision-making units related to e-mobility

Figure 4 demonstrates that at the formal social unit level operational features, charging infrastructure and economic performance are important drivers of decision-making (Azadfar et al., 2015; Bakker and Trip, 2013; Barisa et al., 2016; Barlag, 2015; Foltyński, 2014; Sierzchula et al., 2014; Tan et al., 2016; Haddadian et al., 2015; Bubeck et al., 2016; Haddadian et al., 2015; Kasten and Hacker, 2014; Liu and Santos, 2015; Sierzchula et al., 2014).

Regulations, policy practices and environmental aspects are also relevant (Adamou et al., 2012; Colmenar-Santos et al., 2014; Gallagher et al., 2008; Liu and Santos, 2015; Sierzchula et al., 2014; Da Silva and Moura, 2016; Kasten and Hacker, 2014; Mahmoud et al., 2016; Öko-Institute, 2012; Barisa et al., 2016). Policymakers and energy providers have to keep in mind the environmental aspects and goals set by the European Commission.

The formal social units and collective units have in common that availability of charging infrastructure is a key component affecting their decision-making process (Azadfar et al., 2015; Bakker and Trip, 2013; Barisa et al., 2016; Barlag, 2015; Foltyński, 2014; Sierzchula et al., 2014; Tan et al., 2016; Haddadian et al., 2015; Caramizaru and Barlag, 2015; Laurischkat et al., 2016). In comparison to the formal social unit however, the collective decision-making units also consider the attitude towards electric vehicles as an important aspect (Barlag, 2015; Kaplan et al., 2016; Klauenberg et al., 2016; Matthews et al., 2017; Norland and Ishaque, 2006).

Besides the attitude, also the charging solutions, include the amount and the speed of charging stations are key factors that influence the decision-making (Caramizaru and Barlag, 2015; Laurischkat et al., 2016).

Research into decision-making at the individual level reveals that the attitude towards electric vehicles is predominant also at this level (Axsen et al., 2016; Gebauer et al., 2016; Gruber and Kihm, 2015; Moons and De Pelsmacker, 2015; Peters et al., 2011; Plötz et al., 2014; Schmalfuss et al., 2015). Clear differences can be noticed between the formal social unit, the collective unit and the individual level. For instance, the main aspects influencing the decision-making at the individual level are the following: background of the individuals (e.g., income, age, household size) as well as environmental values, beliefs and norms (Axsen et al., 2016; Barth et al., 2016; Daziano and Chiew, 2012; Jang, 2016; Peters et al., 2011; Peters and Dütschke, 2014; Plötz et al., 2014; Sang and Bekhet, 2015; Ziefle et al., 2014; Rezvani et al., 2015; Axsen et al., 2013; Cherchi et al., 2015; Flamm and Weinstein, 2012; Graham-Rowe et al., 2012; Krupa et al., 2014; Noel and Sovacool, 2016; Sang and Bekhet, 2015).

In addition, social influence plays an important role (Axsen et al., 2013; Daziano and Chiew, 2012; Krupa et al., 2014; Morton et al., 2016; Sang and Bekhet, 2015). Furthermore, regulations, policy practices and incentive schemes introduced by the formal social unit level impact the decision-making at the individual level (Comodi et al., 2016; Daziano and Chiew, 2012; Kunert and Kuhfeld, 2007; Lieven, 2015; Sang and Bekhet, 2015). It is also important to mention that, at the individual level, in comparison to the other two levels, lifestyle and habits with respect to EV use play an important role in the decision-making process (Axsen et al., 2016; Barth et al., 2016; Fujimori et al., 2014; Norland and Ishaque, 2006; Moons and De Pelsmacker, 2015; Pasaoglu et al., 2012).

The analysis of barriers along the three different levels of the formal social unit reveals many different barriers hindering the successful market penetration of EVs in Figure 5. There is a need for governments, cities and car manufacturers to take action, and to invest in practices and technologies that strengthen the benefits, and hence the motivators for using electric vehicles.

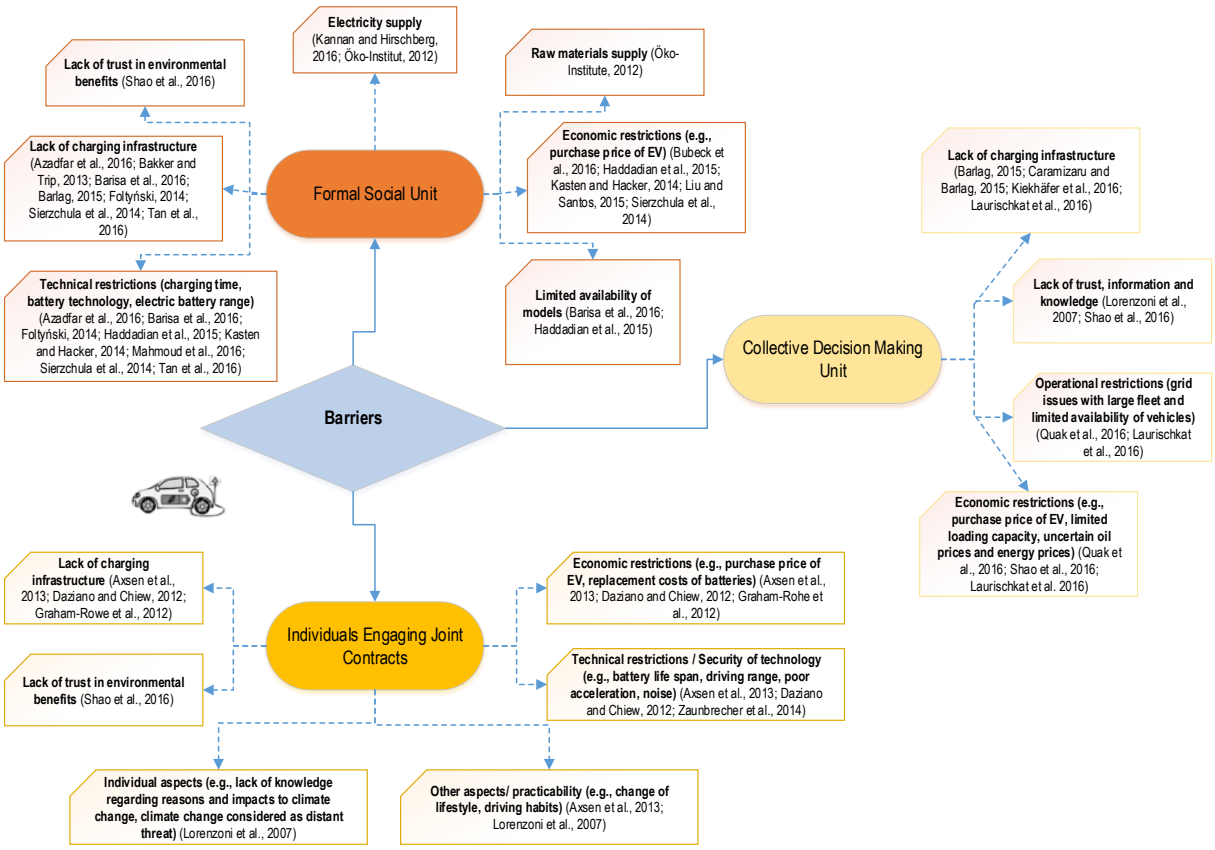

Figure 5: Barriers that play a role in the decision-making units related to e-mobility

Across all decision-making levels, actors almost unanimously agree on the barriers that hinder EV market diffusion. Lack of charging infrastructure, for example, is a prominent barrier mentioned throughout the different decision-making levels (Azadfar et al., 2016; Bakker and Trip, 2013; Barisa et al., 2016; Barlag, 2015; Foltyński, 2014; Sierzchula et al.,

2014; Tan et al., 2016; Caramizaru and Barlag, 2015; Laurischkat et al., 2016; Axsen et al., 2013; Daziano and Chiew, 2012; Graham-Rowe et al., 2012). The majority of studies evaluated the high purchasing cost as main barrier to EV acceptance (Bubeck et al., 2016; Haddadian et al., 2015; Kasten and Hacker, 2014; Liu and Santos, 2015; Sierzchula et al., 2014; Quak et al., 2016; Shao et al., 2016; Laurischkat et al. 2016; Axsen et al., 2013; Daziano and Chiew, 2012; Graham-Rohe et al., 2012). In addition, actors across the three decision-making levels mention the lack of trust as a barrier (Shao et al., 2016; Lorenzoni et al., 2007). This lack of trust is mainly with respect to environmental benefits. Here, policy makers, energy providers and car manufacturers have to provide more information that is easily accessible and understandable for the public.

Specific barriers that primarily affect the formal decision-making level are the supply of electricity and raw materials (Kannan and Hirschberg, 2016; Öko-Institut, 2012). These barriers affect the entire success of electric mobility, and are hence, significant obstacles to be mitigated. On the other hand, barriers that primarily affect the individual level unit are aspects such as climate change, to be considered as a distant threat, or aspects such as the need to change one's lifestyle (Axsen et al., 2013; Lorenzoni et al., 2007).

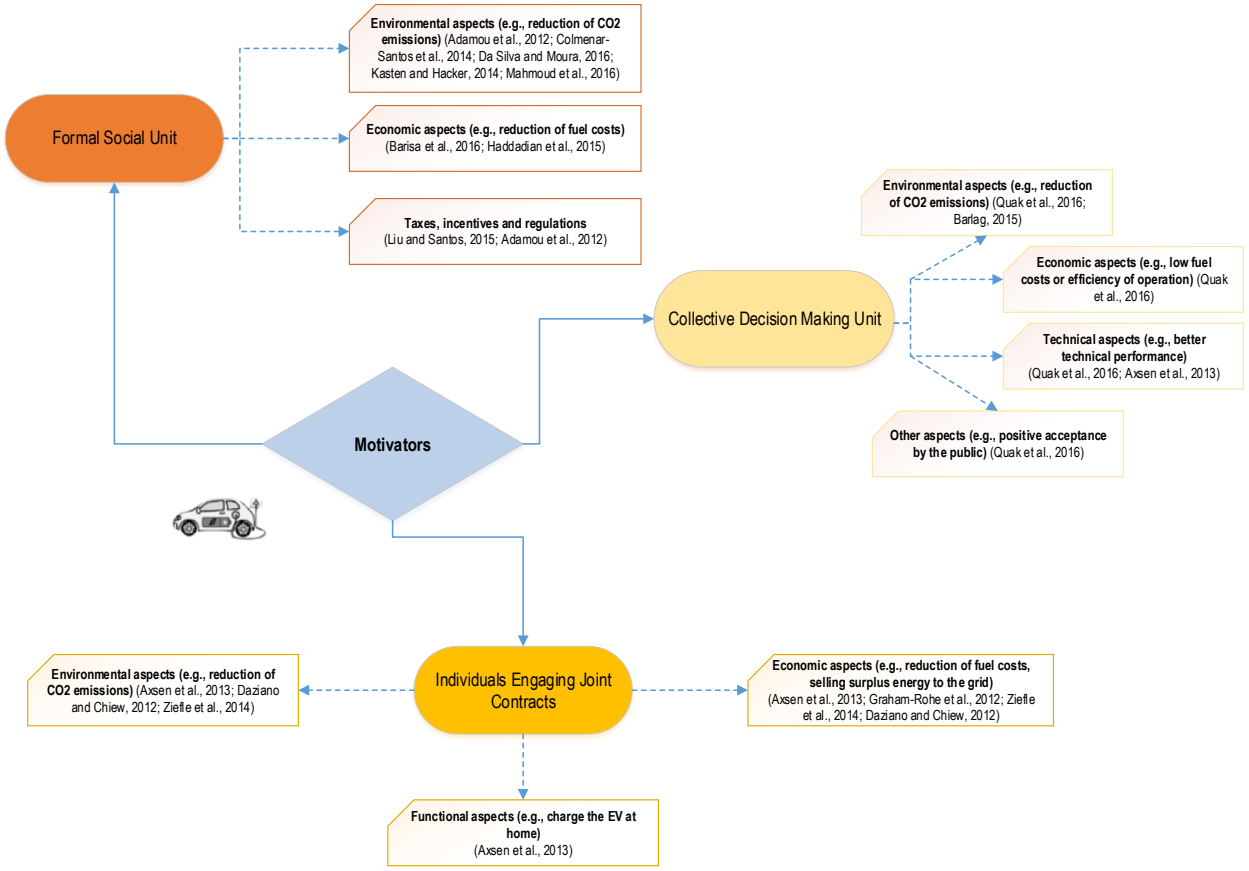

Figure 6: Motivators that play a role in the decision-making units related to e-mobility

Figure 6 summarizes the motivators. The main motivating aspect to engage in electric mobility across all the decision-making levels are environmental factors (Adamou et al., 2012; Colmenar-Santos et al., 2014; Da Silva and Moura, 2016; Kasten and Hacker, 2014; Mahmoud et al., 2016; Quak et al., 2016; Barlag, 2015; Axsen et al., 2013; Daziano and Chiew, 2012; Ziefle et al., 2014). This, however, conflicts with claims by most potential EV drivers that they have insufficient trust in the environmental performance of EVs. Economic aspects such as the reduction of fuel costs are unanimously mentioned as a motivator to EV market acceptance (Axsen et al., 2013; Graham-Rohe et al., 2012; Ziefle et al., 2014; Daziano and Chiew, 2012; Quak et al., 2016; Barisa et al., 2016; Haddadian et al., 2015). This perception is important, and a first step towards better understanding the total costs of ownership. That is, while the purchase price of an EV is higher compared to a conventional car, the operating costs including fuel costs are lower, and hence positively affect the TCO.

Smart Energy Technologies

The term "Smart grid" is a complex and still evolving concept. Consequently, even on the EU level, there is no one single definition of the concept, and there exist several understandings of what the smart grid is and what it does. It may however be considered '*an upgraded electricity network, to which two-way digital communication between supplier and consumer, intelligent metering and monitoring systems have been added*' (EUR-Lex, 2011). An alternative definition by EPRI (Electric Power Research Institute) is '*the overlaying of a unified communications and control system on the existing power delivery infrastructure to provide the right information to the right entity*' (Camarinha-Matos, 2016).

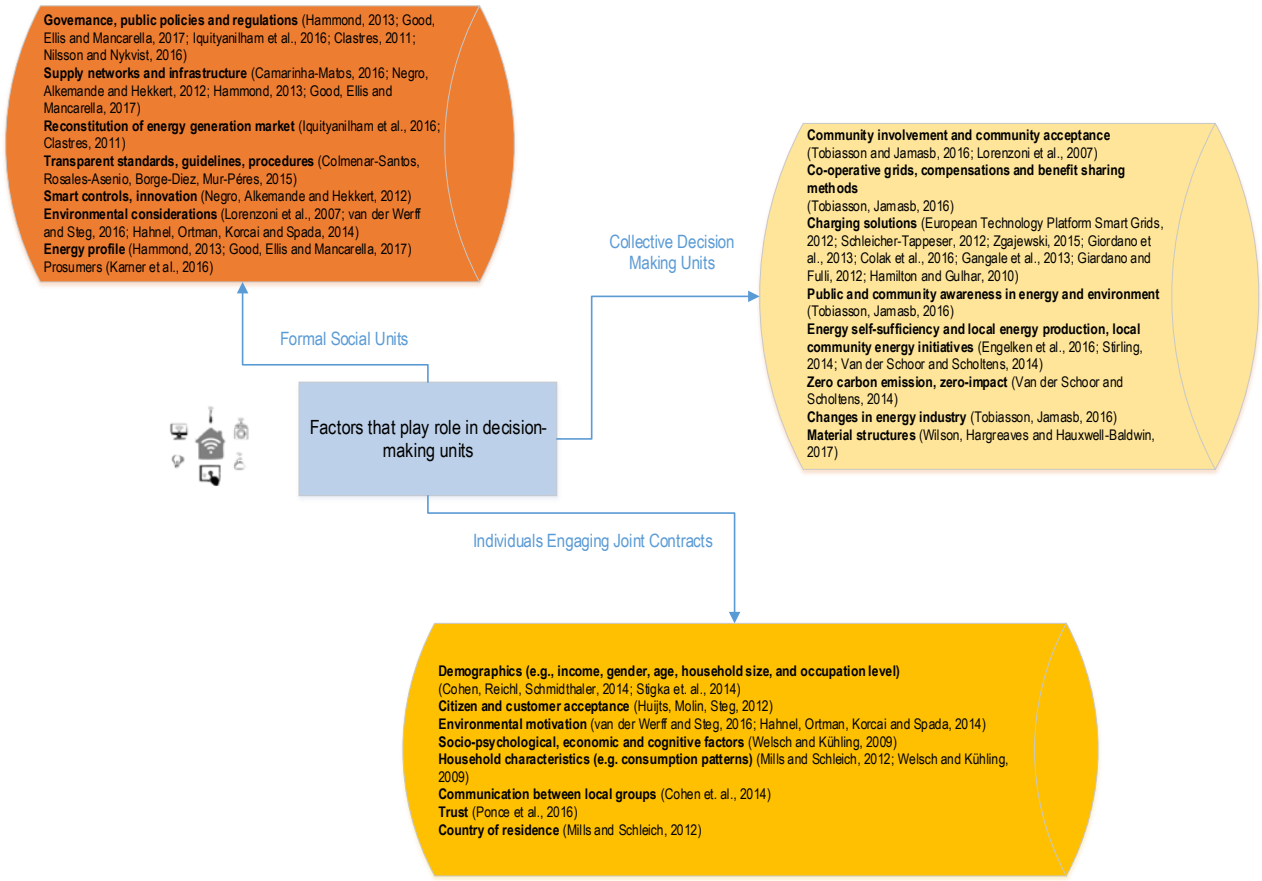

Figure 7: Factors that play a role in the decision-making units related to smart energy technologies

Figure 7 summarizes factors that play a role in the decision-making unit related to smart energy technologies. Considering the formal social units, the factors that are the most important turn out to be the governance and policy related ones (Hammond, 2013; Good, Ellis and Mancarella, 2017; Iquityanilham et al., 2016; Clastres, 2011; Nilsson and Nykvist, 2016). The energy profile and energy supply infrastructure and the market structure are also key factors for formal social units (Hammond, 2013; Good, Ellis and Mancarella, 2017; Camarinha-Matos, 2016; Negro, Alkemande and Hekkert, 2012). Collective decision-making units, on the other hand, are dependent on factors related to both formal social units and individuals. To begin with, incentives, compensations and other regulations are critical (Tobiasson and Jamasb, 2016). For individuals, naturally, demographics, socio-psychological factors, economic factors and environmental concerns are inevitable drivers (Cohen et al., 2014; Stigka et al., 2014; Welsch and Kühling, 2009). It is important to note that communication and consumption patterns have become outstanding factors that deserve more attention (Mills and Schleich, 2012; Welsch and Kühling, 2009; Cohen et al., 2014).

Figure 8 depicts the barriers that play a role in the decision-making unit related to smart energy technology. The rollout of smart grids in Europe has been slower than expected. The reasons for this are identified as pertaining not to the technologies themselves, but to policy and social structures (Tobiasson and Jamasb, 2016). Industries require more financial incentive to render their production more energy efficient, as well as more knowledge and possibly designated

personnel. The energy industry is wary of increasingly decentralized production, and a transition to a more service based economy (Karner et al., 2016). Smart grid demo-projects have tended to have a top-down structure and a technology-only (or almost only) focus. This tendency is criticized in the reviewed literature as a barrier in itself, as indeed the transition to smart grids is considered a political and cultural change, which also necessitating the active participation of citizens. An important impediment to smart grids and smart energy technologies is the confusion surrounding the very nature of these concepts (Tobiasson and Jamasb, 2016).

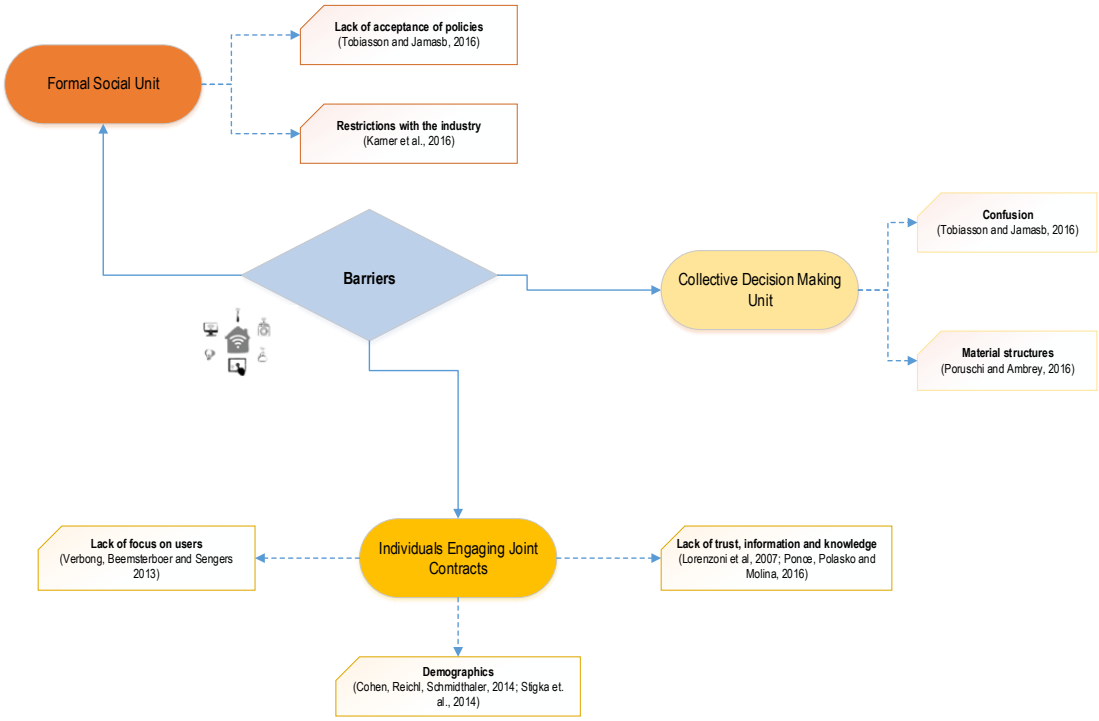

Figure 8: Barriers that play a role in the decision-making units related to smart energy technology

Europeans appear to be concerned with the environment; however, there is a lack of information concerning how smart energy technologies can contribute, and a lack of trust in public institutions and the "market" when it comes to managing energy shifts (Lorenzoni et al, 2007; Ponce, Polasko and Molina, 2016). People want to contribute, but know relatively little about which efforts and actions yield the most notable results. Moreover, those tasks that are easier to perform and that contribute the least to a perceived loss of comfort and quality of life tend to be the more popular (Lorenzoni et al, 2007; Ponce, Polasko and Molina, 2016). Demographic factors appear to be rather crucial to the acceptance of, and engagement with, renewable energy sources, energy efficiency, and the adoption of smart technologies (Cohen et al., 2014; Stigka et al., 2014). Motivators for the acceptance of smart energy technologies are represented in Figure 9 below.

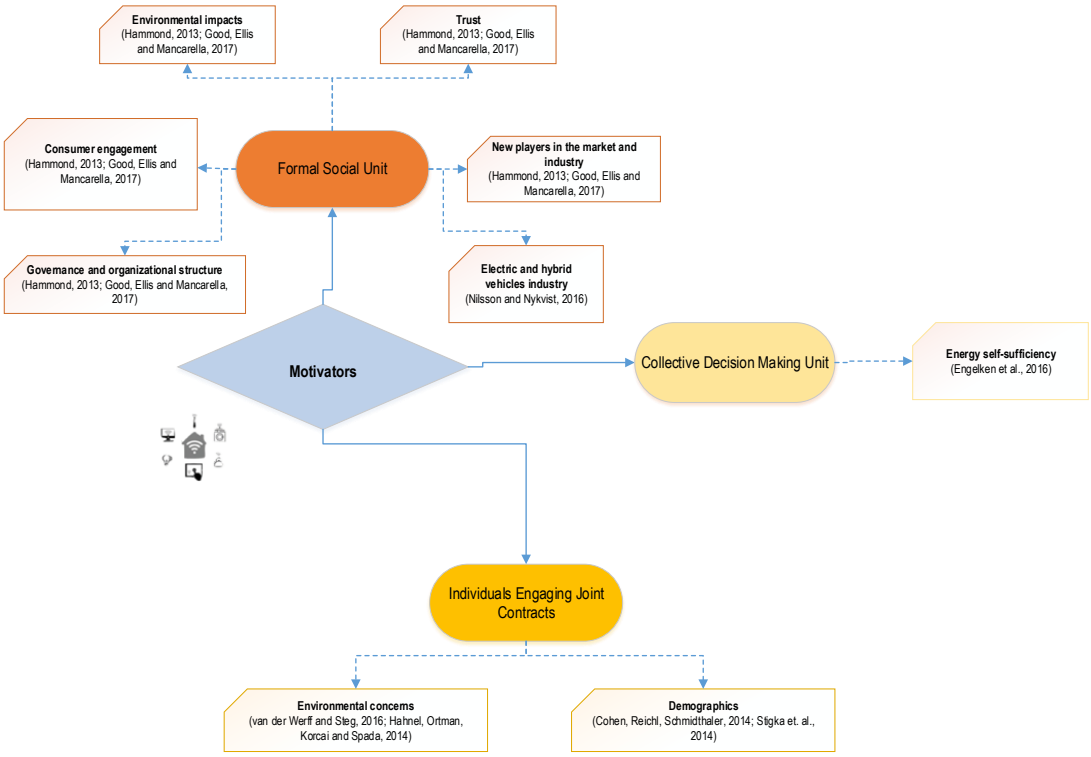

Figure 9: Motivators that play a role in the decision-making units related to smart energy technology

Identification of Similarities and Differences related to Factors, Motivators and Barriers for All Decision Making Units and Technology Foci

The literature review analysed the three technological foci of ECHOES, namely, Buildings, Electric Mobility, and Smart Energy Technologies. Each technological focus is critical to the achievement and completion of the European Energy Union and a critical component in Europe's transition towards the decarbonized energy system of the future. The above analysis of the factors that play a role in decision-making at different decision-making levels demonstrates key similarities and differences. Typically, the variables concerning formal decision-making units are related with policies and incentives, the variables concerning collective decision-making units involve infrastructural and environmental aspects. The variables for individuals are more related to demographic, social, economic and environmental drivers. Figure 10 shows that different technological foci have common key variables such as policy and environmental concerns, whereas there are also technology-specific key variables, such as smart controls for smart energy technologies.

Among the variables that are significant for the collective decision making units, local participation is common to all three technological foci. The buildings and smart energy technologies foci have matching variables such as incentives and environmental concerns, whereas variables such as infrastructure and charging solutions are common to electric mobility and smart energy technologies.

Most of the key variables for individual decision-makers are common across technological foci. These are mainly social, environmental, economic, individual and demographic factors. Consumption pattern and communication emerge as of specific importance for smart energy technologies.

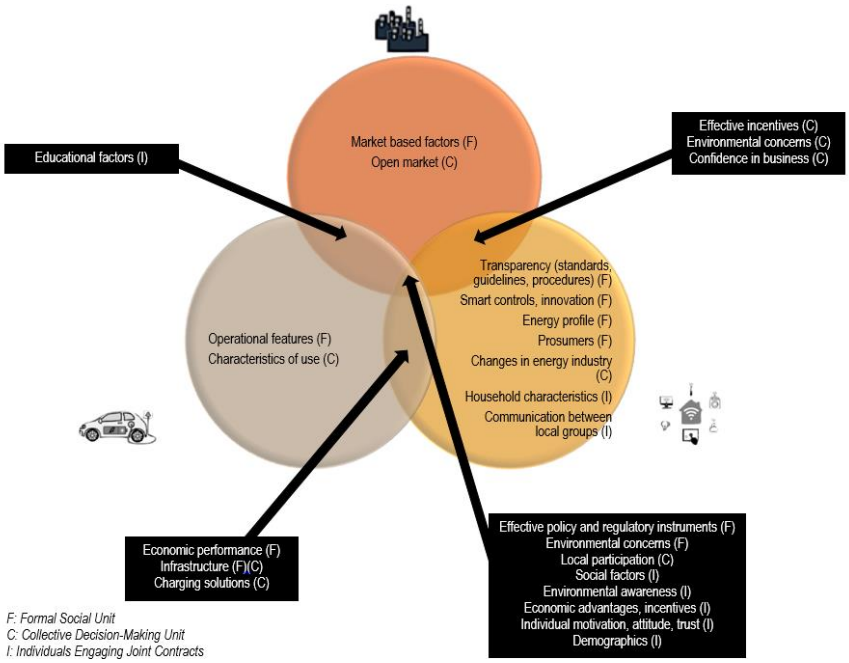

Figure 10 Factors for All Decision Making Units and Technological Foci

An analysis of motivators and barriers yields a similar result: Policies and attitude may pose barriers or motivators for formal decision-making units. For collective decision-making units, effectiveness of policies define barriers or motivators. Risks, uncertainty and costs define barriers; environmental concerns and local participation are important motivators. For individual decision-making units, social, environmental, individual and demographic variables have potential to form barriers as well as motivators. However, currently, these usually act as barriers for the individual decision-making unit.

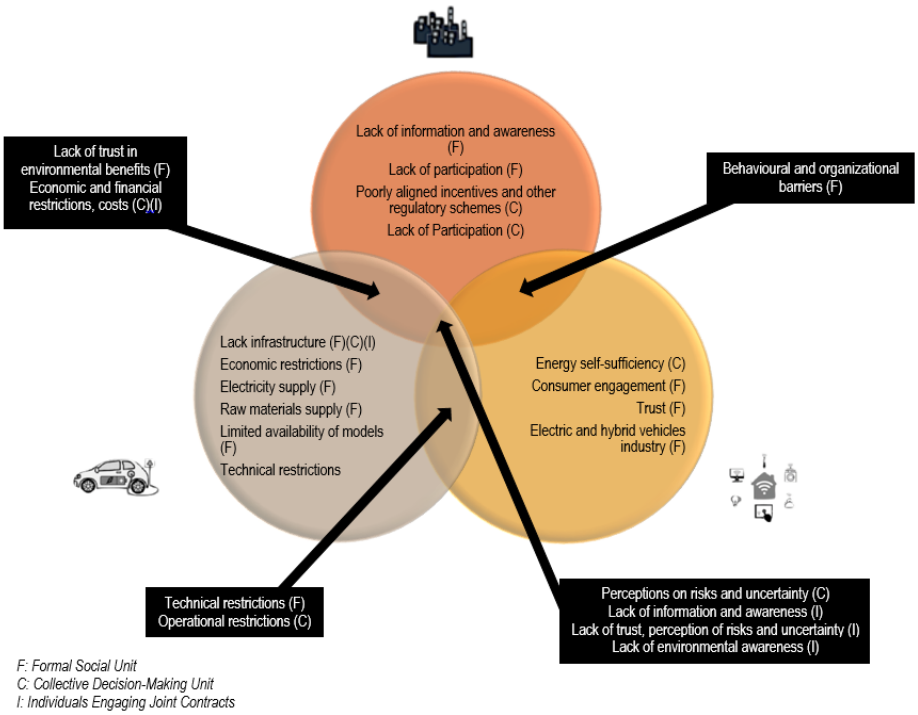

Figure 11: Barriers for All Decision Making Units and Technological Foci

Figure 11 below present comparisons of barriers across technological foci. Although many of the key factors are common for the three technological foci, the barriers hardly coincide at all. This is also explainable by the varying levels of progress for the achievements of the targets regarding different technological foci. The building technological focus is affected by more information and attitude related barriers, whereas smart mobility is adversely affected by the current state of the market offerings and technology. Regarding the collective decision making units, this level is affected in common perceptions of risks and uncertainty. Related economic and financial factors also stand out as barriers for the buildings and the electric mobility technological focus. Operational restrictions are in effect for electric mobility and smart energy technologies. Lack of trust, information and awareness as well as risk and uncertainty concerns affect collective decision-making units. Economic barriers are common to buildings and electric mobility foci. Infrastructure and technical restrictions demonstrate the current problems of the electric mobility.

Similar to the previous analysis, environmental concerns are in effect for all three technological foci as motivator as shown in Figure 12. Moreover, smart energy technologies are sensitive to consumer engagement, trust and electric vehicles industry, which is the core industry for the electric mobility focus.

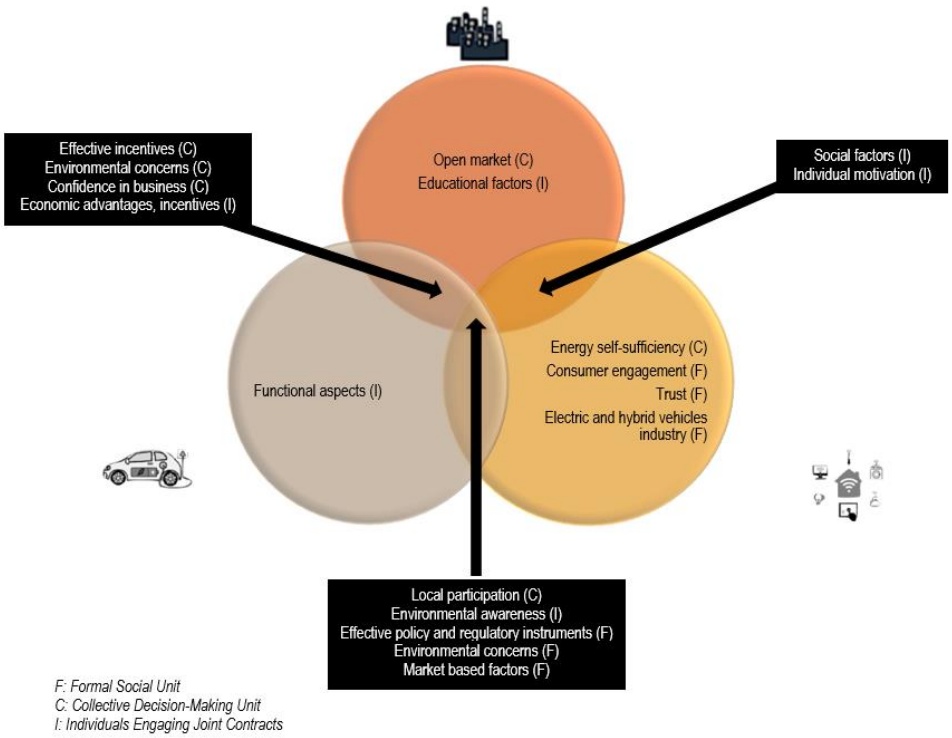

Figure 12 Motivators for All Decision Making Units and Technological Foci

For collective decision-making units, local participation is a motivator for the three technological foci. Important common motivators for buildings and electric mobility are incentives, environmental concerns, confidence in business and local participation. Smart energy technologies have a rather different outstanding motivator, which is energy self-sufficiency.

Environmental awareness is a common motivator for individuals. Rather individual factors such as demographics and social factors are motivators for buildings and smart mobility technological foci. Motivators concerning functional aspects are important for smart mobility.

METHODOLOGY

WP6 of ECHOES aims to identify the drivers of energy choices and energy related behaviour within different forms and levels of formal social units including policy makers, energy providers, industrial consumers, and individual consumers engaging in joint contracts. In doing so, the package also intends to pinpoint the differences and similarities across regional, national and local entities in their energy choices and behaviour. In this context, the primary research methodology of WP6 proposed a combination of qualitative and quantitative inquiries to elaborate on the insights provided by the available literature. This manuscript is based on the qualitative part of WP6 research, which uses focus groups and in-depth interviews, following a comprehensive and state-of-the-art literature review.

The use of qualitative techniques has been highlighted for the objectives of WP6, as these allow for deeper insights into human experience that pertains to energy related decisions and decision-making processes, particularly during low carbon energy transition. The reason for using a qualitative approach was to discover common and emerging themes, distinctive aspects, patterns, sequences and causal relationships, possible hierarchies and the general context of decision making processes in collective units, which could prove to be more difficult with quantitative means of assessment (Strauss and Corbin, 2007). Moreover, because the study examined a sample from six different countries (and hence different socio-cultural contexts), "exploratory, fluid and flexible, data-driven and context-sensitive" (Mason, 2002, p.24) nature of qualitative methodology enabled us to utilize a nonmathematical process of interpretation that was more advantageous in gaining a deeper understanding into our research questions. Such an understanding of the drivers behind collective energy choices also helps to develop deeper grounds for subsequent quantitative data collection stages.

In order to ensure a consistent interpretation and inclusion of the factors regarding energy decision-making processes, initial focus groups were conducted in six countries. The number of focus group studies totalled 15, which involved gathering selected individuals together in order to participate in a planned discussion that is intended to elicit perceptions and behaviours about a particular topic. Focus groups were deemed appropriate for collecting initial information about how decision making on low carbon energy consumption is realized in collective settings. To this end, each focus group accommodated members from a particular decision-making level.

Prior to focus groups, Work Package Leader, Izmir University of Economics, developed a guideline to assist project partners in conducting focus group studies, including basics of focus groups, roles of moderators, general framework with sample questions, and other useful tips. General framework of focus group topics included the role of participants in low carbon energy transition projects and decision-making processes, as well as understanding the collective patterns that influence the perception of motivating factors and barriers in making these decisions.

Focus groups were conducted in Austria, Bulgaria, Finland, Norway, Spain and Turkey and were completed by the end of 2017. A summary of focus group characteristics is presented in Table 1. All focus groups were tape recorded upon written consent of the participants, and then transcribed. Focus groups were held in the language native to participants, while transcriptions were later translated into English for analysis.[1]

Focus Group Code	Country	Decision Making Level	# of participants
FOGR1TRA	Turkey	Collective decision-making units	6
FOGR2TRB	Turkey	Individuals engaging in joint contracts	7
FOGR3TRC	Turkey	Formal social units	10
FOGR4BGA	Bulgaria	Formal social units	6
FOGR5BGB	Bulgaria	Individuals engaging in joint contracts	6
FOGR6BGC	Bulgaria	Collective decision-making units	6
FOGR7ESA	Spain	Collective decision-making units	9
FOGR8ESB	Spain	Individuals engaging in joint contracts	10

[1] All quotes presented in this report have been carefully transcribed and translated to English by members of the ECHOES research team or professional translators. The respondents have not quality checked the final result of this process, so any ambiguities and misunderstandings connected to the quotes from the respondents are under the responsibility of the research team.

FOGR9NOA	Norway	Individuals engaging in joint contracts	6
FOGR10NOB	Norway	Collective decision-making units	3
FOGR11NOC	Norway	Formal social units	4
FOGR12FIA	Finland	Individuals engaging in joint contracts	6
FOGR13FIB	Finland	Collective decision-making units	7
FOGR14ATA	Austria	Formal social units	4
FOGR15ATB	Austria	Collective decision-making units	6

Table 1 A summary of focus group characteristics

In order to further elaborate on the findings of the literature reviews and focus groups, we initiated the in-depth interview stage in the spring of 2017. Similar to focus groups, Izmir University of Economics, as the leader of the Work Package 6, first developed a semi-structured interview protocol with the general framework and sample questions for each technological focus, namely Electric Mobility, Smart Energy Technologies and Buildings, and formal decision making units, namely, formal social units, collective decision making units, and individuals engaging in joint contracts, and circulated this among partners conducting in-depth interviews in their respective countries and settings. The protocol aimed to collect personal, demographic and professional data from the interviewees, their role in energy transition projects and decision-making processes, as well as understanding the collective processes that influence the perception of motivating factors and barriers in making these decisions. Similar to focus groups, the interviewees were first provided with brief information about the objective of the study and the general framework, while their written consent was obtained for tape recording. Interviewees were assured of anonymity, through the use of pseudonyms, and an assurance that no other identifying information would be used in any publications or reports based on the interviews. In order to facilitate referencing, a labelling system of informants' pseudonyms, gender, country and collective decision-making level was used, as indicated in Tables 1 and 2.

Most interviews lasted between 45 minutes and 90 minutes, which was appropriate for collecting in depth information from participants. Interviewees came from a variety of backgrounds, and were judgmentally selected on the basis that they are experienced members and/or ultimate decision makers in energy transition projects in collective settings. Where appropriate, snowball sampling was also utilized.

By the end of 2017, a total of 67 in-depth interviews were completed in six countries identical to the focus groups. A summary of interview characteristics is presented in Table 2. Interviews were carried out in a language native to the interviewee, and a semi-structured questionnaire was used with predetermined questions and script, by which improvisation was allowed for through follow-up questions to explore emerging topics. In case the respondents faced difficulty in expressing themselves, they were provided with examples from previous interviews in a manner that would not result in biased replies. Before finalizing the interviews, the participants were asked about the most notable topic discussed, and if there were additional points, they would like to add. After this stage, the interview was finalized.

Interview Code	Country	Decision Making Unit	Role	Gender
IDIN1TRA	Turkey	Collective decision making	Logistics Supervisor	Male
IDIN2TRB	Turkey	Formal social unit	Director of Social Studies and Projects	Female
IDIN3TRC	Turkey	Collective decision making	Chairman of an Association in oil and natural gas industry	Male
IDIN4TRD	Turkey	Formal social unit	Representative from Metropolitan Municipality	Male
IDIN5TRE	Turkey	Individuals engaging in joint contracts	Head of Solar Energy Cooperative	Male
IDIN6TRF	Turkey	Collective decision making	Industrial Engineer	Male
IDIN7TRG	Turkey	Collective decision making	Portfolio Optimization Manager	Male
IDIN8TRH	Turkey	Individuals engaging in joint contracts	President of Dairy Cooperative	Male
IDIN9TRI	Turkey	Formal Social Unit	CEO of Transportation Company of Metropolitan Municipality	Female
IDIN10TRJ	Turkey	Collective decision making	CEO of Energy Company	Male

IDIN11TRK	Turkey	Collective decision making	President of an Association in wind energy sector	Male
IDIN12TRL	Turkey	Collective decision making	Vice Chairman of Industrial Association	Female
IDIN13TRM	Turkey	Individuals engaging in joint contracts	Director of Housing Society	Male
IDIN14TRN	Turkey	Collective decision making/ Individuals Engaging in Joint Contract	Executive Board Member of Organized Industrial Zone	Male
IDIN15TRO	Turkey	Formal social unit	Mayor	Male
IDIN16TRP	Turkey	Formal social unit	Representative from Turkish Ministry of Energy	Male
IDIN17BGA	Bulgaria	Formal social unit	Chairman of Energy Agency	Female
IDIN18BGB	Bulgaria	Collective decision making	Project Coordinator in environmental NGO	Male
IDIN19BGC	Bulgaria	Formal social unit	Director of R&D Construction company	Female
IDIN20BGD	Bulgaria	Individuals engaging in joint contracts	Entrepreneur in RES and farming	Male
IDIN21BGE	Bulgaria	Collective decision making	Expert in consultancy services	Male
IDIN22BGF	Bulgaria	Collective decision making	Partner in sustainable development advisory	Male
IDIN23BGG	Bulgaria	Collective decision making	Member of executive board EV association	Male
IDIN24BGH	Bulgaria	Formal social unit	Major Administrator of State Agency	Female
IDIN25BGI	Bulgaria	Formal social unit	Director of Ministry's Directorate	Male
IDIN26BGJ	Bulgaria	Formal social unit	Political Decision Maker in Municipality	Male
IDIN27ESA	Spain	Collective Decision Making Unit	High-level representative of large carmaker	Male
IDIN28ESB	Spain	Collective Decision Making Unit	Head of Energy Efficiency	Male
IDIN29ESC	Spain	Formal social unit	Representative from Renewable Energy Technology Provider	Female
IDIN30ESD	Spain	Formal social unit	Director of Regional Energy Agency	Male
IDIN31ESE	Spain	Collective Decision Making Unit	CEO of Renewable Energy Company	Male
IDIN32ESF	Spain	Formal social unit	Director of a Spanish Utility	Male
IDIN33ESG	Spain	Formal social unit	Representative of a Regional Energy Agency	Male
IDIN34ESH	Spain	Formal social unit	Representative of a Regional Government	Male
IDIN35NOA	Norway	Collective decision making	Representative of an Interest Organization	Male
IDIN36NOB	Norway	Collective decision making	Energy and Industry Economist	Male
IDIN37NOC	Norway	Collective decision making	Communication Manager and Advisor	Males
IDIN38NOD	Norway	Formal social unit	High-level Official in the Ministry of Energy	Male
IDIN39NOE	Norway	Formal social unit	Architect/Planning officer in energy saving	Female
IDIN40NOF	Norway	Formal social unit	Director of Energy Department in Energy Agency	Male
IDIN41NOG	Norway	Collective decision making	Representative from an energy association	Male
IDIN42NOH	Norway	Collective decision making	Senior Advisor in electric car association	Male
IDIN43NOI	Norway	Formal social unit	Director of an Energy Company	Male
IDIN44NOJ	Norway	Formal social unit	Project Manager in county	Male

IDIN45NOK	Norway	Individuals engaging in joint contracts	Head of Housing Society	Male
IDIN46NOL	Norway	Individuals engaging in joint contracts	Head and Board Member of Housing Society	Males
IDIN47NOM	Norway	Individuals engaging in joint contracts	Head of Board of Housing Society	Male
IDIN48NON	Norway	Individuals engaging in joint contracts	Head of Housing Society	Female
IDIN49NOO	Norway	Individuals engaging in joint contracts	Head of Housing Society	Male
IDIN50FIA	Finland	Formal social unit	Director of Energy Organization	Male
IDIN51FIB	Finland	Collective decision making	Representative from construction sector	Male
IDIN52FIC	Finland	Collective decision making	Consultant in a building company	Male
IDIN53FID	Finland	Formal social unit	Director of an energy company	Female
IDIN54FIE	Finland	Collective decision making	Director of a company in research and innovation sector	Male
IDIN55FIF	Finland	Collective decision making	Representative from a company in energy sector	Male
IDIN56FIG	Finland	Individuals engaging in joint contracts	Representative from electric vehicle association	Male
IDIN57FIH	Finland	Formal social unit	Representative from Municipality	Male
IDIN58FII	Finland	Collective decision making	Director of a foundation	Female
IDIN59FIJ	Finland	Collective decision making	Policy maker	Male
IDIN60ATA	Austria	Formal social unit	Representative from municipality	Male
IDIN61ATB	Austria	Formal social unit	Representative from municipality	Male
IDIN62ATC	Austria	Formal social unit	Representative from municipality	Male
IDIN63ATD	Austria	Formal social unit	Representative from the department in Provincial Government	Male
IDIN64ATE	Austria	Formal social unit	Representative from Provincial Energy Agency	Male
IDIN65ATF	Austria	Collective decision making	Representative from car sharing association	Male
IDIN66ATG	Austria	Collective decision making	Energy manager in car sharing association	Male
IDIN67ATH	Austria	Collective decision making	Owner of a renewable energy provider company	Male

Table 2 A summary of interview characteristics

Upon completion of the interviews, all voice data was transcribed and translated to English. Data analysis started with the compilation of more than 1,000-page corpus of text, consisting of 15 focus group and 67 in-depth interview transcriptions. During analysis, we followed the guidelines by Strauss and Corbin (1990) and Kvale (1996). In this context, three researchers, to avoid any possible bias, carefully read all transcriptions, and they were systematically coded to discover key emergent themes relating to experiences during low carbon energy transition.

The first stage of the analysis included open coding, which was used to break down, conceptualize and code the data, as shown in Figure 13. Each separate idea in the corpus was labelled and similar phenomena were grouped at this step, using freely assigned words or phrases, such as “incentives”, “social barriers”, “top-down decision making”, and “enthusiasts”. Once open coding was completed by each of the three researchers, these codes were brought together to be processed for the second stage, which is called “axial coding”. In this step, we categorized open codes for differences and similarities, as well as patterns and hierarchies. This stage also made it possible to observe relationships, where we grouped the categories and sub-categories to see potential overlaps and divergences between the concepts. Finally, we applied selective coding, where the core themes of data are identified and the whole corpus is re-read to extract quotations that relate to and describe these emerging themes.

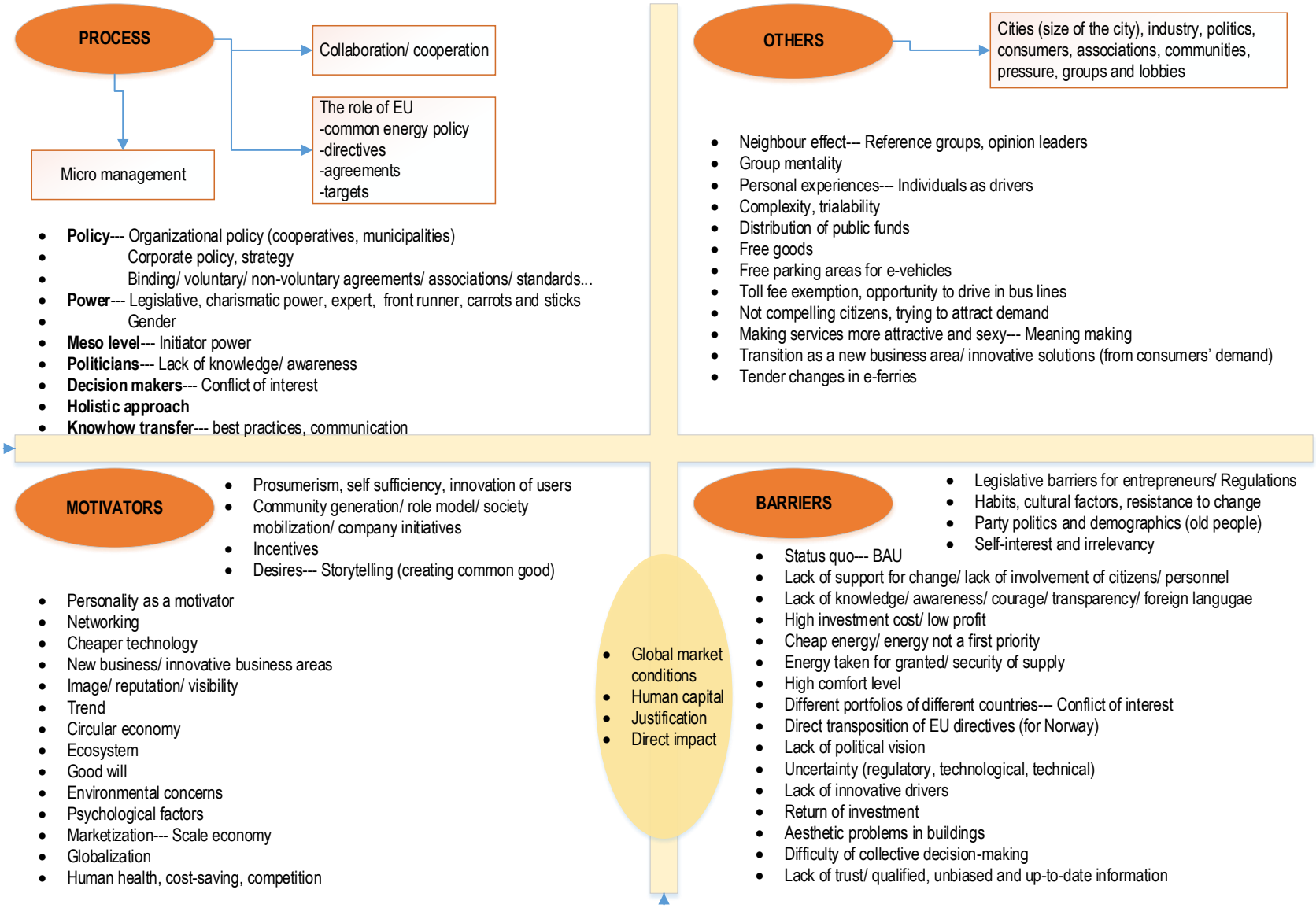

Figure 13 Initial Open Coding Results

Due to interpretivist nature of the research approach, triangulation was applied to ensure validity and trustworthiness of the findings (Shenton, 2004). Triangulation may be achieved through a variety of means, such as merging primary data with secondary sources and field notes, including multiple researchers, or utilizing multiple methods for interpretation. Our triangulation approach included all these techniques, as we compared our interview findings with the available literature, focus group findings and interview notes, as well as employing three researchers studying the same corpus of text individually. Moreover, initial report on findings was shared with the other members of WP6 to ensure that no significant theme was missing from the analysis.

FINDINGS AND ANALYSIS

A content analysis of the transcriptions was conducted in order to explore the relevant parameters (key and emerging themes, as well as the dynamics of the decision-making processes), their interrelations, differences and similarities between levels of formal social units, differences and similarities between countries. The findings demonstrated five main themes, namely the policies, motivators, barriers, power, and execution, as factors that cause and mediate the decision-making process. In this context, we propose a modified version of Dewey's (1910) decision-making algorithm – a seminal work in its field cited by numerous prominent studies (Ennis, 1993; Fisher, 1970; Ferdrickson&Mitchell, 1984; Heppner&Petersen, 1982; Katz, 1960; Krauss, 2005, Langley et al., 1995; Lüscher&Lewis, 2008; Mahoney, 1974; Merrian&Tisdell, 2015). The original framework suggested by Dewey (1910) proposes a five step method, including "a) a felt difficulty, b) its location and definition, c) suggestion of possible solutions, d) development by reasoning of the bearing of the suggestion, and e) further observation and experiment leading to its acceptance or rejection; that is, the conclusion of belief or disbelief". However, this study follows a slightly modified four-step version, enhancing our analysis, from a problem to a solution: a) a difficulty/problem is felt, b) the difficulty/problem is located and defined, c) possible solutions and consequences are suggested, d) a solution is considered and executed. Based on our findings, our model replaces steps a), and b) with policies, and c) and d) with execution, where power dynamics play an imperative role. Within this process, two other parameters are at work, namely motivators/enablers and barriers/disablers, which either facilitate or obstruct particular stages. An initial version of our model is depicted in Figure 14.

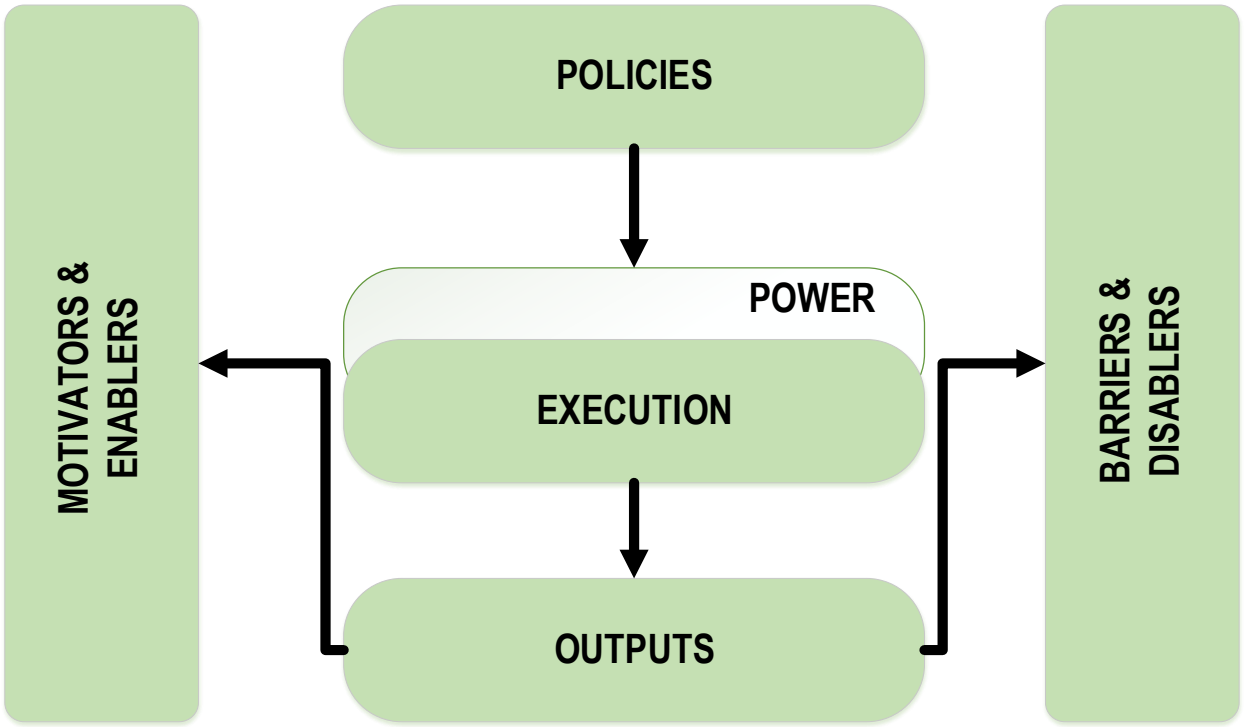

Figure 14 An Initial model of decision-making processes in collective units during transition to low carbon economy

We address these parameters in detail and how they are interconnected to collective decision-making processes below.

INPUTS: POLICIES

Policy refers to a plan of an organizational body that sets the objectives and targets, and a variety of mandatory and discretionary actions to be undertaken to attain these goals. In this context, policy appeared to be a recurrent theme in the interviews, particularly in its capacity to initiate energy efficiency projects and respective decision-making processes. In line with the decision-making levels covered by the interviews, we identified three main categories of policy frameworks that direct the activities of the main actors engaged in energy efficiency, which are interstate, national, and organizational & corporate policies. Disposition of several type of policy instruments as identified in this study are depicted in Figure 15.

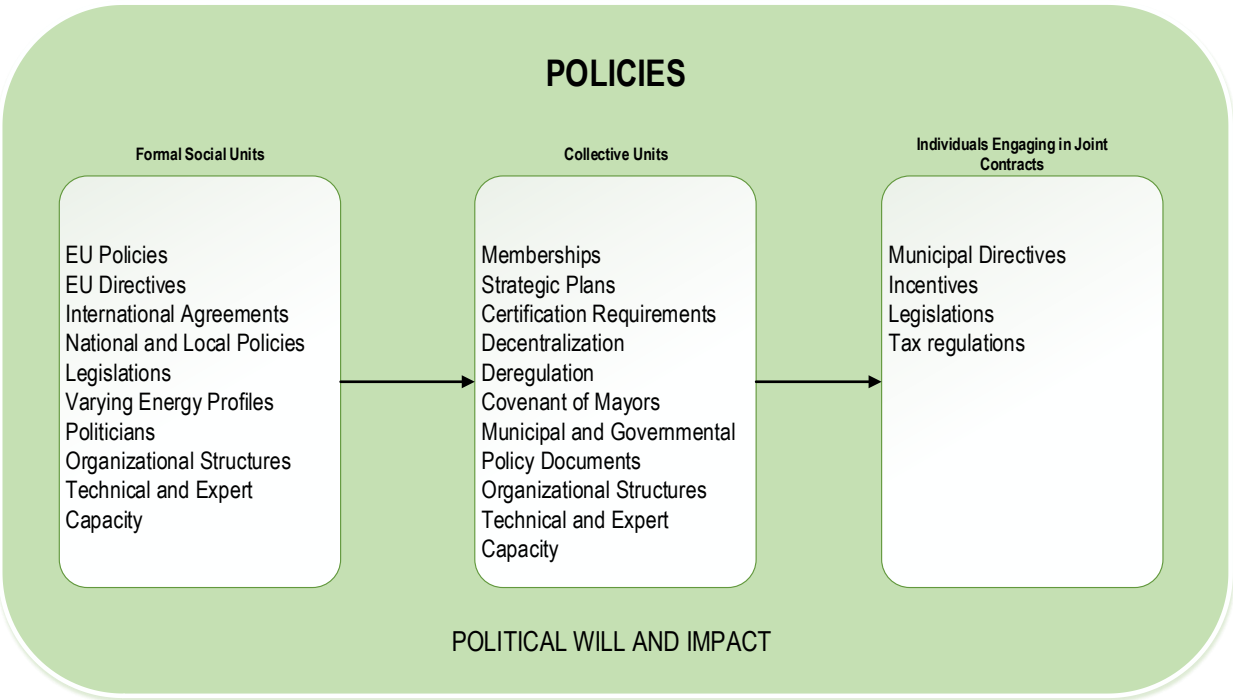

Figure 15 Disposition of several type of policy instruments

Interstate policies mainly refer to international agreements such as the Kyoto Protocol and Paris Agreement, and EU directives such as the Directive 2009/29/EC, Directive 2009/28/EC, Directive 2009/31/EC and Decision No. 406/2009/EC of the Parliament and the Council. These far-reaching measures not only played an important role in increasing awareness on the topic, but they also acted as significant stimulators of collaborative action in many areas that relate to energy, making it possible for the actors to find some common grounds to communicate and cooperate:

> *I have been involved in the Renewable Regulation Area for a long time, but now it has expanded, it is not only renewables, it's the whole field, the scope of action for the climate or defense of climate change, etc., which has embarked on energy, and much more. Then all the movements ... Also, this is something that a few years ago was quite paralyzed or even marginal ... Kyoto, I think people had heard of Kyoto, but seeing it in some press headline, they did not even know what it was. However, people now know more: what the Paris Agreement is about, they know where we are going, they are aware of the problems of climate change, that is, the general awareness about climate change has increased a lot, and, therefore, all the actions, all work related to energy, climate change, renewables, and so on. Well, the work now it is much more comforting.*
>
> Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

For the government I guess, in addition to the global motivation of wanting to, slow down global warming, it's also that they have committed to, there is, the Kioto, and then Paris Agreement. They have to cut emissions, from that out from trading, and have committed to what is it 30 per cent reduction, and, it's pretty clear they're not gonna reach the goal. It's, for a period what was it 2013 to 2020, I don't remember what was the starting date, but it's only three years left or two years left, and there's no way that they're gonna reach their goals.

Focus Group Code (FOGR12FIA, Finland, Individuals engaging in joint contracts)

The administration has to perform certain tasks with the public in mind and operates in climate of political tension, and in a climate of tension on legal levels. And much of what we do is based on European – in the broadest sense of the word – and perhaps also overarching guidelines, the keyword being the Paris climate protection agreement and so on. In other words, a superordinate, meta level actually already exists here, which is then reflected, so to speak, in the administration in the various responsible organisations, and is regained in the implementation. So this is not necessarily something that has invented itself. But of course, a kind of environmental awareness already existed in the country, even before the European Union had developed so many guidelines over a period of time.

Focus Group Code (FOGR14ATA, Austria, Formal social unit)

It is clear that the Paris-agreement and the Climate Settlement (Klimaforliket) in the Parliament and other frameworks and guidelines are leading for the energy policies that are done in different countries. In Norway, we have a set of ratified agreements that sets standards of renewable energy production on one side, and emission reduction on the other hand. Moreover, here you have the instruments that are used in the public sector, most likely easier to do than in the private sector, where the public sector and the State have climate, energy and environmental action plans that they define and work up against.

Focus Group Code (FOGR10NOB, Norway, Collective decision-making units)

The presumed process for policy deployment is from the EU directives to national policies, which then convert to regional or local targets. A majority of the respondents described a similar policy deployment process:

This again has strategic processes and mission processes, which are now not only being made for the province, but also reflect EU directives, the national regulations and climate targets and break them down to this regional level. And we are really typically the ones who also tend to implement the responsibilities and individual measures that our main public owner devises for us and defines in the stakeholder and group processes.

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

National debate often gives the impression, we cannot manage to decide all of this for ourselves. So a little bit of the speed will be determined from outside. Much of the speed is determined from the outside. And there are some big questions, that we don't completely control, which is crucial. Now there are many people from the Norwegian ministries in Bonn, at the international climate change negotiations there, and the processes are difficult, they are certainly not easier with the new President of the United States, and things like that.

Interview Code (IDIN38NOD, M, Norway, Formal Social Unit)

We often meet the EU directives. And they are to be introduced into Norwegian law, and we have been in touch with many of them. And they're not made for Norway, or the Norwegian energy system. So it means that the adaptation sometimes can get a little weird. But we find that the intentions, as seen from the EU's point of view, is good. They want something on both the energy and climate area, but based on other conditions than us. They are concerned with security of supply within the whole EU area, with the purchase of gas and lots of things like that.

Interview Code (IDIN40NOF, M, Norway, Formal Social Unit)

I think what we as Finland Ltd. should be able to influence how Brussels acts in the case of the unique characteristics of national states in these issues. We always loose this war. There is nonchalance to our know-how. (District heating) … is a good co-, the co-production of district heating and electricity is brilliant. This is fantastic

hi-tech this day, and we know that the big nations that do not have it trample us in the votes. This is a fact. We should be louder and lobby these issues more. But in Finland the ministry and the industry are on different sides of the table. A shared discussion is missing. As a small country we should have much more collaboration in these issues. But Finland is not good in dealing with the big picture. This issue about improving our lobbying in Brussels has been in [newspaper] a million times lately. Its close related to this issue.

Interview Code (IDIN51FIB, M, Finland, Collective Decision Making)

The national policies are in many cases directly transposed into national policies and thereafter, to legislations:

These are basically the policies related to environmental protection for energy efficiency and to provide a share of energy from RES. For these policies there are European directives. We also transpose them into our legislation and implement measures to achieve goals that are in both EU and national legislation.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

Such things like emissions trading, taxation and legislation are decided on a national or EU level, meaning that municipalities always operate in that environment, which is given. That is why I also consider odd those discussions, where municipalities [or cities] are raised over the others to the problem solver position. If the national policy is very regressive, the possibilities of municipalities to act are rather limited. On the other hand, in Finland you can identify a group of municipalities, which have been ready to act more and move more rapidly than what is seen averagely across the whole country. I that sense, municipalities can push forward the climate momentum, which will hopefully drip into national policy so that it will not stagnate to decision making of single municipalities.

Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

On the other hand, every country has a different energy profile in terms of their resources consumption patterns, even the energy market structure. Therefore, the interpretation of the EU policies to the national level may differ considerably between countries:

We know what our energy consumption structure is. We have a very large share of electricity. This is simply not typical for the other EU countries. We consume a great deal in the household. We have a large share of electricity consumption for heating. ... First, because there were no alternative sources. We are talking about household gasification, especially the central heating plants.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

The power system in Europe is not emissions-free in any kind of way. But it is in Norway, that is, we have enough renewable power for our own consumption. But it is like that…we all must contribute here. It is only through the access to abundant renewable energy that we can phase out fossil. It's not like you, you cannot phase out fossil energy if you do not see that there is plenty of renewable energy available and ready to take over. That's the mechanics that must be involved if we are to go away from a high-emission society.

Interview Code (IDIN37NOC, M, Norway, Collective Decision Making)

Clearly, the EU is formed by its member states, hence EU policies are formed through the contributions of its members, so, policy deployment is a two-way street. An interviewee, a policy maker from Finland, states that he is not happy with how Finland contributes to EU policy making:

In the EU, someone should make the initiatives, and all the Member States need to take a stand on these. My experience has been that Finland wants to take the minimum obligations from the EU. In that sense, we are ready to do things but not ready for EU commitments. Unfortunately, this doesn't push EU policies forward.

Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

A similar conclusion comes from an interviewee in Austria:

> *The issue hasn't really gotten a boost because people are thinking "I have to solve a problem now and that is problem-solving solution for it", but simply because of the pressure that has come from outside Austria, for example, the EU accession and so on, and that has also arisen due to the legislation. The input, in terms of legislation at the EU level, has been received mainly due to the excellent networking of experts working in the area of energy. And the province also didn't, more or less, get left out of it. I still don't know whether anyone would have said, without any ulterior motive, that it was a real political goal, with the exception of a few people who had supporters in politics.*
>
> Interview Code (IDIN63ATD, M, Austria, Formal Social Unit)

The collective approach in policy making for the EU is not expected to work, nor actually works in the same way for all countries. There may be occasional discrepancies between national priorities and the EU policies. Perhaps the most severe implications are observed in Norway, which is not a member country and does not have a direct say in the formation of policies:

> *We often meet the EU directives. And they are to be introduced into Norwegian law, and we have been in touch with many of them. And they're not made for Norway, or the Norwegian energy system. So it means that the adaptation sometimes can get a little weird. But we find that the intentions, as seen from the EU's point of view, is good. They want something on both the energy and climate area, but based on other conditions than us. They are concerned with security of supply within the whole EU area, with the purchase of gas and lots of things like that. So I feel that perhaps the Norwegian energy system is where the EU would like to be in 2050. So that's in a way, it is important to think: "Yes, nice to have them on the team, but we have to customize things, so we don't lose what is good in Norway." I think it is a point of view I can stand for.*
>
> Interview Code (IDIN40NOF, M, Norway, Formal Social Unit)
>
> *Norway is not a member, and we have slightly fewer channels to decision makers, and the policy toolbox is a much more complex landscape. There are many more things that need to be adopted in the EU, and there are compromises made between countries, and here you come as little Norway and trying to influence. It is not always easy. However, if we now look at Norway, for example, the job is to promote the member companies ' points of view, and in addition to that of course propose our own solutions to the extent we have them, and this of course applies in many other areas than energy and climate.*
>
> Interview Code (IDIN36NOB, M, Norway, Collective Decision Making Unit)

There are more indirect reflections of the EU policies in terms of national policies. One good example, at the municipal level, is the EU Covenant of Mayors for Climate & Energy, which is a voluntary commitment of municipalities that aim to implement EU climate and energy objectives (http://www.covenantofmayors.eu/about/covenant-initiative/origins-and-development.html)

> *Our department makes an important decision on energy transition and sustainable energy. Such decisions are not only made by Mayor but also by Municipal Council. On the other hand, European Union has a different structure called Covenant of Mayors founded in 2008 and oriented to local administrations. The system has a purpose to decrease the carbon emission by 20% until 2020. This commitment was revised and altered as 40% until 2030. We also made a commitment to decrease the carbon emission by 20% after the approval of the Mayor.*
>
> Interview Code (IDIN4TRD, M, Turkey, Formal Social Unit)
>
> *As Bulgaria is a member state of the EU, we are obliged to follow the adopted model for sustainable energy development and we are committed to the long-term European objectives in this direction - our municipality was also the first one to join the Covenant of Mayors.*
>
> Focus Group Code (FOGR4BGA, Bulgaria, Formal Social Unit)

There are enough buildings in the city for renovation, schools and kindergartens, so the aim was always to cover more and more municipal buildings. However, a serious breakthrough has been made with the inclusion of the municipality in the Covenant of Mayors.

Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

In some instances, the Covenant of Mayors initiative is a key determinant of the municipality's plans:

[A]n emission inventory was made, ... and ... a plan for sustainable energy was developed in the municipality.

Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

A bottom up method starting from individuals is accepted as more effective. According to the method, the cities make their commitments to decrease the carbon emission and take precautions about climate change in their area of jurisdiction. This system created by European Union is called Covenant of Mayors. We made a similar suggestion to this system and we received approval from Mayor and Council. After becoming a party, we were obliged to prepare the Sustainable Energy Action Plan. Within the framework of our action plan, we eliminated all the sectors causing global warming due to greenhouse gases. These sectors include industry, agriculture and municipality. In this way, we created the inventory by excluding all the energy resources leading to carbon emission. Consequently, we obtained the carbon footprint of X city having a population of 4 million by analyzing the sectors leading to carbon emission.

Interview Code (IDIN4TRD, M, Turkey, Formal Social Unit)

Many principles associated with energy transition are intuitive in the sense that they are in line with the general understanding of using resources efficiently or preserving the environment and the resources. Accordingly, a number of respondents consider that traditional foundations of their communities may be associated with energy transition. These considerations could date back to pre-EU era; also shedding a light on current EU policies:

[S]tarting from a traditional attitude of reasonably using resources, I would say that energy efficiency is a horizontal policy of leading priority at the municipality. All the people involved in the governance process and providing expert support at the technical departments are fully motivated to work for energy efficiency.

Focus Group Code (FOGR4BGA, Bulgaria, Formal Social Unit)

So this is not necessarily something that has invented itself. But of course, a kind of environmental awareness already existed in the country, even before the European Union had developed so many guidelines over a period of time. There's always been an energy commissioner, even before Austria was in the EU, who has dealt with this issue, because the environmental issues – and, in the broadest sense, issues of energy and climate protection – have been regarded by the public administration as tasks and they have worked on these issues, even if this has perhaps not been expressed directly but rather indirectly implied.

Focus Group Code (FOGR14ATA, Austria, Formal Social Units)

This approach, in some cases, enhances a higher degree of adherence to policies with national origin as compared to the level of acceptance they would receive as policies implied by the EU:

That is to say, our motivation is based on the effort for implementing our overall municipal policy. There is a strong political support for that, which responds to the will of citizens and of local business organizations; the explicit municipal policy is documented in the adopted Sustainable Energy Development Plan.

Focus Group Code (FOGR4BGA, Bulgaria, Formal Social Unit)

With the existence of EU, national and local policies, local governments (municipalities) need to establish a balance that contributes to EU policies and at the same time serves national and local interests. This balance is maintained in different ways in different countries, depending on the strength of national or local policymaking:

In the case of Finland, municipal self-government is exceptionally high with a lot of power meaning that municipalities largely decide on their own practical solutions to mitigate emissions. ... Such things like emissions trading, taxation and legislation are decided on a national or EU level, meaning that municipalities always operate in that environment, which is given.

Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

The Kyoto and Paris agreements on climate change also have a significant role in the development of policies:

In addition to the global motivation of wanting to, slow down global warming, it's also that they have committed to, there is, the Kyoto, and then Paris Agreement. They have to cut emissions, from that out from trading, and have committed to what is it 30 per cent reduction.

Focus Group Code (FOGR12FIA, Finland, Individuals engaging in joint contracts)

Some of the respondents point to the complementary natures of UN climate agreement, Paris agreement and the EU policies:

[W]e need everything from the UN climate agreement [to the EU policies]. But you could say that regarding energy companies, the will of EU to implement strong environmental policies is so strong and the regulation of the EU affects the companies directly, that it is more essential; the disintegration of international agreement around it would not be a great threat. But perhaps, along with this Paris agreement the global discussion is awaken again; the question is how genuinely we are doing this and, in a way, it has brought a new boost.

Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

However, there are still outstanding issues regarding the perceptions regarding these international agreements, even regarding awareness about them:

Kyoto, I think people had heard of Kyoto, but seeing it in some press headline, they did not even know what it was. However, people now know more: what the Paris Agreement is about, they know where we are going, they are aware of the problems of climate change, that is, the general awareness about climate change has increased a lot, and, therefore, all the actions, all work related to energy, climate change, renewables, and so on.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

For Norway, the EEA Agreement (The Agreement on the European Economic Area, i.e. European free trade agreement) is one critical issue. It represents advantages and also disadvantages for the Norwegian energy market:

[I]t is a goal that you do things on the energy side in the European Union, because it has positive effects on emissions in the EU. So there it is more or less two sides of the same coin, in relation to the political developments. It affects us in that we are a small country in the world, and when the big countries in the world, and many countries in the world, around us, make changes to its policies and their markets, as it also affects the Norwegian actors. That is one side of it. Another aspect of it, is what's going on through the EEA Agreement, that is, if we are committed to do something through the EEA cooperation. And then it's a bit like I said, that we would like to develop policies that facilitate the most efficient and climate-friendly energy system in Norway. So given what happens in the world around us, we have to adapt to it, on one side. And the second is that we also need to take into the Norwegian regulations the regulations that are being developed in the EU, and that are EEA-relevant. And that also includes other regulations that we would like to cooperate with the EU for that matter. And some of these regulations affect us, are positive for Norway, while other parts of the regulations might not necessarily as easy, because it has to do with other interests that might be different than what an energy nation such as Norway is.

Interview Code (IDIN38NOD, M, Norway, Formal Social Unit)

For the energy sector in Norway, then the special challenge is, the EEA Agreement. It is good because it gives us access to EU energy markets, and it is good because it gives us the right framework conditions, but because we cannot affect it, then you get some obviously peculiar challenges. That we get so delayed, so we almost didn't get a el-certificate market with Sweden the previous round, for then we parallel-negotiated about the renewable directive and the el-certificates, and it sort of went just like that. They wondered if they had to call in to the extraordinary Minister Council during Christmas to get it through.

Interview Code (IDIN40NOF, M, Norway, Formal Social Unit)

For the collective decision making units and individuals, the counterparts of policy documents range from strategic plans, certificates of international standards, municipal and governmental policy documents.

Regional Energy Strategy is defined by the Regional Energy Agency in collaboration with the social agents, (the) energy agents. This strategy is being drafted ... The way of writing the strategy is being changed a bit now. Before it was something that was cooked almost entirely by the Regional Energy Agency and then presented to the agents, they made allegations or made contributions and this then became the final document. Now we are trying to change that little by little so that the contributions are "prioristic", or however you call that. Before beginning to write the document, a certain consensus is sought so that, when the document is sent to the Parliament, there are all guarantees that everyone has had the opportunity to comment on that document and the content.

Interview Code (IDIN30ESD, M, Spain, Formal Social Unit)

We have a National Energy Efficiency Action Plan that we are implementing and every year we report measures to the EC. We have now made an update on changes to the law and we were looking at alternative measures. It is now under way to be declared by the Council of Ministers. There is a program to improve the energy performance of government buildings that serve the central administration. Under the Directive, each year, the state must improve energy performance measures of at least 3% of the total building area of the building. In the parliament, the committee chairman said, "3% is not enough, let's make it 5". We made it 5%. This plan was set to be led by the Minister of Regional Development and together with our Minister to develop and bring it together with this Energy Efficiency Action Plan.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

You have the Planning and Building Act, which then also applies to existing buildings, when you do a measure. And there's a separate energy provision in the regulation, that has an exception-provision that is the equivalent of the one that is in the European Union, that is, that you can, if you have a conservation-worthy building, and you cannot carry out without, then you can still be allowed to use or build on it or something, and stuff like that.

Interview Code (IDIN39NOE, F, Norway, Formal Social Unit)

For industries, the international standards such as the ISO standards play a key role:

Achievements are huge. The big industry in Bulgaria has invested heavily in energy efficiency and most of the companies I know are world-class. Take major extraction industries for example. There is a world-class plant in terms of energy efficiency and others also ... I'm talking about those we work with – also sodium carbonate production. At a pulppaper plant we implemented an ISO 50001 energy management system. This is a super old plant. It is not new. There, in order to change the energy efficiency, serious investments must be made and people are doing it. They do it because energy is a serious part of the cost. Their business requires a lot of energy. The big industrial energy consumers in Bulgaria are absolutely at an European level.

Interview Code (IDIN22BGF, M, Bulgaria, Collective Decision Making Unit)

We would have to go to more specific projects to see the negative part, then, maybe it requires an investment that often the plants, or the groups do not have or do not want to make, then often the only way to get it done is through legislation, through norms. In that case, the objective is good, but not always everyone can achieve it. As cons, as I said before, those conflicts that arise internally so that the projects move forward. But pros, the pros are almost all, you save money, you reduce CO2, and then also that there are more and more customers that request this, certain norms, certain regulations, right, for example, the ISO 50001, is going to be implemented in a few years; almost every customer will request it. So, in the end, this is something we're going to have to ... we have to have.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

They are corporate responsible, but if they sell less than their major competitor they die. If the corporate responsibility leads you to committing suicide then I don't think it is a very meaningful thing. I do not give imaginary examples. I only speak about those I work with. At this retail chain we introduced ISO 50001, too. The other does not have ISO 50001. However, the energy efficiency level is super high. Just because the company works so. They are super efficient for everything. This is their business model. There is no man in Bulgaria who can go to that competitors store and give smarter advice on energy efficiency. Just because it's a huge system and the latest and best technologies are already implemented. It is applied systematically and according to the requirements of the headquarters. Can you imagine someone here to go and tell them to do this and that will pay off in 20 years. There is no point.

Interview Code (IDIN22BGF, M, Bulgaria, Collective Decision Making Unit)

In companies as well as in communities. In the communities, the responsibilities are even more important, because otherwise often nothing happens, and energy is a transitory item. The annual invoice is paid, but nothing else happens and no one asks questions. That has now been said rather broadly, so there are exceptions. And in companies, expenditures are always examined at very carefully; this means that they are sensitised (unclear comment) to completely different things (20:25) but, nonetheless, you also needs a person who grabs on to it, wants it, takes it seriously and does something. You can see that as well. For example, there are companies with EMAS, ISO 9001 or ISO 15001 certification. They take this seriously and do something and use it for marketing and internal quality control. That works. But above all, we do not get SMEs, small businesses such as bakeries and hairdressers. This is very, very difficult, because half of them are households and the other half are businesses and it is difficult to get them on board. This is a huge issue, and we have subsidy programmes for consultation companies, which are relatively well-received. What we and other provinces like Vorarlberg are trying to do is focus on fire brigades or bakeries. So you have a clear plan to approach only this target group and offer specific energy consulting, and then something goes further. Of course, you need support, i.e., up to 60% funding, to ensure that the consultation is financially viable and affordable. But then you can reach people. But this can only be achieved through a unit such as us, which is a superordinate administration.

Interview Code (IDIN62ATC, M, Austria, Formal Social Unit)

In Germany, for example, I'm not sure if I say this right, for example the ISO 50001 does have an impact on taxes that we do not see, for example, in Spain, right? So that makes the German plants much more willing or ... more motivated, so to speak, to meet the ISO 50001 [requirements]. Yes, talking about, well, talking about the renewables, yes, in some plants we have cogeneration too, but I'm not completely sure here either, it is not 100% renewable, it actually works with gas, but it uses heat, heat and electricity

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

This example I tell you about, the ISO 50001, for example, we also see this a lot in Portugal, where they push it a lot, they are very tight with regard to energy efficiency issues. Then, on the other hand, in this country they also have a lot of subsidies, so we see that the Portuguese plants are doing a lot of things, because, on the one hand they [the regulators] push heavily, but on the other side also, they subsidize 50% of investment, which makes this a much more attractive issue.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

Political Will and Impact

Although EU policies form a common ground for policies of individual countries, the politicians also play a key role in determining how and to what extent these policies will be implemented in their countries. Many of the respondents find the level of commitment of politicians insufficient:

[A]s the example of e-mobility shows, the current intention of politicians seems to be to tell members of the population that it's enough to drive an electric car rather than a gasoline- or diesel-fueled vehicle. But this isn't a behavioural change; this is just the use of another kind of technology.

Interview Code (IDIN63ATD, M, Austria, Formal Social Unit)

I will not say anything negative about [member of European Parliament], but she has a bid role there, and every time a proposition for a directive comes - currently they are making a new construction- and energy efficiency directive - then [member of European Parliament] first statement is always that it isn't enough for anything. I see no ambition here. This is completely irresponsible, and I've sure they have drawn the picture for her, that what these … mean, but she doesn't a) care or b) understand. It's probably a combination of these, but it leads to that this picture is given outwards, also about our politics. It is an extremely negative picture, to speak without knowing what this sector does.

Interview Code (IDIN51FIB, M, Finland, Collective Decision Making)

Inevitably, politicians need to consider the interests of their voters, as they may not be in line with energy transition objectives. Energy professionals from different countries share similar perspectives, as depicted in the quotes below from Bulgaria and Spain, respectively:

[T]here are people who have a great interest in maintaining the status quo. People ... a few people. I do not think they are so many, but they have a strong influence and because both go together in one direction are quite strong. You cannot change political decisions if people who have to make these decisions have no motivation. This motivation, which is our intellectual notion of a better world, etc., the people who deal with it they do not understand it at all. These are - 95-96% of them.

Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making Unit)

[P]oliticians have a few cards up their sleeves, which they can use when they need them, such as when the subject of climate change comes up. If the farmers' harvest crops freeze, the people are flooded out, or a catastrophic mud slide occurs, then climate change is hugely important. But, to draw a comparison, the climate and energy strategy has been blocked for half a year. And things like that. That means that the politicians have been waiting for it to become a global political issue, as it is now, and now they seize their chance.

Interview Code (IDIN63ATD, M, Austria, Formal Social Unit)

The legislative changes that are taking place in the country without any criteria. In Spain we remain in the hands of energy lobbies and nothing can be done about this.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

Regarding the discussion about politics and politicians, it is not only a matter of serving the interests of voters. There are objectives, all of which may serve society, that compete for resources and await actions triggered by the policy makers. Therefore, it is usually an allocation of resources which will not make anyone 100% satisfied with the outcome:

Politicians […] are joining forces with the farmers and do not want to mess with them, and they have completely different interests. So they often have to run between the goalposts without getting involved anywhere and are placed under pressure from those with very different interests [...] On the one hand, we discuss climate protection, which is a very urgent problem and a major global challenge, and, on the other hand, there is the regional politician of our province, whose primary task is to ensure that something happens in our province, such as the allocation of the budget. The question here is, for example, how much money you invest in climate protection and how much money you need to maintain a certain standard in hospitals [...] Needs and environmental protection are now completely different issues that cannot be dealt with together because the law does not provide for this.

Focus Group Code (FOGR14ATA, Austria, Formal Social Unit)

In some instances, the effects of the legislations are claimed to have very significant impacts:

In Spain we continue to see that the electricity companies are very strong and influence national legislation. We have gone from being world leaders in renewable energy and from being a step away from heading on to integration and so on, to see people moving out of the country, because they [the government] paralyzed the industry.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

Spanish legislation does not help a lot, but, right now, with the latest legislative changes, these types of facilities are already legal and profitable. Even so, it is necessary to size them properly, and they may be interesting for companies that have to increase load, or companies with many power peaks (in Spain you pay nearly the same for the power contracted than you pay for the power consumed), facilities like farms that milk twice a day so that they have two strong power peaks and nearly no consumption during the rest of the day.

Interview Code (IDIN29ESC, F, Spain, Formal Social Unit)

PROCESS: POWER AND EXECUTION

The process of decision making in transition to low carbon economies involves several key themes that pertain to actors and their organizational structures, the context and circumstances in which the decisions are taken, tools for action, and the power structure and involvement dynamics that shape the decision-making processes, as demonstrated in Figure 16. Below we provide a deeper outlook into these issues:

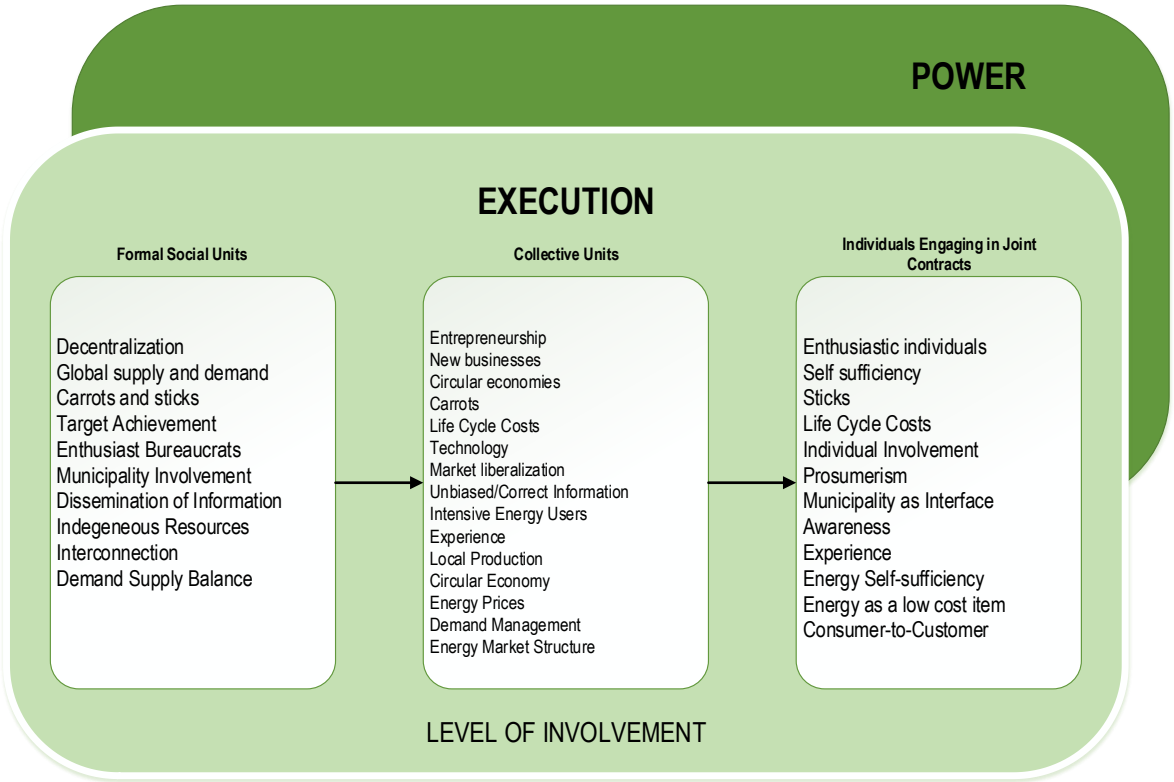

Figure 16 Power Dynamics and Impacts on Execution

Actors of change: Decision-making bodies

Actors of change refer to key decision-making bodies that initiate change and execute decision-making processes towards low carbon targets. The general framework regarding the energy transition is established through EU policies, and accordingly, government legislation. Since central governments are active mainly in the legislative and policy making areas, local governments play a significant role in the execution of the energy transition process. During the

interviews, respondents pointed to a spectrum of various organizational structures pertaining to the local governments, mostly municipalities.

> *Former Provincial Energy Association, which is now the Energy Agency, was founded for a very simple reason: namely, the promotion of the use of forms of renewable energy. In the beginning, the goal was to provide information and promote biomass, district heating and solar energy. The focus was only placed on energy and, specifically, on renewable energy [...] the focus at that time was only placed on forms of renewable energy, and mostly directed toward their use in district heating networks, which included buildings and so on. Of course, one can easily say that this direction has shifted over the years to address the energy transition and climate problems.*
>
> Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

> *[O]ne must simply tell politicians that you want certain things to be given a structure in the administration, because otherwise you will never get the support that, as a politician, you would like to have ... it can be said that a climate protection department exists anyway, which is given a small task with government goals and then has to more intensively look into the issue. During this government programme, this was also relatively strongly represented, which is why the Smart City strategy was developed [...] This has to be agreed upon politically and then represented structurally.*
>
> Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

> *There was the attitude and the will of the management and of the Mayor of the municipality to work in this area. This was supported by the City Council, so this policy, in fact the plan itself was approved by the City Council and by the Mayor so that this activity and the implementation of the plan have started, and there should even be some result already. There is also a Council for Sustainable Energy Development at the municipality and a Process Management Committee so there is a structure that is set up to support these policies.*
>
> Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

These structures also vary between countries, regarding their aims organizational constructs. Although these usually departments- are not very newly established, there are still issues with making them a part of the process. For instance, the managers of one such department in Austria state:

> *The department was formed in 2011 under the Red-Green [Parties] to introduce a positive discussion about the energy transition impulse into the [regional] environment [...] I have dealt with the subject for a long time and also with the department. And we actually work in many areas, from strategy to the development of funding instruments and, in some cases, their implementation. This is a very wide range [...] We also try to support the other departments in the city with energy expertise, which was initially very hesitantly received, but now, after six years of intensive work, we are part of processes that also allow essential decisions to be made and directions for the city to be set.*
>
> *[I]t can be said that a climate protection department exists anyway, which is given a small task with government goals and then has to more intensively look into the issue. During this government programme, this was also relatively strongly represented, which is why the Smart City strategy was developed.*
>
> Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

In addition to the departments in municipalities that are more geared towards operational aspects, in many countries energy agencies play a key role in terms of coordination and collaboration:

> *The Agency is currently an executive body. It also carries out the policies in the field of energy efficiency and renewable energy resources. As such, we also have the function of collaborating with all kinds of subjects that are involved or are interested in this process - government bodies, and municipal authorities, and nongovernmental organizations, and branch organizations and the citizens themselves.*

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

Other than the organizations established to act explicitly in the energy transition (such as national energy agencies), energy transition is not the primary area of focus or operation for individuals, industries, municipalities, or even for states. Therefore, the transition calls for consulting companies to act as catalysts mainly by providing information, suggestions, guiding companies and organizations towards energy transition:

> *EU targets have an impact, and national targets that mean that [our company]'s mission is to implement the government program on those parts that concern energy and material efficiency, and adoption of renewable energy. So then electric vehicle fits both energy efficiency, and the section on renewable energy, and these are quite ambitious targets for promotion of electric vehicles as well.*
>
> Interview Code (IDIN55FIF, M, Finland, Collective Decision Making)

There are also platforms or foundations that participate in the process with the aim of promoting and accelerating the implementation of policies through collaboration:

> *We are a non-profit organization, which is supported through donations. Cities have donated one third, companies one third, and then YY [Finland's funding organization] and state one third. In addition, universities and research institutions are involved.*
>
> Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

> *We have recently formed a cooperation with Large Provincial Energy Provider, the regional energy supplier, and we want to work more closely together with a strong partner in the electricity industry on Smart Building Technologies and Smart Energy Technologies.*
>
> Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

> *The idea of this whole project was that in order to properly accelerate cleantech and clean solutions we need this kind of common action, which should include cities, private companies, state and research and education organizations.*
>
> Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

Clearly, top-level commitment to such organizations increases the chances of success in their goals:

> *CEOs from both of the regions' energy companies are board members of our foundation. With this novel cooperation we are aiming for the willingness and political power to bring these issues forward in a bit more powerful manner.*
>
> Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

> *In Austria, these processes have been driven very strongly in all provinces by the provincial energy representatives. That's what I can say, even without having been involved in these processes. I could observe this from the periphery. These were personalized processes, which were always associated with certain names. These people then quite quickly also became advisers for politicians in higher or the uppermost positions, such as the governor, who has relied on this expertise.*
>
> Interview Code (IDIN63ATD, M, Austria, Formal Social Unit)

The processes through which EU policies and national policies call for actions are undertaken on several levels. Two important components in this respect are the involvement on the local level as well as on the individual level. With their roles in representing local governments and their interfaces with the individuals, cities play a major role for energy transition:

Cities, municipalities, companies and citizens actually playing a very major role [...] international climate policies and these negotiations [...] I somehow consider them as those drivers. Cities are in very important role, there are a lot of factors regarding climate emissions, local emissions, waste, emissions to water [...] you have to simultaneously create such an environment for the residents that is.

Interview Code (IDIN53FID, F, Finland, Formal Social Unit)

Individuals or industrial companies are involved in the energy transition process through their decisions within their personal or organizational spheres. Local governments, however have a different type of involvement. The interviews and focus group studies reveal that local governments (municipalities) are involved in the energy transition process in two main directions: The first is through the processes owned and run by the municipality itself, and the second is more indirectly, through policies or stimulating citizens for involvement. This structure, then, implies two main areas of focus for municipalities regarding energy transition. The foremost is buildings, the second is urban public transport and mobility:

Three are the sectors with the highest energy intensity, respectively, with potential for efficiency. This is energy consumption in buildings, energy consumption in industry, energy consumption in transport. They are highly relevant. Especially for energy consumption in buildings, you know there is an EU directive on the energy performance of buildings.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

The change in the city is particularly impressive with regard to some of the issues concerned - only a few months ago we made a big step forward in urban transport; electric mobility and smart technologies are still to be addressed.

Focus Group Code (FOGR4BGA, Bulgaria, Formal Social Unit)

In cities, the increasing adverse effects of transportation due to emissions and congestion have driven municipalities to make transportation as a priority in terms of energy transition:

It is [...] isn't it traditionally so that climate impacts result from living, transport and food, and transport is something the city can influence quite a lot actually. Different planning solutions, competitive tendering and procurement, and also through making it possible for new technologies and solutions to be deployed, so I think transport is therefore high on the city's agenda.

Interview Code (IDIN57FIH, M, Finland, Formal Social Unit)

Urban environment is contaminated much more than we have thought so far due to the inefficient process of burning this carbon resource in engines with internal burning. Especially with the increase in the number of vehicles, the reduction of their speed because of congestions. The fact that cities are not planned for so many vehicles. We need to do something in the field of transport for sure. Like buildings.

Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making)

In the context of urban transportation, potential solutions to emissions and congestion are the use of public transportation, car sharing, and, of course, the use of electric vehicles. There are even implementations that build platforms for car sharing with electric vehicles. Therefore, municipalities have started showing keen interest in electric vehicles:

Our project was like collecting, the city was collecting together the different initiatives relating to electromobility. Concrete actions include planning of charging infrastructure, ... We made a general plan for the charging network. Then there were also municipal transports, the city buys transport with big money, different transports for the elderly, disabled… transports and others, school transports, so they brought in criteria in tendering and procurement processes about hybrid and electric vehicles. Then there's more, the vehicle purchases of the

city itself, they had the objective to promote electric vehicles, the city had at least three full electric vehicles in joint use for personnel to begin with, so it was already beginning earlier.

Interview Code (IDIN57FIH, M, Finland, Formal Social Unit)

There are also two additional motivators for considering buildings in this scope. First, the role of public buildings and secondly, buildings are convenient areas for execution, that is, for policy to meet practice:

The building heat supply is, of course, also part of this. And these are the big levers. And the second thing that is relevant in terms of energy is the transport sector, and we have seen this from an interdivisional perspective from the outset. Mobility is often considered from a perspective outside of energy. Fortunately, it is included in the climate protection programme. The advantage here was that climate protection is anchored in the [responsible city department], which has integrated mobility into its strategies. But mobility and buildings are the central themes in cities. These areas also produce the largest CO2 emissions, but these are also the emissions that can be influenced.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

We have focused very strongly on the area of heating. This has different reasons. One of these reasons was that there was also the possible cooperation between the city and the province on the basis of political guidelines […] In other words, we considered the areas in which we could effectively become active.

Interview Code (IDIN61ATB, M, Austria, Formal Social Unit)

Rehabilitation process and the implementation of energy efficiency measures began with the renovation of schools, kindergartens, as initially, around 5-6 years ago, the efforts were focused on joinery, insulation, some replacement inside some installations at this level. Almost no active experiments or pilot projects for the application of renewable energies resources have been made.

Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

The number of public buildings form a small share of the building inventory of the city. Hence, the involvement of municipalities exclusively through public buildings has a very limited impact; therefore, municipalities should seek ways to motivate owners of private buildings through incentives or promoting access to funding.

The department's agendas are mainly in the area of funding, and that we work together with the city strategically with respect to the city's strategies. And, of course, when talking about cities and decarbonisation, the theme of buildings is central, because the provinces – and (city of more than 100.000 inhabitants) is also a province – can do quite a bit in the building sector, and we are also involved with funding.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

Local governments seek to increase the attractiveness, and liveability of their cities. These goals, are frequently in line with energy transition objectives, since they both provide better, cleaner environment, economic welfare, and opportunities for investment:

Maybe the most visible and main driver was the fact that XX is X [certain type of the city], and this area has to be the showcase to all the Finnish know-how. So there is sort of quite national viewpoint here: In addition to making our XX region into attractive, vital and investments drawing region, we also want to make it into a visible platform for our Finnish companies.

Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

The context of execution

The context of execution refers to macro environmental conditions in which the low carbon energy transition decisions are taken. These include the market structure, decentralization trends and self-sufficiency, new economic models such as circular economy, demand and supply balance, energy profiles and of countries, and relationships with the energy markets.

One of the common themes in the interviews and focus groups is the trend towards a more decentralized energy system. This phenomenon is a main result of the deregulation of the energy market. A director in a ministry in Bulgaria explains:

> *It (highly centralized energy sector) was a working model until 2003, i.e., it was regulated by legislation. In relation to our membership in the EU, we had pre-accession commitments to adapt our legislation to the European one. This model had to be replaced by a model that regulated the liberalization of the electricity market. Then a new law was passed in 2003, which introduced commitments to divide the functions of supply, transmission and distribution.*
>
> Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

However, big energy producers dominate the current structure of the electricity market in many countries. Hence, changes in the energy markets are expected:

> *There is an increasing penetration of the so-called distributed energy sources. We've been used to build some big power plants before. First coal, then others to transport to the place of consumption. We are increasingly seeing that we can have more distributed generators of a different kind that will no longer make sense of the need for a centralized facility and long trunks to carry the energy with all the losses on the track [...] It just reduces the role of big energy producers.*
>
> Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making)

This trend, in turn brings in the concepts of local production and energy self-sufficiency:

> *To be separate from the network, to be independent. This is one motivation factor. The other is if the consumer is located in a place where it is more expensive to bring centralized source. If it is just you it will be very hard to get the distribution company to put wires for free. There is an increasing number of sites – mini-factories that provide their own energy. There are farms that have already provided energy this way too.*
>
> Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making)

Consequently, the shift towards local production alters the framework in which municipalities act. Local governments previously only indirectly involved in the energy area now take initiatives for a more active role:

> *Now cities perform active policies and they can perform in a more agile way than states [...] Municipalities have done it somewhat longer; smaller municipalities think that especially the usage of bioenergy is better for local economy than the usage of oil, for instance. That is why this has been done for a long time.*
>
> Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

Another outcome in larger cities is the emergence of new business opportunities through partnerships with municipalities:

> *The situation may be changing in bigger cities, the city-owned energy system, district heating network, electrical networks – people want to see them as a platform for entrepreneurship for something new in energy sector.*
>
> Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

Although the decentralization of energy production and local self-sufficiency are generally praised, there are also views warning about the possible drawbacks of this approach to energy production. The advocates of such perspectives point to the danger of local communities acting as the sole owners of their local resources, and not sharing these with other regions:

> *My experience in the energy sector has led me to believe that this shift from a fossil energy supply from abroad to more local, decentralized units has given birth to the word "energy self-sufficiency", which I find very alarming. This is because, here, it makes people think of allotment gardens, and they become very possessive when it comes to energy produced they've produced themselves. The Danube power plant belongs to the people of Lower Austria, who are already virtually energy-autonomous because they have a large power plant. The Upper Styrians say that they are energy-autonomous because they have so much biomass. But people don't think in terms of complete systems. And that can be dangerous, of course. It becomes a problem when a high fence like a border fence is erected around every energy supply plant, and everyone says that it is extremely CO2 neutral and environmentally-friendly, but does not consider that other regions, of course, do not have this potential. Distribution will become a highly sensitive issue.*
>
> Focus Group Code (FOGR14ATA, Austria, Formal Social Units)

In addition to the use of renewable energy sources, energy transition relies on energy savings, energy efficiency and emission reduction as its pillars. These are very closely linked to the concept of circular economy, for which the EU also has an action plan. Several respondents presented viewpoints that integrate the energy transition with circular economy:

> *The transfer from linear to circular economy, at the most elementary level of course. In the circular economy we have design everywhere. This means that we try to implement design in every part of the process. That is actually the interdisciplinary team.*
>
> Interview Code (IDIN19BGC, F, Bulgaria, Formal Social Unit)

> *The building stock is so valuable in that sense that the environmental pieces are becoming more and more relevant there. This has to do with a lot of efficiency things such as material efficiency, energy efficiency, resource efficiency, circular economy. Everyone is asking us why we are not doing this or what are we doing for that. In the end we are just one piece of a very long chain.*
>
> Interview Code (IDIN51FIB, M, Finland, Collective Decision Making)

> *We have considerably more strongly positioned as an actor in circular economy. There, the logic builds on that we aim to utilize everything that is utilizable from waste. On the other hand, a part is left over, and we generate energy based on that. The same logic starts to be valid regarding bio, that is, we aim to produce the highest-valued bio-based products possible, and generate energy based on what is left over, so to speak, from the part we cannot find out any other use.*
>
> Interview Code (IDIN53FID, F, Finland, Formal Social Unit)

> *Open innovation, public-private platform, targeting to cleantech. In practice, it means clean energy, and circular economy, that further means things from different side streams, and better utilization of side streams of process industry, to bioeconomy. There, the focus is, above all, maybe forest based fibers or to more widely utilize wood-based fibers to replace cotton, for example. In these fields, we pull together R&D consortia to find solutions to these kinds of global, systemic problems. Someone could nicely call them ecosystems.*
>
> Interview Code (IDIN54FIE, M, Finland, Collective Decision Making)

> *Circular economy is a term that has begun to walk again now. And for us then it is the same as that we use a waste product as an input factor in something else. And we have a couple such industry clusters around the country, various industrial companies that have built up in the same place, there are several reasons for it, but it gives the advantage that: "Ok, industrial plant A has some waste, with this or that chemical composition. And*

that chemical composition can be used wholly or in part in industrial business B". So, then it's like: "Ok, let's do it." And mostly, this is commercially sustainable. Or it has become that now, since you have technology to treat waste that allows you to manage a good chemical separation process that it is not harmful, and without emissions, and without being very expensive. So that is our focus.

Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

Firstly, we have this waste and recycling of waste. That is, we have considerably more strongly positioned as an actor in circular economy. There, the logic builds on that we aim to utilize everything that is utilizable from waste. On the other hand, a part is left over, and we generate energy based on that. The same logic starts to be valid regarding bio, that is, we aim to produce the highest-valued bio-based products possible, and generate energy based on what is left over, so to speak, from the part we cannot find out any other use. As a perhaps related thing here, electrification is a means to tackle climate change and how the whole system of electricity, heat, and transport, are connected to each other. Additionally, in transport, we have services related to electric cars, charging services, and also, more and more of consumer related services. These are maybe the kind of examples.

Interview Code (IDIN53FID, F, Finland, Formal Social Unit)

Following the era of globalization, markets are no longer local. There is global supply and global demand in almost all markets. Inevitably, the demand-supply dynamics are now much more difficult to estimate and control. The same conclusion holds for the electricity market. Although there is a tendency towards local production and decentralization, national markets can be connected with each other simply through interconnection cables. Despite scepticism concerning the effects of interconnection on supply security and prices, one respondent from Norway comments that Norway's interconnection should be viewed as an advantage and a balancing mechanism:

A cable is a trade connection, you send out and you take in. But in Norway, it is the supply of natural resources that determines how much we produce of power - how much it rains, and how much it blows, how much it snows and how much the snow melting, and so on, but it is the supply of water that is important. Often, we get more power in the form of precipitation and wind and things like that, than we consume, so we usually have - not always, but usually - a power surplus in Norway. Producing more than we use. And the profits must be exported. And the bigger the surplus, the more it is being exported, and the more that is exported, the lower the price, we need to set the power at home. If not, it will be outdone by import. That's how market forces work. And we will always be in balance, no matter how many cables we have. We will always make sure that there is enough power to cover our consumption. Is it too little, so we turn on the cables, use them to import instead. And then comes more cables, and it's not going to change anything at all.

Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

It is still like that that we're going to export the surplus. But it's going to change the rates, it will. It's not going to change the balance of power. It's going to change the prices. What they do, these cables, they provide only for power producers to "time" exports their better, so that they get better paid for the power that they have to export anyway. They simply pick the cable that provides the highest price. And the outcome of it is that the average price of power in Norway will be higher.

Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

The overall idea of the energy transition, and the concepts built around energy transition are common for EU countries. However, when it comes to execution of processes in order to achieve the targets set forth in relation to energy transition, there are differences between countries. One significant driver of such differences is the various energy profiles of countries in terms of indigenous resources, capacity of reserves, demand pattern etc.

According to our findings, some countries have abundance of energy sources:

And we are lucky in Norway that we have the natural resources we have, and hydropower is especially important, it's cheap and good and clean. And now we increasingly get wind power, too, which also is good but not as adjustable as hydro power, but it's renewable. But the natural assumption, it was then and is still important, is that energy use as an important part of our competitive edge. We have cheap energy in the first place, and if we use less of it we become even more competitive. Then there will be even more difficult for other countries to catch up with us.

Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

We have a lot of resources in Austria. We're blessed with resources. Three million cubic meters of wood grow in our forests every year and we only need two of these. I know that the remaining million are not so easy to extract from the forest, but there's still potential there. We have a potential in terms of solar energy; we have water power, and we still have a lot of resources related to wind power. So, all the sources of renewable energy are actually very well represented here.

Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

Norway is awesome on energy. That is what we come back to time and time again. That the Norwegian water power is hundred percent of the electricity.

Interview Code (IDIN35NOA, M, Norway, Collective Decision Making)

Some countries, such as Finland, have the advantage of developing rather more unconventional sources:

Biofuels are a great thing for Finland. For the Finnish national economy, and whether it's not the center party in power, it is still a good thing as Finland has a lot of forest industry and related agriculture and other production suitable for biofuels production. Especially now that company [name mentioned] announced they will no longer use palm oil that much or will at least reduce it as much as possible and instead use domestic [resources], and in Finland company [another name mentioned] has built this, biofactory… It's fine when the time period is long or short enough, how you want to see it, but biofuels are nice, zero emissions if you count it so that it would decay there anyway, mainly carbon dioxide. But if you burn it alongside gasoline it does not increase emissions. Or actually it decreases.

Interview Code (IDIN56FIG, M, Finland, Individuals Engaging in Joint Contracts)

When it comes to electricity, we are halfway happy as Austrians because we already have a share of renewable electricity in the system when we compare ourselves [with other countries] across the EU. In terms of gas, making gas more environmentally friendly is a major issue, which is why we are pushing ahead with research on biogas and hydrogen.

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

while some 'less fortunate' countries seek for alternative sources:

Our business is in energy, and, within the energy field, where can we grow? With regard to growth, of course, in nuclear, there was no nuclear growth; thermal [generation] were just managing, but, well, somehow they were developing and [natural] gas was coming in, that was then undeveloped in Spain. We were far behind other European countries, in Spain gas was incipient and in Europe developing. And renewables, which was a very incipient field then, promised to be something that could have a major development, and we went for them.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

To this end, the debate on the use of nuclear power is a continuing one:

We have nuclear plants in Spain; we have nuclear plants in Europe. There are countries that are saying that they are going to close the nuclear plants, it seems that they are going to close them. Other countries, on the other hand, are allowing, or changing somewhat the criterion with respect to nuclear and they are allowing, not only not to close but even to construct more. This is a subject where there has never been a consensus in Europe. While renewable development, I think it is quite consensual, to varying degrees, or at different speeds,

but it is quite consensual and all countries are introducing renewable, but not nuclear, that is another radically different issue. Germany is saying that it closes everything. England is building new plants. France says they are going to lower [nuclear's contribution], this they are also building [new plants]. In Sweden they said they were going to close them, but, watch out, if we close them, we have problems, so we are going to let the ones we have survive, and even let them be replaced, not to increase the nuclear park but also not to decrease [production]. In Belgium, there have also been problems.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

The demand or consumption patterns, in turn have close correlation with the availability of alternative sources of energy:

We know what our energy consumption structure is. We have a very large share of electricity. This is simply not typical for the other EU countries. We consume a great deal in the household. We have a large share of electricity consumption for heating. Why is that? It is based on historical data. First, because there were no alternative sources. We are talking about household gasification, especially the central heating plants. These are not developed except for the big cities. Even, except for Sofia. Even in bigger towns there are central heating plants, but they are partially developed. Sofia also with its growth rates, the central heating plant does not cover much of the city's territory. Secondly, the prices of electricity that are regulated. Through regulation of prices a social policy is conducted - prices to be bearable. This stimulates the consumption of energy for heating. You know now, air conditioners are massively used for heating.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

The integrated effect of these factors is reflected, for instance, in electricity prices:

In some countries where electricity is very expensive that they will make more decisions that was to like lower down the electricity bills and everything, but in Norway it is comparatively cheaper, the electricity, so I can see that some people won't that much bother with [...] *is like closing the lights during the night or something like that.*

Interview Code (IDIN48NON, F, Norway, Individuals Engaging in Joint Contracts)

In Norway, the power is relatively cheap, and it depends on, maybe it's something that is a bit more expensive in those types of houses, but it's a cost that isn't [...] *If you do downward in Europe, they turn off all the lights, it's a very different focus, and it does something with that one might not have that focus on it, and rather not think of it.*

Interview Code (IDIN39NOE, F, Norway, Formal Social Unit)

The higher the cost of energy for Kwh, the more the measures to move towards more energy-efficient facilities will become more feasible. Why is electricity at the moment cheap ... It is kept artificially cheap and people do not think about it. Because you know, if it's an apartment even on electricity, a few hundred levs...?

Interview Code (IDIN21BGE, M, Bulgaria, Collective Decision Making)

The factor is energy, the cost of energy. This is one of the major factors - when energy costs become higher, more expensive, and then there will be measures to undertake

Interview Code (IDIN21BGE, M, Bulgaria, Collective Decision Making)

But you said it has worked really well. The solar panels it has worked really well in, Germany. Based on what measures and what targets? The CO2 emissions has not decreased, and the electricity price it's a lot higher than in Finland for example. So is that they have more expensive electricity, and not, less CO2 emissions so is that working? If you count the panels and if that's, the, measurement then yes. But it's a bit complicated.

Focus Group Code (FOGR12FIA, Finland, Individuals engaging in joint contracts)

Additionally, the composition of the energy market structure, along with the availability of stakeholders and a spectrum of alternatives is a determinant of the energy transition.

> *If we start from Finland's strengths, many are well known, like district heating, combined heat and power production, energy efficiency of industrial processes, use of biomass in both power and heat production as well as in production of biofuels for transport. Some examples are less known. As an example, I do not think that people know that Finland is the world leader in low-emission technologies in shipping. Well, smart grids have received reasonable good visibility and reputation. Mobility as a service, e.g. digitalization of transport, is an interesting new business, where Finland is clearly on the top globally. In addition, if we look at sustainable food, I was surprised to see that Finland has become very close to the global top, because we have so many vegan choices for animal products, and some of those are really top [products] globally, so there is no need to be shamed in global comparison. So, strengths are many. Well, then we also have many weaknesses and if I start from the easiest, investments in wind power become very late and with moderate measures. We have caught up this recently, but now there is again the risk that the development will upset, so the development is cyclic. However, we have anyway made a good progress, and thus raised from the group of the lowest records to the group including those, who are doing reasonably well. In solar energy, both in electricity and heat production, we are still among the poorest, e.g. we are well behind of both Sweden and especially Denmark. In addition, the development with electric cars has been very modest. It could be unfair to compare with Norway, but even though we compare ourselves with Sweden or some other similar countries, we still fare badly.*
>
> Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

Norway and Finland, for instance have the advantage of such structurally developed markets:

> *Perhaps the Finnish strength is the perspective of [full] energy system, we have district heating networks and systems in almost every town, and usually the same company runs the electricity business there too, and we have combined heat and power production, and with industrial towns we have energy related cooperation. The Finnish distinctiveness and strength is that what we do and develop is based on the operability of the system. In Europe, on an average, decisions are made for one solution, which is interested by the energy company or the decision maker. Replacing imported fossil fuel with domestic fuel has been emphasised for a long time [in Finland], and this development has been strong because many advantages are seen to become realized with this. Other new technologies are not so strongly aspired. It is possible to utilise by-products and local expertise with this system, so this is a larger scope of systemic thinking than just an energy system.*
>
> Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

> *In Norway, if we start here at home, if that is relevant, as we have in many ways a different starting point than most other countries in the world, and we have a different starting point than most of the European countries, European Union countries, where they are going from a power system essentially based on nuclear power and coal-fired power, to a power system with an energy supply based on renewable energy. In Norway we have had that for over 100 years, an energy supply based on hydroelectric power, renewable energy, so here, the political attention is linked to how to create value through the use of the renewable energy we already have.*
>
> Interview Code (IDIN38NOD, M, Norway, Formal Social Unit)

> *In addition, as we have deregulated the Norwegian electricity market, in the beginning of the 90 's. So we have had a market based system for over 25 years, which also has shaped how we produce and use energy. And such a matured market-based system, which now in the European Union, for example, is really about to be establish between the different EU countries, where there has been a much more fragmented and national system than we have had in the Nordic countries.*
>
> Interview Code (IDIN38NOD, M, Norway, Formal Social Unit)

In comparison, Denmark, for instance, has a more regulated steering of the market,

Well I think that Finland and Denmark are different from the energy perspective. Of course, they are often even structurally different but I mean differences in mentalities. That is, in Denmark, kind of a heavy regulation and steering is quite ok, that kind of things are, in a way, hoped. In Finland, energy companies are typically thinking that they know the best how things should be done and others should be kept outside. That kind of thought. Further, of course, say, in attitudes towards bioenergy, we definitely see differences. They also come out from either knowing or not knowing the substance, also affecting the image. But, there is kind of a very strong collective thought in Finland on bioenergy being practically the best thing there is. In contrast, some other countries have come into a way of thinking that bioenergy, as a matter of fact, is harmful, especially if related to forests. There are these-, it is not that a single person in a country comes up with a thought but it is formed on a basis of all the thinking and information flowing inside that country.

Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

while for Bulgaria, it is still expected that the market will be dominated by cost considerations:

The financial factor will always be the motivating factor for the implementation of energy efficiency measures. It is a different situation here in Bulgaria. Conditions are much more motivating compared to the Scandinavian countries. While it is important for Bulgarians to isolate their homes because it will be more comfortable in the winter and they will pay a little less, in the Scandinavian countries it is different. It is a function of those enterprises that do not use much energy because they have already isolated their buildings. They have the comfort and can afford their bills. The bill is OK for them. The motivation is different in their case. I do not know if this is the right word but "modern" idea for the "green future". This is the motive for them - to implement some measure of energy efficiency, no matter what, with the idea that they will contribute to the green development of the country, the world, etc. Anyway, Bulgaria is socially on such a level in the Community that the financial factor is a bit stronger than in Western Europe or the Scandinavian countries. It will never stop being a motive for actions in this direction.

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

When these examples are considered, an important finding is that the legislative framework has a clear impact on such differences. Austria and Spain are two particular countries that suffer from such legislative inadequacy:

And, if people always thought that what we do in Austria is really great, then every time I've had to say that my colleague from Denmark is much further along. So, it's not always the case that every member state of the EU does nothing. On the contrary. Unfortunately, Austria is pretty much in the last place. Other countries have the advantage of a centralised government. As an Austrian, you can see that as either an advantage or a disadvantage, but I see federalism as an absolute disadvantage in this case.

Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

I have some reservations about this regulation that exists today, but well, in principle, after many years of discussions and comings and goings, a methodology has been defined for the retribution of network assets and, well, it seems that it is stabilized now. In the area of competition, in the field of competition, we have the freedom, in principle, to install facilities, the companies decide if they construct wind farms, if they construct a gas power plant, as was done back in time, or a hydroelectric power plant, if there are possibilities, and so on. So that has changed a lot in Spain and I think we have to separate it [the two markets]…. in Spain, things differ a lot, in my opinion, with respect to other countries, since there is no planning, that is to say, before we had not only planning, but also programming: we have to do this, of this typology, on this date, and this way and such. Now there is absolutely nothing, not even a planning that allows seeing a little what the trends are or where the country is headed. So, we are at a stage at which ... that lack of planning makes investment decisions very difficult and so very few decisions are taken, almost none.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

Executional Tools: Carrots, sticks, or both?

The policy toolbox regarding energy transition is only as effective as it can be transformed to execution. With the complexity of the energy markets, social, cultural, economic factors, and a considerable number of barriers, this, clearly, is no easy task. Therefore, it is a common practice that the policy makers utilize carrots and sticks, generally in the form of incentives or subsidies and additional taxes. The tax implementations are typically applied based on the 'polluter pays' principle:

> *You have to be fair and consider the overall economic situation and, perhaps, also solve this problem by applying the "polluter pays" principle, so that those who have the possibility to optimize their position within the system have to pay more for the overall system.*
>
> Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

On the other side of policy makers' intervention for energy transition are incentives and tax reductions:

> *There should be incentives on the part of the municipality in all types of buildings that are using this approach and this philosophy. There is tax rate reduction in many countries. The garbage fee here is very high and not always fairly defined. There should be incentives for residents, for investors in business buildings, etc., which would to a certain extent motivate them to take these measures, as on a common state level, they are extremely useful.*
>
> Focus Group Code (FOGR6BGC, Bulgaria, Collective Decision Making)

> *With electric cars here in Norway, it has also gone very fast. Maybe it should not have surprised very much. If you look at electric cars, maybe there was reason to believe we should see it coming, simply because we have extremely generous support schemes for electric vehicles in Norway. And it has given people a lot of good reasons to either buy electric cars or hybrid cars.*
>
> Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

> *We have quite a wide variety of incentives in Norway. The two most important is that we have tax exemption when you buy electric car, that is the VAT on 25 percent, so it's a pretty big economic incentive. In addition, we have a one-time fee for cars, so on average on gasoline and diesel cars it's around 80 000-90 000 in that one-time fee, while electric cars are exempt. So it makes the that Norway is one of the few markets where you can go to a ///D2///-forehander, and you are going to buy a ///P2///, and the electric ///P2///en is about as expensive as the fuel powered one. So we have used the tax system to in a way to even out the price differences, and then we see that people are interested in buying an electric car. In addition, we have some benefits when you own the car. We have lower annual fee, and it that will go down to zero next year. We have toll exemption on crossings, which is a very strong economic incentive, and we can see that the places where it's very high electric car share, then there is likely a toll or ferries, i.e. Oslo, Bergen, it's some of those small islands around in Hordaland, where you typically see 20 percent electric car share, and it's because they have a bridge that costs a hundred or so NOK each way. So we have in a way a very broad instrument package.*
>
> Interview Code (IDIN42NOH, M, Norway, Collective Decision-Making Unit)

There is evidence from real cases that highlight the significance of incentives in the form of international (e.g. by EU and UN) funding:

> *Before the UNDP programme opened in 2007. Under the UNDP programme, 50 buildings were renovated and I personally went to see one of the last buildings in Mladost housing estate (Block 525). President Plevneliev was at the opening ceremony of this block - with pavement areas, gazebo, sanitation, and so on. I liked all this and I searched for more information about the UNDP program - in which cities and what has been done. I liked that small as well as large buildings were included. Then, in 2012 the EU rehabilitation programme was announced and I started convincing the residents in our building to take action. At that time the 25% co-funding scheme for owners was still valid.*

Focus Group Code (FOGR6BGC, Bulgaria, Collective Decision Making)

There is the guarantee fund, there is also a privatization fund that finances a similar type of activity. Different decision is taken every year what to be financed, so it is not impossible. The Municipality has also own financial resources and also European funds for more specific pilot projects.

Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

Access to finance is also one factor that would help. By the way, for individual clients, there is such program - REECL is one for energy efficiency, where we are also in. They go through some banks - Piraeus Bank, whatever. REECL give up to 20% financing, and it may be for isolation, for some energy-efficient solution - either solar collector or whatever, joinery, anything. They give you some kind of loan, with respectively, lower interest and 20% grant [...] *funded by the European Bank.*

Interview Code (IDIN21BGE, M, Bulgaria, Collective Decision Making)

In any case, the use of policy intervention tools such as incentives and tax regulations need to be implemented with utmost care. When there is a state-driven, centralized market, the intervention of the state is more acceptable. However, for liberalized markets, the underlying assumption is that market dynamics and no other external forces should be in effect; therefore, the implementation of subsidies, tax reductions or additional taxes should be kept at minimum and used only if absolutely necessary. Considering the current outlook of the energy markets and the goals of energy transition, nevertheless, most respondents support the implementation of such tools:

[...] with carrot and stick. We are actively looking for the carrot side. One should identify ways on how the consumer and the citizen would get meaningful rewards. And I think that developing those is essential. On the other hand, regulation and pushing from the stick side is also very important. So I wouldn't underestimate that either. So I don't think that the markets will take care of everything. They won't.

Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

The best example is the car taxes in Norway and Sweden. Norway have had zero or, zero taxes on electric cars. Whereas Sweden has had very high CO2 taxes on theirs, on the use of ... or on fuel then. But it's in Norway that electric cars have become big. So, then in a way the way of thinking that if only we have high enough taxes, then [there will be change], no that's not happening.

Interview Code (IDIN38NOD, M, Norway, Formal Social Unit)

In most cases, policy makers prefer a dynamic implementation of such tools. The measures are put in effect, implemented for some period, and revised according to the current contextual developments:

Incentives are a tool of conducting the state policy. We decide that we need photovoltaics right now; we are raising the buying cost of power from photovoltaics. We see that we do not have biomass in the mix; we do something for pellets, briquettes, and so on ... There really has to be an overview of these capabilities and tools, both over time and by the type of fuel and energy.

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

Power and involvement

The use of power is obviously an important component in understanding decision-making processes in collective units. The source of power and the ways to exercise it was considered an important component that reinforces the execution of decisions, and leads to either failure or success. In this context, individual or unit characteristics, as well as involvement levels were found to be of utmost importance.

On the national level, governments define policies. Other than those involving mandatory practices, policies need backing of citizens to be effective in real life. At this point, the characteristics, habits, culture, choices of society and individuals become very significant:

> *Well, perhaps about the external stakeholders still, the transport service providers were critical in a way, because taxi operators and entrepreneurs, they don't have many vehicles… or they in practice buy and drive the vehicles. The city cannot necessarily influence greatly what vehicles citizens buy.*
>
> Interview Code (IDIN57FIH, M, Finland, Formal Social Unit)

Most of the respondents recognize the effect of their personal characteristics and background on their approach or contribution to energy transition:

> *I was myself interested in promoting these low carbon… society and lifestyle. Easy to stand behind it and perhaps motivated to do and of course well aware of the issues so it helps in the work. In general, I think it has a lot to do with people's own interests and motivations so that they want to promote and those whose motivation you cannot awaken it is very difficult to take things forward. Inspired individuals are always those who it goes through, on the high level too.*
>
> Interview Code (IDIN57FIH, M, Finland, Formal Social Unit)

> *I've always been pretty heavy with the issue of switching off [the lights], and asking people to turn off the lights, so I think something personal was there too.*
>
> Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

The focus groups and interviews reveal that almost all the respondents accept the need for action regarding climate issues as an unquestionable reality. Therefore, involvement from individual, collective and formal levels is necessary:

> *When we have such a serious and acute climate crisis [challenge], then we need everybody involved and to do as much as possible. It is a secondary thing to speculate that is it states, municipalities, companies or individuals, who need to act because we need everybody involved and to do as much as possible.*
>
> Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

With the need for involvement seen as inevitable, a common theme in the interviews and focus groups is the prerequisite of citizens' involvement. Although the common understanding is that individual involvement alone is insufficient, there are a range of ideas on who is responsible for this or how it will be resolved. Some of the interviewees pointed out that individuals in society have a tendency to perceive energy transition as an undertaking by the government:

> *Basically, there is a preoccupation on an abstract level that is permeating society, which is almost like a mantra, right? The fact is that if we want cheaper and more sustainable energy that is more environmentally benign. But when it comes to making our own choices as citizens, as consumers, all this is forgotten. All this is forgotten. And we put the blame on the Local Government, in the Regional Government, the State Government, that is, someone should come and solve the problem: "guarantee me that ...". So, of course, this is a social problem, but one that is not solved by, well, attacking the legislator or the executor in charge in a given moment, it has to be solved by a change of habits".*
>
> Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

Although the common understanding is that individual involvement is insufficient, there are a range of ideas on who is responsible for this or how it will be resolved. An energy professional in Spain argues that this is a social problem:

Society today is not involved in anything, we have relegated all responsibility, we have relegated it to third parties and as we are lacking that responsibility we also do not assume issues such as climate change, energy saving, saving water, protecting the air and all those things. We hope someone takes that responsibility and that's it. We, at the most, are willing to pay someone to assume that responsibility, which is ours, but we load it on somebody else's back and that's it. I think it's a matter of society, not so much technology.

Interview Code (IDIN30ESD, M, Spain, Formal Social Unit)

The assignment of responsibilities is not entirely well done, or at least the assignment of responsibilities is not well understood by society. After all, legislators and governments - in our case, a regional government that does not have all the legislative capacities that make up the [legislative] framework - we have the responsibility to create an adequate framework for the transition, but the transition in itself has to be carried out by society.

Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

One executive of a municipality in Austria shares a similar perspective. The argument highlights the role of the individuals for energy transition. Although this may be taken as a deviation from the perspective that places the emphasis on institutions rather than individuals, it may also be viewed as a means of individual support for institutional goals:

Proposals are being made for what others should do, but when you try to direct this to your own target group in order to find out what we could actually do, there is suddenly radio silence. Then everyone clears the field. And that's happening everywhere. It doesn't matter whether it is a question of greening in the sense of climate change adaptation, for example. A green roof should be made on the neighbor's house, so that it is 2°C cooler at my house. But why not on your house?

Interview Code (IDIN61ATB, M, Austria, Formal Social Unit)

One of the common themes in the interviews and the focus groups is the identification of the changing roles of individuals as customers. One key factor triggering this change is the market deregulation that places the customer in a more active position. However, there are concerns that the systemic changes needed to handle this new context are far from being completed:

The power of consumers, and perhaps also the underestimation of that power. That if consumers would understand even better what the benefits of low carbon energy system are, and they would benefit from those advantages, how they could improve their lives, and get economic advantages from it. We are still quite far from that. And now that we are making a systemic change and building it through the so-called official actors, the consumer side is still the big thing.

Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

Some of the respondents argue that the changes in the role of the customers in the energy market may be termed as a disruption of the classical business model, and are bound to have further impacts:

The classic business between energy supplier and customer, where you have to make an application for the supply and then are billed per kilowatt hour, is disrupted. If Hofer or REWE then enter the business and take the customer seriously and offer things that the customer can accept, then the customer will jump at it. If he can refuel free of charge at REWE and can also buy electricity and buy food, that's great. Hofer and the others have a completely different, much more customer-focused strategy here, and I believe that much more will happen.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

As intensive users of energy, the level of involvement of industrial companies is a significant determinant of the success of energy transition. However, some policy makers find this involvement insufficient:

If you look at the mobility sector, in which plans to be fossil-fuel-free by 2035 have been made, this is highly ambitious, and we have hardly any industry or trade that deals with the subject. So, certainly not much has happened in this area.

Interview Code (IDIN62ATC, M, Austria, Formal Social Unit)

Some of the local governments attempt to achieve this industry involvement through collaboration and as part of their efforts in the transition process:

What we've managed to do quite well, I think, is work together very well with our social partners, despite the fact that we sometimes have very different interests. It's clear that the Federation of Austrian Industry and the Chamber of Commerce want something other than the Chamber of Agriculture ... And the Chamber of Labour.

Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

Although cost considerations are primary motivators for companies to get involved in energy efficiency related decisions and processes, it is not very likely that every company has the same level of involvement. In some countries, governments use policy tools such as incentives and tax reductions in order to stimulate industrial companies in this respect.

Yes, yes, for example, we also see this a lot in Portugal, where they push it a lot, they are very tight with regard to energy efficiency issues. Then, on the other hand, in this country they also have a lot of subsidies, so we see that the Portuguese plants are doing a lot of things, because, on the one hand they [the regulators] push heavily, but on the other side also, they subsidize 50% of investment, which makes this a much more attractive issue.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

[I]n Germany, for example, I'm not sure if I say this right, for example the ISO 50001 (international energy management standard) does have an impact on taxes that we do not see, for example, in Spain, right? So that makes the German plants much more willing or ... more motivated, so to speak, to meet the ISO 50001.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

In some interviews, the respondents claim that the involvement of intensive energy user industries in the energy transition process is not possible without the governments taking the necessary actions to cover associated costs. They believe that the situation may even threaten the companies' global competitiveness:

In certain industries, according to certain EC criteria, which are energy-intensive and their competitiveness on world markets is threatened, because they do not have such commitments to pay for renewable energy - they are reduced to this component / price / duty supplement to society, which is related to the cost of potential purchases of RES.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

In general, the orientation of industrial companies respond to economic considerations. That is, every decision is evaluated with respect to its financial implications. Therefore, important parameters are the initial investment required, the payback period and expected savings or earnings. Energy investments are typically perceived as high-investment, long-payback period investments by companies. However, it is more preferable that decisions are based on both economic and environmental goals:

One of its 5 pillars is sustainability, right? But ... well ... eh ... companies are always going to say that it has to do with the topic of decarbonization, but hey, it's also clear that there is an economic background, right? So I think it's a bit of both, that the fact that, well, in this case it's a win-win, that is, you manage to save money and it also has a positive impact on the carbon footprint.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

In many cases, the process is led by a number of frontrunners or motivated people. However, in some cases, the role of these enthusiast individuals is absolutely critical:

> *I would say, and this more relates to my life experience in general, that everything depends on individual people. Certain strong individuals can considerable enhance or slow down change ... Moving to a smart and clean city, low-carbon society, is what everyone officially wants. But because we are in a critical or turnaround period at the moment, there are a lot of factors that defend the existing system, and obstructing the change. For example, cities have been built for the old system so these silos are very strongly there. Achieving the change depends a lot on how the message or willingness to change moves down from the top management to the next level.*

Interview Code (IDIN58FII, F, Finland, Collective Decision Making)

> *As with Speedy. Not just the boss wants to get into this, but to engage a whole bunch of people. It took a little while for Speedy drivers. As far as I know they were not very motivated to drive them. Just a month later, it was a privilege to drive an electric car, because they are much more comfortable to drive every day. There is no noise, it stops and goes very softly.*

Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making)

Even with formal decision-making units such as municipalities, where the institutional principles are in effect, such enthusiast people are of great importance, especially for interfaces with individuals:

> *[…] my idea of the big change is that there are always some single persons that take the leadership and they push things and speed-up the development. We can see this from the pioneering countries, cities and regions - typically, some really committed leader takes the development close to his/her heart. The same accounts in Finland, if we look at the existing Government, it is very clear that increasingly minister A but to a lesser extent minister B are those kind of persons, who take this as a personal matter. Without these persons, the situation would be totally different. The same happens at the company level, e.g. single visionary CEOs are able to do a lot, if we think about influencing ministries and their Chief Secretaries, so these people still have a big role in Finland.*

Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

> *The Municipality would never have become a member of the Covenant of Mayors if I had not pushed these things. I say it directly because there was resistance – the truth is that there were people who were against it. And I have been in conflicts, also with managers not at the highest level, but - with directors of departments, etc. "Why would we make such commitments?" etc.*

Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

> *The management has decided to support this, but they always need people who act. Decision-makers need people who act. And if the staff or parts of the workforce do not participate, if every person works by the book and does not identify her or herself with their activities on the basis of their attitude, then it is very difficult to address such a topic.*

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

Within formal organizations, the decision-making power is usually delegated to the top level managers. Therefore, it would be appropriate to argue that, in order to succeed, the enthusiast individuals need support from top managers, or need to be top managers themselves:

The commitment from the high level, it is in my opinion human, I mean as a normal civil servant who has a lot of work and resources are diminishing and you have all the mandatory tasks you're used to, so to be motivated in a development initiative like this, so if there's a big effort to change processes or something, so it takes a lot of time and I understand that for the average person the motivation and opportunities to take initiative big way… so in a way the support from management and mandate to do things. Also you need resources, whether it's your own job or a project like this that gives an impulse forward.

Interview Code (IDIN57FIH, M, Finland, Formal Social Unit)

Execution vs Policy Targets: Achievements and Failures

The policies regarding energy transition are mainly transposed from EU policies. These are transformed into national policies and then into national targets, such as reducing carbon emissions, or increasing the share of renewable resources in the energy mix.

The overall process regarding the energy transition is, in a sense, triggered by the policies on the EU level and international agreements that are binding, and structure the legislative framework for countries. These EU policies and international agreements, undersigned by the countries, involve targets. One significant step in this regard is the establishment of the EU "20-20-20 targets". European Commission acknowledged a renewed energy policy for the EU in March 2007, identifying three objectives: (1) the sustainability, (2) competitiveness, and (3) security of supply, and it also established these 20-20-20 targets as binding targets (EC, 2010b). The targets were; (1) to decrease Greenhouse Gas Emissions generation by 20% compared to 1990, (2) increase the share of renewables in total energy consumption to 20% compared to the 2005 figures and (3) to raise energy efficiency by 20% by 2020 compared to 2005 figures. These early milestones were scheduled to be achieved by 2020, simultaneously with member countries' own targets.

In the energy transition roadmap, these targets play two main roles: the first one is to structure the national, regional and local targets. That is, the breakdown of the EU targets is used to determine the national, regional and local targets in a top-down approach. Second, the targets structure the means to monitor and evaluate the progress of the mechanisms for energy transition, that is, the execution. Once the targets are set, governments utilize the policy toolbox to enhance the target achievements. In general, the success of the policies in achieving the targets depend on how well the policies are formulated taking into account the social, cultural and political infrastructures. As well as the enablers (motivators), there are also disablers (barriers) that significantly affect the level at which the aforementioned targets are achieved. Thus, it is generally a compound effect of policies, process, execution, motivators, and barriers, whether the output is a failure or a successful achievement of the targets.

The target achievements, as seen by the policy makers, are not always satisfactory:

National Climate Change Committee. .. progress report … if you compare this with … 1990, 1992 – I'm referring to the Rio Conference – and how much we thought we needed to achieve… And here we are now in 2017, facing roughly the same emissions, in absolute terms […] Over the last 25 or 30 years, we have been running in circles, creating an estimated 70 million tonnes of CO2, no matter how you calculate it. This hasn't really gotten any better.

Interview Code (IDIN61ATB, M, Austria, Formal Social Unit)

One key determinant, to begin with, is the conformity of the policies and targets, to the country's, industries' or society's characteristics. Such discrepancies may result in failures:

Of course mistakes are made and so on. I think what we as Finland Ltd. should be able to influence how Brussels acts in the case of the unique characteristics of national states in these issues. We always loose this war. There is nonchalance to our know-how. (District heating) … is a good co-, the co-production of district heating and electricity is brilliant. This is fantastic hi-tech this day, and we know that the big nations that do not have it trample us in the votes. This is a fact. We should be louder and lobby these issues more. But in Finland the ministry and the industry are on different sides of the table. A shared discussion is missing. As a small country we should have much more collaboration in these issues. But Finland is not good in dealing with the big picture. This issue about improving our lobbying in Brussels has been in [newspaper] a million times lately. Its close related to this issue.

Interview Code (IDIN51FIB, M, Finland, Collective Decision Making)

And a second disappointment, which also constantly recurs, is the disappointment related to how ideas ultimately lead to legal framework conditions and how these are formulated, regardless of whether the subject is one of energy efficiency or something else. If you then look at energy efficiency, for example, how the Energy Efficiency Act is written and what has been built up there again in terms of bureaucracy and additional burdens, the point has completely been missed.

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

Clearly, it is still an open debate whether the lower-than-expected target achievements are results of targets being too ambitious, the mismatch of targets with the social or technological conjuncture, or rather due to insufficient involvement or simply insufficient performance:

As far as climate protection targets and so on, for example, are concerned, we are not meeting these as quickly and to the extent that it has been desired, predicted, or foreseen, seen from either the European or our own (Austrian) point of view. …. And that is exactly the same in residential construction. ... From our point of view, you can't overload the residents with technology. Too much is perhaps being demanded of those involved in this area.

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

The key factors and drivers that affect the outputs regarding the energy transition do not always function as assumed by the policy makers. Some of these factors and drivers turn out to be barriers during the course of the process, although they were not considered as such at the outset. The converse is also true. There are cases in which factors initially assumed as barriers have been transformed into motivators through the process.

One example of such a situation is where the legislations are considered to be enablers, but their perceived insufficiency later turns into a barrier, although still surpassed by the individuals' feel and taste of energy self-sufficiency:

Although our policies actually fail to address much of the climate protection issue … consumers themselves are investing a lot in the issue.

My parents bought a photovoltaic system, solar thermal system and a heat pump when they were 75 years old, because I also did that and now they stand in the basement every day reading how much was produced. This is simply an example of total fascination and describes very well how humans act and react.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

Undoubtedly, the policy toolbox is one of the most important drivers towards energy transition and target achievements. Although meant to be enablers, the uncertainties associated with legislations may drive industries into hesitancy towards energy transition targets:

The legislative changes that are taking place in the country without any criteria. In Spain we remain in the hands of energy lobbies and nothing can be done about this. The Spanish political party "Citizens" made an election campaign saying they were going to fight against the "sun tax" Royal Decree but, in the last minute, they backed off. In Spain we continue to see that the electricity companies are very strong and influence national legislation. We have gone from being world leaders in renewable energy and from being a step away from heading on to integration and so on, to see people moving out of the country, because they [the government] paralysed the industry. For me that is very sad.

Interview Code (IDIN29ESC, F, Spain, Formal Social Unit)

In addition to the more debatable effects of big energy companies or lobbying, there is a collection of darker factors, such as corruption and incompetence, which may cause policies to turn into failures:

Corruption, as already mentioned, is another barrier – there is a lot of corruption in the energy sector. Decentralization would mean – theoretically but also practically – less corruption; public control would be easier at the local level than at the national one. It is a problem that the Agency for Sustainable Energy Development is a subordinate department of the

Ministry of Energy. We twice established the previous Agency for Energy Efficiency and it was immediately after that hidden so that it could not be independent from the State.

Focus Group Code (FOGR5BGB, Bulgaria, Individuals engaging in joint contracts)

I claim that they are due to corruption but equally due to incompetence – there are people at the highest political level in the country who are pretty well aware about their personal short-term interest but not able to explain what they are doing and why at the national level governance. Electric transport is inevitably coming and needs the timely design of relevant infrastructure, yet people here behave as if we in Bulgaria will be poor for ever – it is a sad feeling of being doomed.

Focus Group Code (FOGR5BGB, Bulgaria, Individuals engaging in joint contracts)

Although there is so much on the output side that is attributed to policies and the setbacks in their implementations, there is also the reverse effect: The policies set forth by the governments in general aim at a group of industries or individuals for action. However, these groups do not always act as expected, due to different priorities in their agendas on the industry level:

The most disappointing part is the constant fight with those plants that we talked about previously, those that are not at all conscious and with them it's a daily struggle. That many times you bang your head against the wall and that things do not come off because of that apathy, that lack of motivation, and, even so, you have to keep fighting for it... Because it's your job and the project has to go ahead, but many times you feel like ... good ... [smiles] I was going to say something, it was not going to be nice talk right now.

Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

Similarly on the individual level:

We have the National program for energy efficiency of residential buildings, which is for me a total failure. First of all, this is a pure theft to take my money and give other people 100%. This is crazy. To give my money to other people so they can live better. Where is the logic? Then, the decision to reduce energy consumption belongs to every single individual or legal entity. This is not a decision of the state. How come, the state will enter my house and tell me it's more important to me ... See, everybody runs their own budget. How come, the state will tell me that I have to invest 1000 levs more to reduce my energy consumption, when I want to give 1000 levs and go to the marathon in Vienna. There is no right for the state to take my money that way. Is this true?

Interview Code (IDIN22BGF, M, Bulgaria, Collective Decision Making Unit)

The same lines of arguments also hold for the social constructs:

Disappointments, which I experience again and again, are related to the social attitude that follows the motto "Let's go swimming, but I don't want to get wet". I am thinking specifically about the XY power station and how it is viewed by the public, and that this radicalization of society is also taking shape when it comes to the issue of the energy transition, which only disappoints me. This doesn't mean that you have to deal with things in a factual way, but is simply more humanly disappointing.

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

Considering the interests of the stakeholders involved, one theme that occurs very often is the cost considerations. As a recurring theme, the cost and profit perceptions do have significant roles in the success or failure regarding target achievements:

As far as disappointments are concerned, however, I have to say that even in the energy transition, monetary profitability is very, very often a central factor. You have to reckon with some kind of monetary amortization or something similar. This is the case in all areas and not just with respect to the small, end consumers who may not be able or willing to afford it. The next disappointment in this economic situation is how much energy costs and how much or little value it has. And how we deal with efficiency is something that often bothers me, even though the restructuring rate, which you have already mentioned today, is three to four percent, which is well above the average, especially in the non-profit sector.

Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

POSITIVE MEDIATORS: MOTIVATORS & ENABLERS

While policies, -whether in the form of international agreements, directives, organizational targets or corporate objectives-, lay the foundations for and activate energy transition, there are numerous other factors that enable decision-making bodies to further engage with the processes and bring them to completion in an efficient and timely manner. These factors, which we classify as motivators and enablers in general, may appear both as an input and an in-process variable to decision-making, as they initiate action as well as acting as catalysers throughout the process. In this context, it is useful to see motivators as the positive agents that initiate a particular action, and enablers as factors that facilitate, encourage or ease the execution of steps undertaken. From time to time, motivators and enablers may also appear as overlapping factors.

The literature lists a myriad of motivators and enablers that are found effective during collective and/or individual decision-making process for energy transition. While it is possible to discuss particular motivators for either of the technological foci, as provided in the literature review in detail, broad categorizations encompassing all three areas of energy transition, i.e. Buildings, Electric Mobility, and Smart Energy Technologies, are also viable. In this context, two general categories of motivators appear to be a) (financial) incentives and rewards, and b) collective or individual pro-environmental attitudes, indicating a push (top-down) and a pull (bottom-up) effect, respectively. A brief description of key themes with regard to motivators and enablers are shown in Figure 17.

From more institutionalized formal social units to looser collective decision-making units, our findings also support a dichotomy of push and pull motivators. To this end, push motivators refer to rather external mobilizers of action, while pull motivators are generated from within the decision-making body. Our findings reveal that push and pull motivators may appear and operate simultaneously, often indicating an interplay between the two. Below, we provide a detailed investigation into these motivators, and how they accompany the decision-making process in collective decision-making units.

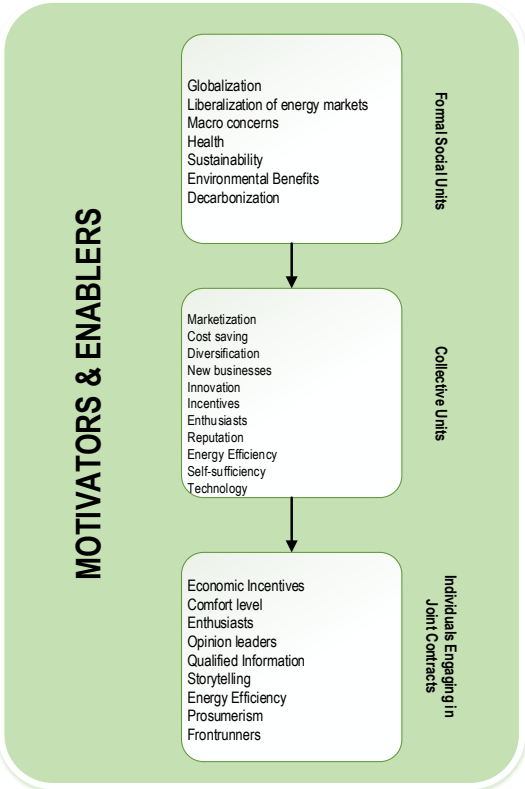

Figure 17 Motivators and Enablers

Economic Motivators

During the interviews, the respondents in a multitude of concepts and themes, including but not limited to phrases such as “global market conditions, globalization, competition, marketization, cost-saving, scale-economies, and incentives”, frequently highlight economic motivators. Energy transition efforts as an outcome of global market forces are often addressed by formal social units, such as policy-makers and (inter)national energy providers, while concepts such as competition, marketization, and subsequent pressure to decrease costs are rather reported by lower levels of collaborative decision making, such as companies.

As one respondent clearly stated, globalization was the driving force behind all collective and individual actions to energy efficiency, as it had direct and indirect impact on all issues related to the “economy”:

> *To the extent you can call it a shift, to the extent it can be defined at a particular time, it was somewhere in the 70-or 80-number. That's when it begins to be expensive to do industry here in Norway. We have high labor costs, and now things are beginning to change in our competitor countries. Before it was very stable; you were doing this and that, there and there, and then you had your market share, and so were you happy and satisfied with it. But then came the when the global market more and more. It was more and more raw materials that were sold on stock exchanges, which was listed in London, in New York, and so on, and it was then the idea to try to be competitive in the areas one had begun with in the first place. And then came the energy law. Before, power prices were regulated, after the energy law there was market-based power prices. And along with the energy law, in ' 91, China's fierce ascendancy in the market begun, when the industry in China really began to grow. That’s when the really big initiatives took place here in Norway for the first time. Now we’re talking about measures that were not only easy to do right away. This was the time when we started to introduce technology that at the time was seen as “smart”, which today is obsolete and replaced of course. But this is when energy efficiency became a focus, especially among business leaders. But just when it comes to smart technology, we sort of just look at it as a continuous process, driven both from the top of the industry and from, let's call it, "the guys on the floor". The main motivation from top management is of course about economy, but “economy” can the integrated into the very many different considerations one must make. And here come the operational aspects, the men and women who works with the actual processes every day, they are the first and foremost concerned with security and their own work space; health, and secondly, that they have a safe place to work in the first place. And both of the two parts have to do with the economy. You don’t want people to be injured or become ill at work, it costs money, and it's not so good for the one being hurt either. And the second is that industry worker himself sees that, after all, we live in a global market which is very demanding, and if one is worker refuses to make use of the new technology because it is unfamiliar and requiring training, and perhaps outside the comfort zone; "That's the way we've done things before. That [new] way we will not do things in the future ", then you lose and fast.*
>
> Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

To this extent, the economic aspect of energy efficiency, decarbonization and the green shift not only addressed decreasing production costs, but it also alleviated indirect costs incurred due to unhealthy and unsecure living and working conditions. From a policy-making perspective, it was also understood as a tool to enhance the competitiveness of national economies, strengthening the position of actors that operate in them, which is made clear in the below quotation:

> *If you think about what drives decisions in climate policy, the climate motivation is understandably central. But, surely the other central matters are behind as well: Typically in the case of Finland, these relate to national economy, employment and [competitiveness of] export industries. Partly [the criteria] might also relate to general policies, when you think about Finland’s positioning in Europe and internationally.*
>
> Interview Code (IDIN59FIJ, M, Finland, Collective Decision Making)

Therefore, particularly for the representatives of formal social units, globalization and the need to remain competitive in the global economy were considered as main motivators for the green shift, as it eventually generated positive results in every aspect linked to national economies. With this idea in mind, our findings indicate that countries, which

pioneered in the green shift, have changed their understanding of energy efficiency and decarbonisation from that of a burden to an opportunity. As one respondent notes,

> *[t]here's a shift in the climate discourse… [w]hich has gone from being one of looking at the climate challenge solely as a burden that must be resolved as cheaply as possible, to looking at it as a possible new business area from which anyone can make good money.*
>
> Interview Code (IDIN37NOC, M, Norway, Collective Decision Making)

A significant finding in our analysis is that envisaging energy efficiency as a potent tool for further marketization is currently confined to countries that have already taken substantial steps to this end, such as Norway and Finland. This might also be particularly due to the fact that such countries enjoy the advantage of their natural resources (e.g. Electricity production in Norway being 100% renewable due to country's hydro potential). Therefore, the focus in these countries is on developing new business areas out of energy efficiency goals, rather than trying to overcome obstacles to EU decarbonization targets, which is commonly the case in some other countries such as Bulgaria.

Formal social units frequently highlight the need for industries to actively engage in marketization process, transferring the catalysing power of energy transformation from policy makers to businesses. According to our findings, industrial transformation is realized in a series of steps, which usually begins with the competitive pressure to reduce energy expenditures. As the price of energy increases, businesses find themselves in a constant battle for looking for alternative sources of energy, which frequently direct them to channel their efforts into two streams: Energy-saving policies and/or generating their own energy:

> *Our plant has an extremely high electricity consumption since our production is mainly based on electrically driven tools. Therefore, our aim was to decrease these costs resulted from our focal operations. When we decided to establish a trigeneration system, we made calculations on the cost such an investment and ROI. We then made the investment and installed solar energy in order to compensate for excessive electricity consumption. In the same vein, we also had the opportunity to generate our own electricity thanks to natural gas-operated trigeneration system.*
>
> Interview Code (IDIN6TRF, M, Turkey, Collective Decision Making)

> *Energy efficiency is the starting point of all the decisions taken. Unfortunately, we have never regarded energy consumption and environmental pollution as a priority. No company replaces engines and machines only to protect the environment. The costs are the determining factor for such a change. However, the investments in the long run are made by taking into consideration both energy consumption and environmental factors. [In our case], our major concern was energy consumption, and our aim was to decrease the current energy consumption. Making an investment for the factory to generate its own energy was not on the agenda. However, now there is an energy project based on the construction of a wind turbine near one of our factories. Thanks to this project, the energy will be able to supplied by a single wind turbine partially. The turbine blades will be probably produced in our factory. Consequently, the project will constitute a successful marketing tool for an environmentally friendly company that can generate its own energy from wind power.*
>
> Interview Code (IDIN1TRA, M, Turkey, Collective Decision Making)

Low carbon and efficient energy projects are also used to generate other benefits for the companies, such as taking advantage of incentives. In addition, the use of clean energy is regarded as a marketing tool to promote the brand, as noted in the following quotation:

> *The transition to a low carbon economy might be considered as a marketing tool by specific sectors. These sectors perceive the transition as a trend and they use it as a tool for the branding of their companies. On the other hand, some sectors try to take grant from the State in return for their expenditures. The final stage includes people that are extremely environmentalist planning to make investments for green economy. However, this stage requires extreme awareness for environmental concerns.*

Interview Code (IDIN12TRL, F, Turkey, Collective Decision Making)

Our respondent highlights the fact that economic returns are always favored by the companies as compared to positive environmental impact, however these quotations also reveal that this is an inevitable process. For instance, another apparent finding in the interviews is that these energy investments result in structural changes in businesses within a certain period of time. As the firms become more active in energy savings and generation, there emerges a need for qualified personnel and departments specifically designated to plan, organize, and lead energy related activities of the company. These positions are usually filled with people who have studied different aspects of energy, and who are interested and knowledgeable about innovative technologies, holding pro-environmental values and attitudes. As will be further discussed in the coming sections, these individuals play a very important role in encouraging companies and other organizations, such as municipalities, to undertake a variety of innovative projects. Consider the following quotation, which explains how the energy department takes a leading position in integrating all energy related decisions in a multinational company:

> *Why did the department come into life? Well, it came about because of the issue, well, the energy price starts to rise, well, it seems that prices climb on and on, the energy cost, sorry. Then, too, then, there is more and more awareness. There are also more restrictions, regulations and norms. So, well, we've emerged as a new way to boost savings within the plants. But also, let's say as a platform to unify knowledge on energy efficiency issues in all plants, right? Because [the company] is a group that has grown a lot and very fast and ... well, there are plants that are doing things really well, in terms of energy efficiency, but of course, maybe a plant that is doing very well in China, but the plant in Mexico has no idea, right? So, we are also serving as a link between all plants, and, at the same time, we are promoting the installation of energy efficiency management systems, with some quite ambitious energy savings objectives.*
>
> Interview Code (IDIN28ESB, M, Spain, Collective Decision Making)

Therefore, our findings support that economic factors, activated by globalization, act as an important motivator at formal social and collaborative decision-making units. We also observe a clear pattern which begins with the managerial will to reduce energy expenditures, and leading to engagement with more ambitious energy projects, particularly with the support of enthusiastic individuals who assume a leading role. For collaborative decision-making units, the next step is about advancing the organization's energy engagement further by applying this experience into new business ideas.

New business, marketization and innovation appear to be such keywords that refer to the inevitable route that the industry follows, or at least, is expected to follow. As previously mentioned, the trend is much more visible in countries that already had substantial achievements with regard to decarbonization. Marketization, in which we address a shift of power from policy-makers (i.e. politics) to the industry, is understood in many discourses. To some respondents, it is the reflection of a "noble cause behind cost motivation":

> *….you always have to have business case behind it, although you can have a, noble vision, a vision of you want to reach, something based on other, measures than financial measures you always have to have financial measures in place as well. It comes down to cost at the same time…. But it, the decision always comes down to, in the end the business model behind it. But the decision to, look at the business case can be based on noble, the noble approach of wanting to reach, some, environmental targets or, coming from governments or other, decision-making bodies.*
>
> Focus Group Code (FOGR12FIA, Finland, Individuals engaging in joint contracts)

For some, it represents the enthusiasm of people and their organizations to make an impact for the industry and the society:

> *I think that everyone that has worked here or work here now, is personally motivated by the Green shift. But in many dimensions, not only the climate and the environmental dimension, but also the opportunity to build industry, and provide more legs to stand on, and so on, so I think we are motivated, and that we see that in*

fact a relatively small organization, which also should have an "impact". So that it is motivating and fun to work with large processes.

Interview Code (IDIN41NOG, M, Norway, Collective Decision Making Unit)

And for others, it is just the beginning of an era in which the power is transferred from politics to consumers via businesses. At this point, some of our informants highlight the fact that power now lies in the hands of industry, which has the power to reshape future societies and consumption. The below quotations, for instance, underline how the automotive industry has claimed such a role in future transportation systems:

(When asked about the future of biofuels)

No, I don't think so. Electric cars will win by far. It's because the electric vehicle industry has decided so. No car manufacturer is currently producing in series a car designed for biofuels.

Interview Code (IDIN56FIG, M, Finland, Individuals engaging in joint contracts)

(When asked about the drivers for electrification)

There are [many] drivers. Firstly, the global car manufacturing industry, it's seen years ago, they are forced by environmental factors, and then there were those emission scandals, and they had to change their agenda. There is no other direction than full electric vehicles. The most significant car industry has decided that electricity is the energy carrier of the future for cars. It was anticipated and guessed that this would happen. We want to be on board in this.

Interview Code (IDIN56FIG, M, Finland, Individuals engaging in joint contracts)

Similarly, another respondent exemplifies how retail giants can use their power to reshape industry and alter consumption dynamics, in the case that traditional structures (e.g. politics or major energy providers) are taken over by inertia:

We have retail chains such as Hofer or IKEA that implement climate protection measures. If the country doesn't create reasonable framework conditions, for example, for wind turbines, IKEA or anyone else buys them to produce 100% of the electricity themselves if it takes too long. So here there is an enormous amount of energy, and they have really set off on their journey. There will be a lot of things coming up. And this is very exciting, because they approach the topic differently. When Hofer, Spar, or REWE take up the topic and that they will also get involved and are considering whether they will buy their own wind turbines or take an energy supplier as a partner, or if they will operate charging stations or sell electricity like Hofer, for example, they drive into the market and suddenly bring a completely different perspective with them. The classic business between energy supplier and customer, where you have to make an application for the supply and then are billed per kilowatt hour, is disrupted. If Hofer or REWE then enter the business and take the customer seriously and offer things that the customer can accept, then the customer will jump at it.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

One of the main drivers regarding the energy transition, with significant effects that range from policy related issues to operational aspects of execution, is the liberalization of the energy markets. The countries are at different stages of liberalization; however, almost all respondents perceive it as an inevitable and a 'must do' undertaking:

Market liberalization is a major issue. Some normal and transparent market interactions, in a normal competitive environment that are not used for political, corporate or any other purposes, create incentives for efficiency and so on.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

It is the only right way. The liberalization of the market is the only right way that we need to go ahead. Sooner or later it will happen. There are steps and measures in that direction. Of course everything should happen in small steps, so you don't make big mistakes.

Interview Code (IDIN20BGD, M, Bulgaria, Individuals engaging in joint contracts)

The energy market structures in countries are not totally alike. It is not only due to the varying energy profiles of the countries, but also as a function of the maturity of the energy market. Even though it may be argued that every country has a unique market nature, all have been involved in market liberalization, which has led to significant changes:

Before, the electricity market was a much ... predictable, in which companies followed the instructions or the guidelines that the government gave. ... and you had a guarantee that your investments were going to be remunerated and that, well, it worked without any major upheavals, right, except for an unforeseen international crisis. But, now, not anymore, now every company makes its decisions, and the decision to invest is not directed by anyone at all, except by the markets or the regulatory indications that come from the Administration, and I think that is so generally across Europe.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

At some point there was a change of paradigm, the criterion of "I will do what they are telling me to do, I am interested in and I should do it" to "I will see what I will do? Within the "I'll see what I do", you have to make a series of decisions, and a series of analyses and approaches that are totally different. Before when you built a coal plant, you knew which plant, where, when, where, where you put it ... now you have to decide: Should I build a coal plant? Or not? Or should I build a gas plant? Or not? What are the perspectives of this...? How will it evolve, how will I sell this in a market? How am I going to...?

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

The recent past actually begins with the liberalisation of the electricity market in 2000. This was the first time we had a chance to secure energy sales outside our small supply area with our power plant capacities. Previously, the regulation was relatively simple. We were able to supply our customers in our grid area, but with everything that went beyond our grid area, we were dependent on the big players, for example what kind of electricity and at what tariff. With the deregulation of the electricity market, we suddenly had tens of thousands or millions of customers in Austria who could simply buy our electricity directly and thus our production of electricity could be secured with end customers, which was not possible in the past. And I believe that this was a very important step in turning us from a tiny energy supply company into an Austria-wide recognized energy supplier.

Interview Code (IDIN67ATH, M, Austria, Collective Decision Making Unit)

We have been forerunners in opening the [electricity] markets, not as the first ones but among the first ones, the end consumer markets have been open for 20 years now already and it is functioning well - there is good competition and it is totally possible. The situation is the same in heating markets, the constructor can decide the heating system and competition is functioning. In that sense we can think that Finnish energy policy and system is based on markets and that is what the companies have wanted as well, it means that the customer can make the decisions, and that it cannot be regulated. And of course we have not had any regulated prices, except for the electric networks which has a monopoly position, and the allowed profit is regulated there, but even there, it is not regulated how the price is defined. The customer's freedom of choice is taken for granted perhaps more here than in Europe on an average.

Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

As with any industry, the pace at which markets change depend on the market construct in terms of factors such as ownership, existence of local versus international companies, investment opportunities. In Norway, the heavy influence of international corporations affects the decision-making process and priorities in favour of global interests of owners.

Keep in mind that the industry in Norway, with the exception of Y2, is owned by foreign companies, it is they who must decide, these are international corporations, and there are Germans, French, Australians, Americans who sit and decide whether to take huge investments in Norway, for a technology that one... You know approximately how it works, and you know that it's going to work out, but you don't know just how expensive it will be.

Interview Code (IDIN36NOB, M, Norway, Collective Decision Making)

Some of the member countries, such as Bulgaria, are in the process of establishing a deregulated energy market. The deregulation of the energy market usually comes with fundamental changes, such as privatization of distribution and changes in electricity prices. Some of the respondents fear that, although there may be a consensus regarding market liberalisation, the effects of the changes it brings may lead to undesirable outcomes at first. Therefore, a transition period is suggested, mainly for consistency in energy prices and guaranteeing a secure supply; also regarding the social effects of the deregulation:

The idea is the market to become completely deregulated, i.e. to drop regulation of energy prices and natural services as monopolistic, they will remain regulated. Of course, with some transition period, with partial regulation in this transition period, so there will be no major turbulence in market relations and in prices and security. The supplies should be secured.

Interview Code (IDIN25BGI, M, Bulgaria, Formal Social Unit)

Generally, as you know the Bulgarian market is regulated. We are still making the first steps towards an energy market, starting of course with electricity market, because it is the readiest one and easiest to get. But the regulated market means that the state defines how much the energy costs. It is the same for households. Even though everyone complains about high bills, they are not so high. The price of bread, meat, and other things, that need energy to be produced, have also increased their price many times, but no one protests against the price of bread but all protest against 10 cents in the electricity bill. And there is a very large imbalance in prices, due to the lack of market. Nowhere in the world households pay the lowest price for energy. On the contrary, households pay the highest price because they are the smallest consumer. It is a market principle. When you buy one thing, it costs that much. When you buy 1000, it costs a little less.

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

At this point, the relationship of power between different levels of decision-making appears to be the locus of energy discourse. In this context, we may conveniently assume that politics as a mobilizing force is now a memory of the past, and it has transferred or is about to transfer its role to businesses, whether willingly or unwillingly. Even in countries where this is not yet the case, the expectation is that industry will claim this right through its capability to innovate, being more involved with the contemporary trends that change the world. According to one of our respondents, these megatrends are the real forces driving companies to such ends,

… [b]ut if we think about companies, the megatrends - i.e. urbanization, climate change, digitalization - are shaping the world, and low-carbon business is a growing business area, with practically un-limited growth potential in the global markets.

Interview Code (IDIN58FII, F, Finland, Collective decision making)

While states, directives, regulations, that is the mobilizing agents of formal social units, are considered to be relatively futile at this stage:

Well I think that 10-15 years ago, policy and legislation dictated, of course, companies also tried to anticipate a bit perhaps, but the activities were fitted for that. And now we have gone beyond that point, the emissions are diminished for 60% during the last 10 years, companies do not think any more whether the demand will appear based on regulation; instead, this is the direction anyway. Thinking about smart grids and others, companies wish that regulation would not spoil the markets which are/will be created there. Instead, companies

would like to develop services and utilize the smart energy system which is created partly due to regulation or requirements. The development has been for some time and from now on guided by market.

Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

This being the case, there is certainly an interesting question as to the role of formal social units in this new era, and the tools they have been utilized as a means to achieve decarbonisation targets. According to most of our informants, the power shift gives way to a market economy where demand is the decisive factor, and therefore there is no need to stimulate it with subsidies or other similar incentives:

The pressure is growing. States, citizens, the environment itself is setting them. We see hurricanes and such, it begins to sink in why it happens, and inevitably car industries need to go electric. We want to be part of it. For Finland, it doesn't really matter what we drive with, if we look at global carbon dioxide emissions and other emissions. Everyone knows that. But we do not want to do nothing. We are not for aggressive and fast change, it is not productive. Markets are introducing now very good electric vehicles, reasonably priced. In two or three years they will be even cheaper and prices are constantly going down. There's no need to use tax money to support electric vehicle industry, there's no hurry.

Interview Code (IDIN56FIG, M, Finland, Individuals engaging in joint contracts)

In the same vein, a significant theme in our findings is pulling rather than pushing demand. To many of our respondents, the carrot should now be favored over the stick, and the role of higher level decision making bodies should be to develop policies to ensure an environment that fosters innovation, as well as providing the consumers with quality information, so that they can actively seek energy efficient solutions in all sectors of life:

[…] the pulling type, that would be a big opportunity. Just the way one collegium of professors from energy sector stated a couple of years ago, that is, using energy policy as a tool for innovation policy. In particular, by changing the regulation challenging enough to force innovating. This way, these innovation actions are boosted. Instead of trying to push it by money, the approach is in pulling it by demand. Then, in our case of [name of the area], as we try to bring the challenging future environment in today, of course, it costs. That way, the traditional, say, support from [a state-owned organization], is brought in, through the costs of creating a challenging operational environment. It could mean, for example, changes in taxation. So, the thing is to use the R&D support more in creating the pull rather than pushing.

Interview Code (IDIN54FIE, M, Finland, Collective decision making)

Likewise, in such an environment, one respondent notes that,

[the focus will be] over the link between climate and consumption. Consumers will be forced to either buy pure products, or they want to buy clean products, or a combination of the two. And who is it that has clean products to offer?

Interview Code (IDIN36NOB, M, Norway, Collective decision making)

Where the answer is contained in consumer demand, which is another indicator that the power is shifting from higher level decision-making bodies to lower units:

I would use the term of customer's era, which is beginning or has begun. Actually, customers' needs or the different services customers want have never been central in the energy companies. There has only been the basic presumption that customer wants to have cheap energy in a reliable way, and that may have been true, but not so that the customer could choose among several options, the energy company has made such decisions instead of the customer. Now we are shifting to the situation where customer makes the choices among the options energy companies and other actors provide, and this will be the very thing, which alters business models.

Interview Code (IDIN50FIA, M, Finland, Formal social unit)

To sum up, our findings point at a transition period where power has shifted or is about to shift from formal social units to collaborative decision-making units, and it is anticipated that the trend will continue with individual actors, i.e. the consumers becoming more involved with actively demanding energy efficient solutions, that is, products and services, transforming push markets into pull markets. However, we also have to note that the road is not without obstacles. As will be later discussed in detail, the lack of quality information, and therefore awareness, hinders consumers becoming active agents of this transition. Therefore, from an economical perspective, incentives remain effective in lower decision-making units (e.g. individual consumers or individuals engaging in joint contracts). This is in contrast to formal social units and collaborative decision-making units, as these bodies consider these investments as an opportunity to penetrate into new business areas, rather than a burden. As one informant puts it,

> *[w]ith companies, […] it is simpler because of the amount of energy consumption we are talking about and the improvements that can be achieved. It is easier that an economic calculation favors the change, that is to say that change is no longer motivated by criteria of efficiency or by criteria of environmental sustainability but by criteria of economic sustainability of the company,*
>
> Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

However, when the energy investment addresses individuals or consumers engaging joint contracts, such as building renovations,

> *[…] there is a strong impression and perhaps also a justified one, justified impression that every krone invested in buildings yields less than money invested in other sectors such as industry and transportation. And this we struggle a bit with, both because questions can be asked about the technical basis of the calculations that this impression is based on, where they probably estimate too short of a lifetime account for the investments. And second, it is because this justifies few actions in the construction sector and the housing sector,*
>
> Interview Code (IDIN35NOA, M, Norway, Collective decision making)

Which we consider to be an important issue that should be further investigated in an attempt to envisage the future of energy efficiency policies.

In this context, it is possible to claim that the energy behaviors of lower decision-making units are influenced by different motivators as compared to higher levels. In some instances, individuals are interested in decreasing their electricity bills, which acts as a motivator to purchase electric cars, invest in smart systems, or carry our building renovations:

> *Common citizens are interested in paying less per month for their electricity. I think that the motivation for people is paying less money and not so much taking care of the environment. Of course, there are some people who are committed to the environment, but in general it is an economic issue. Among those people who are thinking about moving into a new home, they are looking at the energy certificates because they know that it means saving money in your electricity and gas bills.*
>
> Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

> *Always the primary goal of people who have invested in this type of technology is to reduce their annual electricity, heating costs. Accordingly, this annual cost is not just about electricity, but about consumables that are paid for consumption of some energy [...] The purpose of these technologies is precisely that - initially making a high investment, but in the future, considered in the years, this investment will be paid to you within 5 years. Then to have real profit, and your consumption to be low.*
>
> Interview Code (IDIN21BGE, M, Bulgaria, Collective Decision Making)

Yet, whenever this is the case, energy investments are expected to be economically justifiable. That is, the environmental and climate-based consequences are almost always welcome, but seen to be a part of the decision-making process only for a small group of individuals:

If we want certain type of solutions, they need to be economically justifiable. We only have a very small group of people making decisions based on ideology, ready to put effort into saving the climate/atmosphere, so it's a very small group. If we want to facilitate decisions to lead to better choices on carbon emissions, they need to be economically lucrative.

Interview Code (IDIN52FIC, M, Finland, Collective Decision Making)

However, one significant topic that is countercharge, which is repeatedly mentioned throughout the interviews, pertains to the perceived value of energy for households. As one interviewee puts it, a great majority of the consumers take energy for granted, as a resource that always has been available, as the security of supply is no longer a problem.

Nowadays, I would say that there are two main aspects in which social concern can be observed in the field of energy, which are sustainability and the economic issue, when before other issues were much more important, for example, security of supply. The axis of security of supply we have practically solved, which has led society to disregard this concern, today this is something that is taken for granted in our surroundings and the preoccupation that existed before related to this axis has now shifted towards the other two: sustainability and price.

Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

Therefore, the price of energy is low, particularly due to political agendas, which in turn, undermines consumers' motivation to take action towards energy efficiency:

It is a public good, is it not? The expectation is that it is there. It's always there, and yes, it costs a bit, but it's something we want to have, almost no matter what it costs. But at a certain level, then the price will ... It's not everyone who can afford to pay if it gets terribly expensive, so the market works.

Interview Code (IDIN40NOF, M, Norway, Formal Social Unit)

Perceiving the price and the cost of energy as kind of a non-factor is an important barrier that we will later discuss under another heading. This being the case, economic motivators for individuals and individuals engaging in joint contracts differs substantially from those of formal social units and collaborative units. At this point, both incentives and the expected level of comfort coupled with the cost of energy investment appear to be significant factors that motivate households to engage in such actions.

Incentives are frequently mentioned in literature as powerful motivators (e.g. Clastres, 2011; Monfils, 2016; Romano et al., 2017; Ástmarsson et al., 2013; Šahović & Silva, 2016; Buhagiar & Borg, 2016; Axsen et al., 2015; Sierzchula et al., 2014). While our findings align with previous studies on the importance of incentives, particularly for households due to the particular reasons discussed above, an emphasis is also put on the "right incentives":

It is important to provide the right incentives for people. If you try to somehow override and say that I must have water heater that is extra expensive or something like that I'll just get grumpy right. And will try to cheat and trick. But if we instead are looking at ways to make my life better and I'm saving money on it at the same time, well then I might be happy to control my water heater a bit.

Interview Code (IDIN43NOI, M, Norway, Formal Social Unit)

Our respondents also highlight that creating an experience of observable benefits through economic incentives should be an important criterion when implementing these tools, as marketization will deem economic incentives to be void in time. When this happens, it is important that the consumers do not take incentives for granted, for reasons that we have discussed under the pull market scenario. One informant, when commenting on building renovations, exemplifies this through the subsidies offered for replacing windows:

Well, I suppose the subsidies ... the demand for subsidies will always be there. Because the actions are there, in a certain way, the subsidy is also a sales weapon for the respective window seller, in the specific case of

windows. Then, the motivation of the windows subsidy is, firstly, because it is a simple reform and the relation of cost of subsidy – energy saving is relatively strong. Well, this has been the reasoning behind it. I think subsidies cannot be issued eternally, right? I won´t say that you are artificially influencing the market, but, well I don´t think that if there are no subsidies anymore, people will stop changing the windows. I do not see that.

Interview Code (IDIN30ESD, M, Spain, Formal Social Unit)

At this point, we observe that anticipated level of comfort with the investment plays an enormous role in motivating consumers. Energy efficient solutions are usually regarded as a by-product of these investments, which mainly aim at increasing the comfort level, regardless of the technological foci. Consider below quotations:

(On energy efficient buildings) I think of course it's important but location and the convenience for me and my family is much more important. Maybe if it's energy-efficient it's an extra plus, but it's not, why do I choose it?

Focus Group Code (FOGR12FIA, Finland, Individuals engaging in joint contracts)

(On energy efficient buildings) When it comes to the annual general assembly or annual meeting or what it's called there are always heavy and difficult discussions when it comes to costs that they residents don't quite see the value of. And often the winning argument is one about amenities, about better comfort. Thus, when the building is so bad that it is both drafty and cold, and thus uncomfortable, you often manage to make decisions. But where you just want to save on your electricity bill, it is very demanding.

Interview Code (IDIN35NOA, M, Norway, Collective Decision Making)

(On energy efficient buildings) But my impression is that the owners are interested in comfort. And so, they are interested in, eventually, more interested in being climate-friendly, that there is a trend there, but that is a bit more in general I think.

Interview Code (IDIN39NOE, F, Norway, Formal Social Unit)

(On e-mobility) No, no, see, it's not that I'm not convinced ... well... it's that I would feel very uncomfortable with an electric car today, because of the availability of charging stations.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

(On energy efficient buildings) My motivations are not only savings, savings you look at when you can, but savings should not be at the expense of comfort. At least I am not willing to continue living with minimum temperatures, that I won´t do, but what I want is that, as far as I can influence this, the money that I spend goes to something that benefits the energy transition.

Focus Group Code (FOGR8ESB, Spain, Individuals engaging in joint contracts)

(On energy efficient buildings) Motivating factors in office buildings are about creating comfort for those who pay, the tenants. This is the leading thing and as a consequence, the owner of the building and the investor are interested to create maximum comfort for tenants because while reducing maintenance costs and the so-called 'service charge'. On the other hand, the owner could increase the rent by comparing his building with the surrounding ones.

Focus Group Code (FOGR6BGC, Bulgaria, Collective Decision Making)

Summing up economic motivators, our findings reveal that global economy is a significant motivator for higher decision-making levels, as it pushes organizations toward cost minimization along with energy efficiency. This in turn is considered as a dynamo for new business development and innovation, which is expected to be further realized within free market dynamics. Our respondents foresee that the shift of power from policy-makers to businesses will continue with another transfer of power to consumers, which will complete the transformation from a push system to a pull system; however, this has not yet been achieved due to a number of factors. The most important of these is the lack

of awareness and quality information, coupled with the low perceived value of energy by the general public. However, our findings also support that the views that there is an increasing trend of pro-environmental attitudes, which are largely triggered by personal and social factors, which we will examine in the next section.

Personal and Social Motivators

Besides from economic motivators, an emergent theme in our interviews were found to be personal and social motivators, which predominantly refer to demographic and psychological features of individuals that lead to pro-environmental attitudes, behaviors, and lifestyles. We consider these qualities to be the locomotive function for a pull market, as discussed above, as they appear to be significant motivators for mobilizing individuals, consumer groups, and eventually the society. Another importance of this category relates to its links with the new economic models, such as prosumerism, self-sufficiency, consumer innovation, and sharing economies, which are frequently mentioned by our respondents.

Personal and social factors as motivating forces to energy efficiency decisions have been frequently and excessively discussed in literature (e.g. Lilliestam & Hanger, 2016; Lopes, Antunes, Jandad, Peixotoe and Martens, 2016; Mills and Schleich, 2012; Axsen et al., 2016; Barth et al., 2016; Daziano and Chiew, 2012; Jang, 2016; Peters et al., 2011; Peters and Düschke, 2014; Plötz et al., 2014; Sang and Bekhet, 2015; Ziefle et al., 2014). Our findings also align with these in terms of sufficiency attitudes, environmental motivation, and energy conservation behaviors of individuals, as well as level and capability of technology adoption, all of which are influenced by demographics and personality traits. Similarly, we have observed that individuals involved with energy issues are from higher socio-economic backgrounds, were trained in energy matters, expressed an interest in environmental issues, and tended to have a blend of intellectual and activist personalities, as illustrated in the below quotation:

> *[...], but the Platform for a New Energy Model was created following a hunger strike by a mayor, [name surname], this man who went on hunger strike when the cut of renewables in Spain was made - one of the first cuts in 2010 - and ...he came walking from their village, he was like 5 days walking.*
>
> Interview Code (IDIN31ESE, M, Spain, Collective Decision Making Unit)

These characteristics were also explanatory in understanding why these individuals play the role of “innovators” in the diffusion of new products, a term that refers to the individuals who are first to adopt an innovation. The literature acknowledges that innovators are willing to take risks, are younger, are from higher social classes, have great financial lucidity, are very social and have closest contact to scientific sources and interaction with other innovators (Rogers, 1995). Personal experiences shared during the interviews frequently confirmed the impact of such individuals in initiating change with respect to energy.

Our findings reveal that these people have a huge impact in motivating others toward efficient energy actions, performing a variety of roles. These include initiating, communicating, training, and leading. It is a common phenomenon that individuals and organizations act and feel hesitantly against new and uncommon practices. This happens primarily because of the perception of uncertainty and risk associated with the new practice. Lack of associated know-how build-up, and the setup required also have an effect. In such situations, those individuals or organizations that are called 'frontrunners' are very important in the sense that they are the first to try to succeed with the new practice, which encourages others to follow. The below quotations, for instance, describes how enthusiastic CEOs can change the energy scene of a nation,

> *I mean these trend-setter or forerunner CEOs definitely have a big impact. In the United States, there is a bunch of them, we are also starting to see them in China, and in Finland there are them as well. … they definitely have impact and we have examples on them. Then, I stuck on thinking about them collectiveness. I think creating certain collectives to push on for something as another driver in it, let us call it a change of cleantech type. Somehow these two, as you for a start said that there are different levels. I think these two levels somehow are the driving ones. That is, first, there are these collectives, often ideological ones, or, then we have visionary CEOs of the forerunner companies, whereas the other two levels are clearly weaker here.*

Interview Code (IDIN54FIE, M, Finland, Collective decision making)

and also how they can initiate the establishment of an energy department in a collective decision-making body (in below examples a municipality and a company), and trigger a paradigm shift,

> *At the end of 2007 or 2008, I was able to bring the jurisdiction for energy matters to my former department. With the support of the politically responsible at provincial level, the highest official in the Styrian provincial government at that time, I was able to move the entire energy block to my department in a cloak-and-dagger operation. Then, I began to organize it, and since it was not so easy, I said, "I need a strategist". At the time, that was Mr. XY as Styrian Energy Commissioner. A strategist also had to be a good head of the administrative units. I decoupled the funding area and so on from the agendas of the Energy Association, for which someone else was responsible. I kept Mr.XY there as a quasi-expert in the department, and he had a small team available. In this way, I kept the operational area separate. That was my job in that context.*
>
> Interview Code (IDIN63ATD, M, Austria, Formal Social Unit)

> *Well, I generally agree that which people sit where and how they think and act definitely has a strong influence. One should never underestimate that either. However, administrations find it relatively difficult to do so. Maybe one starts from this mechanical view of human beings, that one has a department and a job description, and then it doesn't matter who you put in the position, because the person will do the job. But this is nonsense, because people act and work very individually. The department started with eight employees, now we are 14, which means that I have brought a certain number of employees into the department by myself, and I am totally convinced that leadership and cooperation can be extremely strongly influenced and diverse. And I have an advantage and a disadvantage. I have an advantage in that I am very enthusiastic and persuasive about what we do. I think this is also a motivating factor for the employees, and that is why we are extremely strong in some areas and do a lot, so that many people are surprised that such a small department produces so much output.*
>
> Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

and how one individual can influence others in lower level decision making arrangements (both examples are from building renovations),

> *But most importantly we had a very competent and knowledgeable engineer living in the house who works for the city and she was very enthusiastic and took a leading role in driving the energy efficiency renovations. … I mentioned earlier this knowledgeable and efficient young lady in our house. All the new and modern suggestions for energy renovations came from her side. I think the professionals should take more responsibility for finding innovative solutions and show more interest.*
>
> Focus Group Code (FOGR13FIB, Finland, Collective decision-making units)

> *This is, roughly put…when something happens in a housing company it is because by accident you have on the board a person who is passionate about one or another type of solution.*
>
> Interview Code (IDIN35NOA, M, Norway, Collective decision making)

These examples clearly show that some passionate individual is the source of real impact in all decision-making levels. While this is quite expected given that energy efficiency is still an innovative business domain, it is interesting that the literature is limited in examining the role of these key opinion leaders as motivating forces. We observe this phenomenon, therefore, as an important emerging theme in the content analysis.

The importance of enthusiasts is not limited to collective decision-making processes. These people, who act as innovators within the diffusion process, also have the capability to influence other individuals (and individual decision-making processes) throughout the marketization of efficient energy solutions:

One interesting issue to be thought is what kind of-, if the energy world of the future is such where customers make a large part of those energy decisions and investments and choices, what kind of social barriers are related to the fact that if people can grasp those opportunities. That is, I believe certain things are progressing fast but there are single things, say, electric car, as your neighbors start having some, more will be acquired. Similarly, as solar panels, you observe somebody having got one on the roof, this way it proceeds quickly.

Interview Code (IDIN50FIA, M, Finland, Formal Social Unit)

Among the individuals, the frontrunners act toward trust building and accelerate the process:

It is important to see and touch things in real. It happened that one of the neighbours was a construction entrepreneur and he had already repaired 8-9 apartments over the years. This was very useful - when somebody is your neighbour, you know him and you trust him. Our neighbours believed him, he is young and we have similar thinking. This helped us when we were working on other neighbours' apartments.

Focus Group Code (FOGR4BGA, Bulgaria, Formal Social Unit)

Moreover, in some cases, frontrunners may appear in the form of best examples from other cities or countries:

We rely on international exchange and try to keep the contact with other cities, to give good examples over and over again, although [city] has a lot to offer here. We do both, but there are always frontrunners, where it has to be said that our municipal utilities, for example, have not yet reached this stage.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

We work a lot with spreading the lessons learned from the electric cars in Norway; How do we use our cars, are we satisfied with our cars, not least how we charge our cars. And we see it is very many misconceptions of how to charge the cars, how much power you need at home to recharge their cars, both in Norway and abroad.

Interview Code (IDIN42NOH, M, Norway, Collective Decision Making Unit)

Clearly, the frontrunners are not always expected to be the best examples, and they can experience failures. Interviewees argue that the improvements are generally possible by taking gradual steps, and not necessarily through doing the right thing in a single move.

If you can do something, you won't do everything correctly. If the Tesla company hadn't existed, the electric car would not(?) be so far away today; instead, it might have been where the hydrogen vehicle is now.

Focus Group Code (FOGR14ATA, Austria, Formal Social Unit)

The electric car is not 100% perfect, but from the point of view of the energy transition, it is an important step forward. It may not be the final solution, but at this point in time, the electric car is the right move. If we look at the present time as a ten-year period, then this is the only possible step we can take. But this step will also leave a footprint. We cannot prevent that.

Focus Group Code (FOGR14ATA, Austria, Formal Social Unit)

The role of frontrunners is even more critical in cases where it is required to stimulate the more widespread implementation of new technologies, such as electric vehicles for e-mobility:

Something that should happen is to have more people who have the power to decide and manage large parks of electric cars. These may be directors of departments in companies or directors of directorates in ministries, it does not matter. Someone who has one or another cause of service - reports dealing with cars that are over 10, 15, 20, 30.

Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making)

At this point, some of the respondents claim that there are prerequisites or barriers associated with being frontrunners in energy transition. One reason for this is related with the power, which the organization holds within the market. Companies that perceive themselves as small market players, that is, followers, think that it is the trendsetters' role is to set the example:

> *Because we are private, we are a little more demand-driven and not so interested in implementing strategies for political reasons. … we do not have to be the first-mover, and what is also a problem is that we – as an SME – cannot afford to do so. … Our approach is not to develop things as trendsetters, so to speak.*
>
> Focus Group Code (FOGR15ATB, Austria, Collective Decision Making)

One critical finding about the role of key influential figures is that, particularly when they are an indispensable element of collective decision-making processes, the whole process might rely on their performance and availability. The below quotation, for instance, illustrates how the entire process collapsed when a key figure died unexpectedly:

> *City council Mr. [Name Surname] started blazing the trail, as it were. When he died too soon, nothing went any further. So, even in the provincial capital, the process relied on a single person. And from that point onward, virtually nothing has been done with what he introduced.*
>
> Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

In summary, a second emerging theme of our analysis pertains to the impact of individuals and social dynamics in realizing energy efficiency. In this context, we highlight the significance of enthusiastic individuals, who act as innovators of the diffusion process, and their roles in initiating, communicating, and leading energy investments.

Quality Information and Storytelling

A third emerging theme in our analysis addresses communication as a motivator. In this context, our respondents referred to a variety of aspects relevant to communication. Again, the importance of communication is already contained in literature (Barisa et al., 2016; Haddadian et al., 2015; Shao et al., 2016; Van Doren et al., 2016; Persson & Grönkvist, 2015; Ástmarsson et al., 2013), and our contribution at this point rather relates to the processing of information, particularly by using a consumption culture framework.

To begin with, strategies and decisions on the formal level have low chances of success without and understanding and support from society. To this end, providing information to individuals is very significant:

> *But if we want to move away from carbon in the long term, we have to start somewhere, and people can receive information about the Smart City strategy in this case which, thus, motivates them to act."*
>
> Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

In the same vein, there is a common agreement among the respondents that one key issue that acts against energy transition is the lack of information on various decision-making levels.

> *The whole building and construction business is collaborating very little with any foreign organizations or actors. 99 % it is national, we may get a product idea from abroad, but any other collaboration is minimal. Extremely difficult. We have some time tried to open discussions years ago, my predecessors, but they never really found anything to take forward.*
>
> Interview Code (IDIN52FIC, M, Finland, Collective Decision Making)

Surprisingly, in many cases, this is not the result of the unavailability of information; but rather the lack of reliable, unbiased information. In this context, our respondents frequently highlight the fact that communication should be understood in terms of quality rather than quantity. They state that all decision-making units are aware that they should keep communication channels open and convey relevant information to all stakeholders; however, what happens in

reality is that the communication is realized in the form of a one-sided monologue. Several actors try to overcome this situation by providing quality information through communication; one such actor is the association for building or renovating detached houses in Finland:

> *In energy issues, there's a lot of information from different sources and if we follow information released by terrestrial heat pump association or district heat association, it can oftentimes be contradictory. We try to have dialogue around it, to dig deeper, and then communicate so that we do not overdo it or give faulty information.*
>
> Interview Code (IDIN52FIC, M, Finland, Collective Decision Making)

Similarly, the following quotation provides an accurate description of the current state of "quantity information", and why it should be transformed into "quality communication", particularly in the digital era:

> *Basically, there is a preoccupation on an abstract level that is permeating society, which is almost like a mantra, right? The fact is that if we want cheaper and more sustainable energy that is more environmentally benign. But when it comes to making our own choices as citizens, as consumers, all this is forgotten. All this is forgotten. And we put the blame on the Local Government, in the Regional Government, the State Government, that is, someone should come and solve the problem: "guarantee me that ...". So, of course, this is a social problem, but one that is not solved by, well, attacking the legislator or the executor in charge in a given moment, it has to be solved by a change of habits. So, what we have to encourage is [to facilitate] more information because ... more information, but not in terms of volume of information, but in terms of quality of information. Today, the distribution channels for information are guaranteed and there is a lot of volume, a lot of information and also a lot of misinformation, because it's the quality of information that is lacking. And also, because of a defect that we have incorporated as human beings, which is that of remembering the scandalous, so then society gets stuck with a bunch of misinformation or more or less incendiary slogans and they determine the decisions that we then make. And what we need to*
>
> *do is to change this volume of information for quality information, for verified information, truthful information, that sticks in society. The bad thing is that I believe that as Public Administration we do not have a culture to deliver that kind of communication. We have a very institutional communication culture, very formal, we do not have the kind of culture of information, as I discussed with my collaborators, that enables us to make or generate some informative content. ... Well... The word, the way of defining what we needed is: "we want something that our mother or our nephew will retweet or send by WhatsApp", something that is sufficiently attractive, key to amazing information or fun or ... or the type of things that go viral – this is the right word - so that it becomes viral. Because, on the other hand, biased information goes viral all by itself.*
>
> Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

Recipients of the information provided have a tendency to evaluate it based on its source. It is a common belief that the content of the information is designed to serve the interests of some party. Therefore, the information provided by a neutral party is perceived to be more reliable:

> *We can hold on to the neutrality, and dissemination of reliable information. ... information coming through [our company] is considered more reliable than the same information given by some industry. If the same message is delivered by car or energy industry there is always the question whether they have some hidden interest. So if one wants to formulate it in a sophisticated way, it relates to the information steering quite a lot.*
>
> Interview Code (IDIN55FIF, M, Finland, Collective Decision Making)

As the knowledge, knowhow and experience accumulate in an area, it is easier for the stakeholders to access information and to assess its reliability. However, when this is not the case, it becomes more difficult to capture and utilize information with the potential to serve decision-making. Therefore, in areas such as electric vehicles for instance, quality information is more valuable:

We are also preparing this new communication project where we would first update and renew the web service, and its tools. It sort of needs information targeted at consumers because there are also a lot of advisors for these different driving power sources and fuels, and not even the devil always knows what to believe in. Even if there were no direct lies, but it easily happens that the strengths are over-emphasized and the weaknesses are softened or faded out. Then the consumer is a bit confused.

Interview Code (IDIN55FIF, M, Finland, Collective Decision Making)

The dissemination and communication of information to the citizens is important in terms of obtaining support and acceptance for energy transition by society. Such efforts also add to the visibility of what has been done in this respect:

They (citizens) were not, as far as I know, involved in the development work as such, together with us, it was quite purely design driven activity in that project, but we did disseminate and communicate to the citizens quite a lot. We had different campaigns and events with electric bikes on show and for test driving as well as get-togethers for electric vehicle drivers. Then we had a sort of final event where [a famous name, celebrity] came with their own electric car. This type of more popularised things and it seems to go very differently. Citizens are interested in that type of thing, and we got a lot of positive feedback and visibility.

Interview Code (IDIN57FIH, M, Finland, Formal Social Unit)

Apparently, what is needed is "meaningful, reliable and viral communication", a two-way flow of quality information that people may relate to. This type of a communication has the capacity to involve others personally in energy efficiency issues, and therefore act as a "real" motivator. One of our respondents provided an example of how this type of communication can provide real results:

People need to take responsibility of the house finally and not just always vote "nothing to do". We have also introduced information displays at the building corridors to encourage people to inform the housing board and the maintenance company if there is too cold or warm in their flat etc.. to get us know more about the shape of the house… when we have started to engage residents and flat owners more and ask about their experiences and needs, there has been clearly more willingness to listen to us and to accept hopefully the energy renovations and not just do the absolute minimum.

Focus Group Code (FOGR13FIB, Finland, Collective decision-making units)

These quotations emphasize the fact that communication should be exciting and inspirational, because it is the only way that it can keep individuals motivated. It also should generate meaning, as beautifully put forward by the below quotation:

[E]lectric cars will be urban cars for quite some time. At least for now, they are good for the big cities. It is important to add that it they make sense. It literally creates meaning. Much of the things we do today are emptied of meaning. It is difficult to define what I mean by meaning, but as we say it, giving a person freedom, everyone understands for himself. It's clear what I'm talking about.

Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making)

This is a particular aspect that we focus on: As humans, and consumers, our choices are usually the result of a meaning-making effort, and it is widely acknowledged that commodities (or services) are utilized as the vessels to meaning making in life (McCracken, 1986). This being the case, consumption preferences are not only the result of rational calculations, but also irrational. Therefore, meaningful communication does not necessarily refer to mathematical formulas and cost-benefit calculations, but rather to the avenues through which consumers may use these in understanding the fabric of life. Irrationality is a common theme that has been illustrated in a number of quotations given below; highlighting that communication should be directed at generating meaning and maintaining dialogue between parties:

We all are consumers and we all are individuals. We all do choices in our everyday lives. From that perspective I'm only thinking that, I have PhD in energy science, energy studies and I know a lot about energy, but anyway I think it's so damn hard to do the good decisions in my everyday life. Because I know what's right and I know what I can do but it's very hard. And many good choices that I know it's good choices does not really fit into my daily life and my schedule and things that I, have to do. I can't really use energy during the night even if I know that's good for the energy system.

Focus Group Code (FOGR12FIA, Finland, Individuals engaging in joint contracts)

I suppose on average, people's criteria in decision-making are somewhat crude, after all, despite they tell it being the other way. The same thing is valid for national and municipal decision-making. The reality hits from two directions, first, ideology or value-based decision making costs. Secondly, policy measures advancing clean energy negatively impact in some stakeholder groups that have to be considered by political decision-makers. This makes them difficult. Perhaps this explains the difficulty for a forerunner company, especially if it is in good shape, for really being a forerunner and to make these radical decisions. On the other hand, a consensus is easier to find for a community as it has gathered people with similar mindset, in contrast to a municipal decision-maker or a politician.

Interview Code (IDIN54FIE, M, Finland, Collective decision making)

Energy is the amount of clothing you buy, where you buy food, traceability ... Everything is imbricated, everything is united. So, it does not help if someone, in the context of this energy transition, thinks "Hey, I'm going to buy a Toyota Prius because they are very positive for the energy transition and climate change" and then this person does not pay attention to the rest. It's not logical, it's not consistent.

Interview Code (IDIN30ESD, M, Spain, Formal Social Unit)

The year I came, this was also considered to be very important subject, and we spent years talking intensively on the subject and reflecting on what we should do, what we leave behind in this world by carrying out our activities. This has already led me very far in that direction, and I try to live it personally. Not in all areas, because it doesn't always work. I also occasionally sit in an airplane, but I try to avoid it as far as possible. I don't drive the car very often. As little as I can. This has quite curious effects, for example, when one of my friends says that I don't have a bad job with the city administration, and that I could actually afford a car, and I don't always have to ride my bike. People really say this kind of thing, and very directly, to you. I'm saying at least that's the way it is out in the country now. This might be different in the city, but I originally come from a rural community, and I have already been asked this question there. My answer is then, yes, I could buy a Porsche at any time, but do I really need it? For me, this is already highly symptomatic of how people think about things. If you approach this person with a climate protection survey and ask him if he thinks it's important and great: What do you think he or she would answer? Of course, that's really important and great. But that person still wouldn't understand why I ride a bike instead of a Porsche. So that's the schizophrenic aspect of this whole subject.

Interview Code (IDIN61ATB, M, Austria, Formal Social Unit)

In this context, our findings also reveal how "meaningful" communication can be carried out to initiate change and motivate individuals and the society towards energy targets. A key finding relating to this addresses the importance of storytelling, which is now considered an integral aspect of any successful marketing strategy. Storytelling can be defined as the process in which learning is structured around a narrative or story as a means of "sense making" (Reissner, 2008). It can involve the use of personal stories and anecdotes to engage learners and share knowledge, which in turn increases involvement and interest with the message. One of our informants, for instance talks about how energy efficient solutions, such as EVs or photovoltaics, should be made "sexy", so that the story around this concept will generate real results:

The e-car has to be made sexy somehow or the public transport has to be made faster or a lot cheaper than the alternative. There simply has to be some sort of incentive that changes the user's behavior in such a way

that he or she changes their behavior by himself or herself. And to do that is the big trick. It's like photovoltaics. That's the best example. You don't build in photovoltaics because it saves electricity, but because it's sexy at the time and, ultimately, because a small system with two three kilowatts doesn't cost a lot of money, and because you can immediately see the results. You can look at the meter every day and observe the effect of a cloud on the kilowatt hours, for example, and this is simply exciting and a certain stimulus and, therefore, it works well. If this were to happen somewhere in the area of mobility, I hope it happens very quickly. That is the hope.

Interview Code (IDIN62ATC, M, Austria, Formal Social Unit)

Similarly, our interview accounts demonstrate how shared stories will enhance diffusion of new products and systems, and therefore operate as strong motivators to mobilize different sections of the society:

I am always interested in how things have gone in the past in other areas where similar processes of change have taken place. I have the impression that the subject of overload, and I also see this quite clearly, must simply be put on hold. In the 1990s, when the Internet was introduced, no one understood how it worked, and there was a lot of debate about how it worked. And this is generally the case when introducing new technologies. I believe that we are still at a stage where we are dealing with the function of the energy transition and smart technologies. This is a normal part of the development cycle. When new technologies come onto the market, people want to know how they work. I believe this is an ephemeral process. When things are established, nobody cares anymore. I do not believe that we, as energy suppliers, will have to explain our products in the near future.

Focus Group Code (FOGR15ATB, Austria, Collective decision-making units)

I also believe that the success stories regarding climate protection or energy issues will emerge over many years. It doesn't help if I have a good year this year, because I don't save the world's climate that way. It has to work continuously for many years. And you have to persevere, and setbacks are part of the job, and I'd say that you mustn't view it so narrowly.

Focus Group Code (FOGR14ATA, Austria, Formal Social Unit)

So in a way there are quite wretched or ordinary reasons which boost the suspicions of regular people. The more electric cars we get into use, and the more good experiences are shared, the more people dare to buy an electric car.

Interview Code (IDIN55FIF, M, Finland, Collective decision making)

These findings also highlight the need for well-designed messages to be transformed into powerful stories, as well as suitable channels that will effectively convey these to the right audiences, in order to ensure that quality communication is achieved and utilized its potent to motivate change towards energy efficiency.

To sum up, our analysis has identified three main categories of motivators, i.e. economic, personal, and informative, underlining a variety of relevant aspects that have had limited discussion in literature to date. These include the impact of globalization, new business development and marketization, key opinion leaders and passionate innovators, quality information, and storytelling. We now focus on how these motivators are embedded into decision-making processes, with a focus on patterns in different levels of collective decision-making.

NEGATIVE MEDIATORS: BARRIERS AND DISABLERS

Numerous previous studies investigating barriers to implementation of low carbon energy solutions have concluded that a myriad of factors might be at work, including economic, technological, political, personal, and social barriers (e.g. Van Doren, 2016; Persson & Grönkvist, 2015; Noel & Sovacool, 2016; Henriques & Catarino, 2016; Lorenzoni et al., 2007; Van Rijnsoever et al., 2015). Similar to a discussion of motivators versus enablers, through our analysis we concluded that barriers should rather refer to factors that prevent taking an action, while disablers are the conditions that discourage or impede the execution of the process. As with motivators, some of our findings are aligned with the

existing literature, accompanying emerging themes that form the theoretical contribution of this study. An important finding of our research is that barriers and disablers are frequently mentioned as being confined to lower levels of collective decision-making units, i.e. individuals and individuals engaging in joint contracts. For higher levels, transition to low carbon is deemed inevitable, and therefore their willingness to succeed this process is greater, if not without obstacles. Therefore, an important conclusion of our analysis is that there are more disablers at work than there are real barriers.

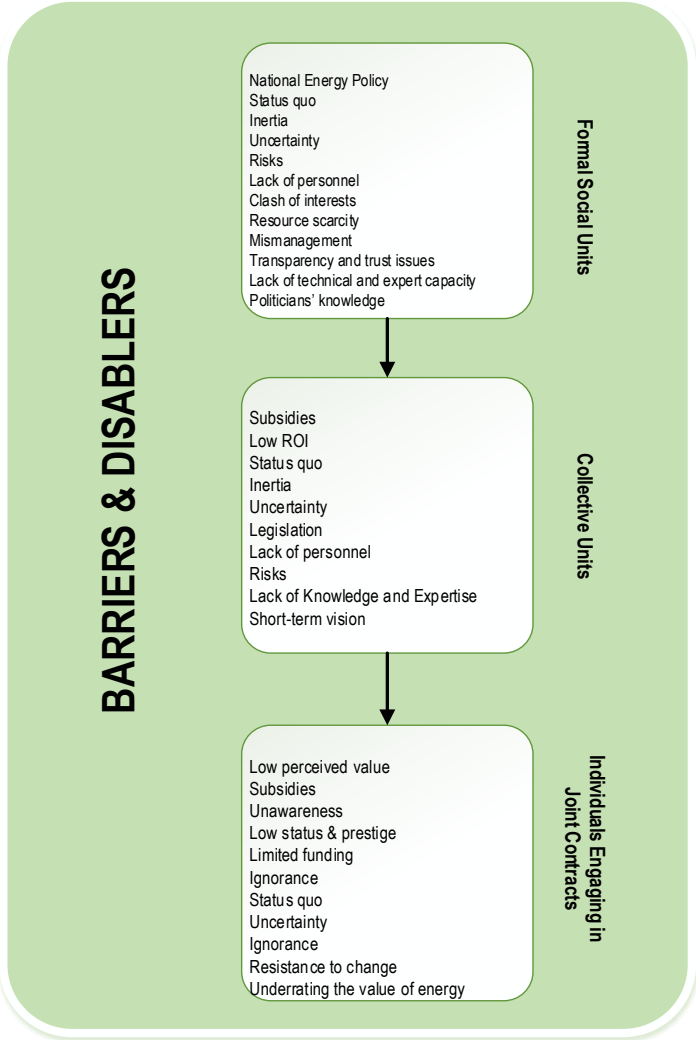

Figure 18 Barriers and Disablers

Below we provide a discussion on how several factors, particularly those limitedly mentioned in literature, impede the transition to low carbon energy. A graphical representation is also provided in Figure 18.

Perceived value of energy

The first and the foremost of these emerging themes addressed the perceived value of energy, which was frequently mentioned by respondents, regardless of the country or the decision-making level. Perception of energy as a low valued utility was a common complaint, as it acted as major barrier for persuading individuals, organizations or the society as a whole to take action on energy efficiency. As one of respondents reacted:

The society is not interested in energy issues, basically, because it does not hurt their pockets [silence]. If the gasoline cost three times as much, the water costs were twice or triple, or rather, all the basic resources cost three times as much, the people would say "hey, this is serious!" People also have no real conscience, what [energy] really costs, for example, the contribution that the system makes to the government, so that they have access to those resources, which they consider a right. I mean, all these costs are not reflected in the [energy] bill. Since the electricity bill, in general, does not hurt anyone's pocket and these costs are assumed [by society], you say "Ok, I go with it". Apart from all the bad things that the system has done, the billing system of electricity, well ... leaving that aside ... but, in summary, I do not see that there is a great concern about energy.

Interview Code (IDIN30ESD, M, Spain, Formal Social Unit)

Our findings asserted that most households take energy for granted, and are not motivated to look for alternatives, particularly because energy costs account for a minimal amount within their expenditures. The low cost of energy is sometimes linked to the geographical conditions of the country, such as Norway, which relies on its natural resources to a great degree,

The price and the cost of power for electricity in Norway is kind of a non-factor [...] That is, that the profitability considerations in Norway are different because of the cheap power.

Interview Code (IDIN35NOA, M, Norway, Collective decision making)

and sometimes to political decisions, such as heavily subsidized energy in Bulgaria:

This is the price of electricity and the imbalance in energy prices. Because you are not in the field, I will explain. For example, at home, consumption of 1 kWh of electricity and 1 kWh of natural gas, the price is almost the same for the households. The difference is minimal, which is not normal. Electricity has always cost more than the natural gas. That is why in Germany over 60% of households connected to the gas network. In Bulgaria they are 3%.

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

Another important issue is that such a perception is not limited to households. Our respondents mentioned that for many small businesses, particularly those operating in the service industry, energy cost is not a factor that necessitates strict scrutiny. This being the case, it is usually not possible to motivate such organizations to seek and invest in low carbon energy solutions, as this will mean "unnecessarily increased costs" from a business perspective.

From a business point of view, energy efficiency is, in fact, an absolutely uninteresting business. For 99% of the companies, I exclude big energy consumers because there energy is important in cost. But in a consulting firm, energy has no value in terms of cost. Now, if you just want to do great things and if you have decided that this is the most important thing for you...may be. From business point of view, however, it makes no sense.

Interview Code (IDIN22BGF, M, Bulgaria, Collective Decision Making Unit)

Tourism companies such as hoteliers, for example, are a difficult target group, and it is very difficult to get through to them because the energy sector is only a very small part of their business. Commercial and industrial companies are very difficult to reach because they usually have their processes well under control, and the energy costs only represent a small part of the overall system. So these are the points which, in terms of their effects, have a much greater impact than the individual items in the budget. That's always our problem.

Interview Code (IDIN62ATC, M, Austria, Formal Social Unit)

Besides the low perceived value of energy, our findings also revealed that the individuals lack knowledge about what energy efficiency refers to, as the concept of energy is rather abstract. This results in the perception of the value of energy being somewhat distorted and not comparable, ultimately leading to a situation where a product or a service

promoted as low carbon or energy efficient is not necessarily recognizable to individuals. As stunningly illustrated in the below examples, such a distortion also complicates the problem of understanding the real value of energy:

> *I also realize that people cannot understand that, because it's incredibly abstract. Just ask someone how he envisions a gigawatt hour. People who are experts and have been dealing with kilowatt hours for 40 years have a hard time imagining this. A power plant builder would say that he needs a turbine of this size, and another person would say something else. It's hard to imagine something so abstract. And, that is why it is very difficult to explain such relationships. Meanwhile, we need more energy for hot water in a good house than for heating. If you tell people that, then they're surprised. And, practically every family needs three times as much energy for the car as for heating and hot water together. And these kinds of things are just not clear to people. So, if someone says that he is totally committed and builds a passive house that is four kilometers away from the nearest public transportation, to which he then has to go by car .... many people do not understand that. It's hard to make something so clear to people that they then do something to move in the right direction.*
>
> Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

Underrating the value of energy ultimately reflects itself in an unwillingness to invest in energy efficient and low carbon alternatives. A considerable reluctance is particularly attachable to individuals and small businesses (including contractors and developers), as noted above, because they believe that they will not be able to amortize their investment. At times, choosing an energy efficient option even might become a social burden:

> *[…] everyone told us it was an expense that we were not going to be able to amortize, that it was going to be extremely expensive and we could not go into solar energy.*
>
> Focus Group Code (FOGR8ESB, Spain, Individuals engaging in joint contracts)

> *The low cost of electricity in Bulgaria is another huge problem for this. As long as the big developers with whom I have contacts on a daily basis and the landlords don't really care. Ok, it is maybe a generalization what I am saying. It is not that there are no good examples from people who heard about it, who think about it and want to keep pace with the world tendencies. But the general mass of people doesn't care at all because it thinks only of the short-term profit and how to invest less money in the building. The other thing as I said is the low price of electricity in Bulgaria. This does not motivate poorer people and the retired persons for example to think about development, there should be other mechanism. They see their bill is OK, so everything is OK then. What about the comfort about the wellbeing or the healthy living?*
>
> Interview Code (IDIN19BGC, F, Bulgaria, Formal Social Unit)

At this point, it can be said that one of the main problems is that one cannot fully grasp or experience the benefit of investment immediately. Especially in Europe, which has a relatively favorable environment, the real impact of investing in energy is not clearly understood by households. In this context, an important finding in our interviews is that European citizens cannot fully comprehend what they will receive in return for their significant investment.

> *One problem with energy efficiency saving solutions is that the investment costs are immediate while the benefits come little by little in the future.*
>
> Focus Group Code (FOGR13FIB, Finland, Collective decision-making units)

> *A problem in cleantech things is that you pay for the choices but it is hard for you to see the benefit in the choice. There is a lack of the benefits concretely, how much your choices here in Finland impact in mitigation of climate change. It is quite an abstract thing. But you'll immediately see the price of the choice in your wallet. Perhaps this is the dilemma here. Air quality in Chinese city is an easier example of impact. There, the threat is somehow immediate for those people, so they had a high motivation to improve the air quality, as they saw the health impacts every day.*
>
> Interview Code (IDIN54FIE, M, Finland, Collective decision making)

Low rates-of-return (ROI), either perceived or real, also forms a barrier for companies and organizations, such as municipalities. This is particularly true when the funds are limited, and the decision-maker has to choose the most efficient alternative in terms of returns. In this case, returns refer not only to monetary returns, but also to intangible benefits, such as the satisfaction of residents.

> *Particularly, the ESCO (Energy Service Companies) in Bulgaria goes best in the street lighting field. It turns out that it is a relatively simpler system. It is easier to get a return on investment in a shorter time, while with the buildings things are slower, and the system is more complex. One building is a very complex system. In many cases, when such buildings are approached, it is not understood, for example, that ESCO cannot cover everything, it covers the energy part from the point of view of energy efficiency, but sometimes it requires constructive improvements and some other functional investments. These are activities that cannot be included in the ESCO. These are activities that need to be funded separately.*
>
> Interview Code (IDIN22BGF, M, Bulgaria, Collective Decision Making)

Moreover, lifetime costs, unfortunately, do not share the same time base with the common time frames of the decision makers:

> *All alternative forms of energy require a high initial investment, but over the lifecycle costs I am alwaysbetter off with cheaper ones. All decision-makers, whether in business or politics, have a five-year horizon and no alternative form of energy is economic within this period. … And that is why alternative energies do not pass through politics or the economy.*
>
> Interview Code (IDIN66ATG, M, Austria, Collective Decision Making)

Nevertheless, as already mentioned in our discussion on economic motivators, we can say that the value of energy is better understood by the upper and mid-level collective decision-making structures. Unfortunately, the value of energy is increasingly underrated as we approach lower levels of collective-decision making, which includes small firms, individuals and individual engaging in joint contracts. One particular reason for this is the short-term vision inherent in such decision-making structures. Limited funding is clearly another reason, when compared with the higher-level decision-making units. Yet, we also identified personal-social barriers to be in charge to a great extent at this point, which appears to be one of the most significant emerging themes of the analysis.

Personal and social barriers:

Similar to personal and social motivators, we can clearly identify the existence of personal and social barriers, which are also discussed in literature to a great extent. Within these, lack of interest and involvement appears to be a key factor. Lack of involvement can be attributable to a number of causes. These include unawareness,

> *For many people outside Sofia it is still like a space shuttle. I had a conversation with an owner of a roadside complex in z village. We are looking for charging station locations and I sent people mail, then I call them on the phone - "Ah, electric cars - Space technology. They are far away from us.*
>
> Interview Code (IDIN23BGG, M, Bulgaria, Collective decision making)

ignorance,

> *Society today is not involved in anything, we have relegated all responsibility, we have relegated it to third parties and as we are lacking that responsibility we also do not assume issues such as climate change, energy saving, saving water, protecting the air and all those things. We hope someone takes that responsibility and that's it. We, at the most, are willing to pay someone to assume that responsibility, which is ours, but we load it on somebody else's back and that's it.*
>
> Interview Code (IDIN30ESD, M, Spain, Formal Social Unit)

Think we have already discussed, in another context, why climate change is not such an issue for people. It's always pushed very far away, and it's the other person's fault […] Why should I avoid driving my car when something like this happens elsewhere? Then the Chinese and then the Indians are made to blame… Once you have identified a culprit somewhere, you no longer have to account for your own behaviour.

Interview Code (IDIN61ATB, M, Austria, Formal Social Unit)

a strong resistance to change,

Lack of involvement. The absolute lack of involvement that you can find in certain levels of both administrations and society itself. There is an ENORMOUS resistance to change, monstrous. Promoting any small change involves an investment effort and an unreasonable amount of time, perhaps, since you are all day involved in this and you have heard things so many times, and you have seen the numbers so many times, that for you it becomes something almost obvious. But when you see the one in front looking at you with the "cow looking at the train" face.

Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

desire to maintain the status-quo,

This, on the one hand and on the other hand, there are people who have a great interest in maintaining the status quo. People ... a few people. I do not think they are so many, but they have a strong influence and because both go together in one direction are quite strong. You cannot change political decisions if people who have to make these decisions have no motivation. This motivation, which is our intellectual notion of a better world, etc., the people who deal with it they do not understand it at all. These are - 95-96% of them.

Interview Code (IDIN23BGG, M, Bulgaria, Collective Decision Making Unit)

inertia,

But, alas, when push comes to shove, and when the community, the province, or the federal government should spend some money, then no one wants to play along. And, I don't just mean spend extra money, but simply shift the priorities from something else to the energy transition. And, that is undoubtedly our biggest shortcoming. And, that all effort ends immediately, as soon as somehow work and money are connected with it. It's not even just money, but it's also time and work people don't want to invest.

Interview Code (IDIN64ATE, M, Austria, Formal Social Unit)

I have heard from many experts the sentence "this cannot happen," which is indicative. It can't happen because the individual person has not really bothered to explore it deeper.

Interview Code (IDIN20BGD, M, Bulgaria, Individuals engaging in joint contracts)

scepticism,

As I go there, I try to present myself more as an expert rather than as corporate representative. I'm always with my head in the wall. I try to convince them that this is the future, so it should be like this. However, they are particularly afraid when it is coming from the business. Always considering it is a lobby. And what's so bad about a lobby? You have no idea how France protects small producers, sometimes it is even nonsense.

Interview Code (IDIN19BGC, F, Bulgaria, Formal Social Unit)

And then one grandmamma said that we are fakes, she didn't believe that this is possible and the project was over. We were almost at the end but she refused to agree and that was it. So such situations also appear and it is really hard then.

Interview Code (IDIN19BGC, F, Bulgaria, Formal Social Unit)

fear and anxiety,

> *Starting with the car dealers who make it hard to buy a hybrid car, because they do not want to get into trouble and complicate their lives selling such cars.*
>
> Interview Code (IDIN29ESC, F, Spain, Formal Social Unit)

> *The most disappointing outcome has been that there is virtually no intention or will to make political statements on the subject motorized private transport.*
>
> Interview Code (IDIN63ATD, M, Austria, Formal Social Unit)

cultural values and norms,

> *I believe that the mentality of the citizens should be changed immediately. For instance, many people believe that the use of private cars and high- quality cars are a symbol of social status. For this reason, we cannot convince them to use bicycles. At some points, as the municipality, we might be insufficient to encourage them to use bicycles. Even though we make a significant effort to increase the use of bicycles, the citizens resist using them. From my point of view, the citizens will demand nothing in order to change the current system. Therefore, the municipalities will have to be very innovative and to support the advertisement campaigns such as billboards and public service announcements in order to spread the use of bicycles.*
>
> Focus Group Code (FOGR3TRC, Turkey, Formal Social Unit)

> *[I]t is quite complicated ... to start with a plant that has acquired certain habits and often, well, that I also understand, people do not feel like the company is their ... I mean like it's not your house, right? People leave and leave the machine turned on, because they don´t care, in some plants. But in others, what I was telling you, in others, it would never occur to the operator to leave with a press switched on, because this is how it has been is done from the beginning, when you start working at the plant. Yes, when you enter the plant you see that everyone does it, or they explain to you how it is done, if it is almost a culture, a work dynamic, well, and then you do it. In a plant, where it has never been done like this, well you can get the need across to the workers, but it is a much more complicated road. We, for example, have a plant in Germany that now puts next to each machine a kind of signposts indicating everything that there is to do, everything that needs to be turned off, then good, because it starts there. It begins by informing the workers of that need, and then how to control it? Well, at first this is not going to work all by itself, is it? Well, at the beginning, there has to be control, but once you enter into that routine, in that dynamic, perhaps it is no longer necessary to have someone on top to make sure that that things are turned off, it will happen automatically.*
>
> Interview Code (IDIN28ESB, M, Spain, Collective Decision Making Unit)

and of course, social status,

> *And then another effect is that of inequity. When I mean is that all the energy issues, that is, energy efficiency and renewables are a thing for the rich [silence]. They are for the rich due to two facts, you hear, because undertaking the investment is viable only for a person with a hell of economic resources and not for the common mortal, and then, the type of housing that people with high purchasing power have is much more suited for the installation of renewables and for energy efficiency actions.*
>
> Interview Code (IDIN34ESH, M, Spain, Formal Social Unit)

As this extensive set of quotations reveal, personal and social barriers play an important role in hindering successful implementation of energy efficient solutions. In this context, we can address the lack of quality information that inspires individuals as a first and foremost factor that contributes to this barrier. Unfortunately, the sheer volume of information does not help people to make meaning, which in turn, results in ignorance and inertia.

Moreover, we see that there is a strong resistance to change, which is partly attributable to incomprehension of the value of energy, as discussed in the previous section. Individuals see no benefit in investing in a low carbon economy, which is understood as an untimely and unnecessary cost to be resisted.

Scepticism, fear and anxiety form another group of personal barriers, as individuals perceive great uncertainties and risks with these technologies. Particularly in the cases where households and businesses form a decision-making relationship, households perceive themselves to be on the more unfavourable end of power and information asymmetry, and therefore hold a belief that there is a business interest that will lead to a financial loss for them. In other words, they feel that there is an inevitable fraud or trick in the companies' (developers, dealers etc.) efforts to persuade them to purchase low carbon products and services. Consequently, the relationships end before they even start, or become untrustworthy from the very beginning, which complicates the post-purchase evaluation process.

Cultural barriers are also at work: As exemplified in the above quotations, households may believe that low carbon solutions offered by the industry are low prestige alternatives to the existing products and services. This is particularly true in the case of E -Mobility, and especially in countries such as Turkey, where grandiosity is matched with high status and affluent identities. Yet, as discussed in the motivators section, transforming low carbon products into symbols of sexiness, coolness, etc. might be a viable solution to change such perceptions.

Uncertainty and perceived risk

A major theme in our findings pertains to uncertainty, and the resulting perceived risk with these products. Perceived risk is a common barrier for all innovations during the diffusion process, and may be reduced with increased possibilities of experiencing compatibility and visibility of benefits.

> *But there is enormous uncertainty, in relation to that we do not know what the actually cost really is, for example, by going with a whole new energy carrier. One thing is the material, which has a price, but you're going to build all sorts of facilities, so then you will have some unpredictable prices here and there, and so you end up with something that you are just guessing on. And what kind of economy do you have in 4-5-6-7 years.*
>
> Interview Code (IDIN44NOJ, M, Norway, Formal Social Unit)

> *You know approximately how it works, and you know that it's going to work out, but you don't know just how expensive it will be. It is what we call not "technological risk", but "commercial risk." … Simply because of: "Ok, this is something new, it's something unproven, it is not necessary so that we earn very much from it. It is at all worth taking the risk of that kind of large investments? It is not necessarily certain. " And then there is the need for internal training.*
>
> Interview Code (IDIN36NOB, M, Norway, Collective decision making)

However, in the case of decarbonisation, uncertainty not only exists regarding product-related factors, but also contextual factors to a great extent. One of these factors is technological uncertainty, which arises from the fact that the energy technologies are rapidly developing and the decision-makers can not foresee whether or not their investment will be obsolete in the short-run,

> *And still the attitude of the state is that the companies must conduct…, it's kind of not our business to do something, as in somehow the optimal assessment of what is risky and what is not. But no, it is clear that barriers come both in terms of costs and in the perception of what constitutes a high cost in order to create the necessary climate change. And when it should happen… So, again, it's like, it is. .. there is both cost, and something about uncertainty related to the technology, [and when it] will get better. But the industry in general says that it can [do this?].*
>
> Interview Code (IDIN37NOC, M, Norway, Collective decision making)

or how existing administrative and legislative structures will respond to such change:

Now the transition is technological, now we are not only talking about changing the way we work, but that the technology we have is totally different. And we do not how the energy mix will look like from now to 10 years, or 15 years on, but it will probably very different from the one we have now. ... the nuclear plants are likely to disappear, the coal [plants] will disappear. Then, we will have a radically different electricity-energy scenario with technologies with variable costs practically zero or very, very low, with lower investment costs, but with investments cost still much higher than the operating costs, just the opposite of what we have now, and with an operational dynamics that will give lots of headache ... we're going to need more renewables and something to help us manage the system with a high level of renewables, and today, that management capacity is basically provided by hydroelectric plants, combined with storage, and combined cycles.

Interview Code (IDIN32ESF, M, Spain, Formal Social Unit)

Another source of uncertainty pertains to regulatory matters, which further complicate the business climate:

This is maybe the local situation, I cannot describe it. Too complicated business climate, so to say. Not that you cannot do business, but it's a very complicated business climate. This thing always kills me – the last-minute change in the situation, as it happened with the renewable energy sources, as it happened with organic farming. … his is something that frustrates me constantly. Along with all these minor changes, last minute setbacks, legislative ones that really fail things.

Interview Code (IDIN20BGD, M, Bulgaria, Individuals engaging in joint contracts)

According to one of our informants, regulatory uncertainty is so great that even entrepreneurs cannot make their own decisions about the future of their own businesses, without hiring a consultant to explain the regulations and procedures:

RESPONDENT: Regulatory uncertainty is critical for renewables in general and for energy efficiency measures, right? I mean, all the long-term measures, right? Then, of course, it affects a lot that you have to be very specialized to get into this already, as you say, it is a very difficult law, there are people, businessmen, presenting themselves to auctions, those that the Government has called for is this year, who do not fully understand how it works and who have to hire consultants. I have been hired, once, for the January auction to explain how the auction works, if auction winners are going to receive the money from the plants, right? This is truly striking, isn't it? That an entrepreneur needs professional support to understand how much he will earn, right?

INTERVIEWER: To understand your own business, right?

RESPONDENT: Of course, of course. Imagine that transferred to a small consumer, it is, of course ..., this normative complexity, what it does in the end is to drive away, drive away the small consumer from being able to invest, to be able to participate in the change of energy model, clearly. I, when talking about the barriers to self-consumption in Spain, the first barrier, which is not the best known, the so-called solar tax, ok? The first barrier is the bureaucracy that prevents many people from getting into self-consumption by the ordeal of administrative procedures they have to overcome before they can connect their facility.

Interview Code (IDIN31ESE, M, Spain, Collective decision making)

And last, but not least, a great deal of uncertainty stems from the political environment. Rapid changes in the legislation without sound criteria, which is a common complaint in countries such as Spain and Turkey, create a great barrier for businesses with regard to the promotion of an investment.

The legislative changes that are taking place in the country without any criteria. In Spain we remain in the hands of energy lobbies and nothing can be done about this. The Spanish political party "Citizens" made an election campaign saying they were going to fight against the "sun tax" Royal Decree but, in the last minute, they backed off. In Spain we continue to see that the electricity companies are very strong and influence national legislation. We have gone from being world leaders in renewable energy and from being a step away

from heading on to integration and so on, to see people moving out of the country, because they [the government] paralyzed the industry. For me that is very sad.

Interview Code (IDIN29ESC, F, Spain, Formal Social Unit)

Moreover, the power of lobbies and interest groups also discourage small businesses and communities to build and maintain confidence in the future, as the former has an enormous capacity to influence politics and hence legislative decision-making.

Well, I think maybe the biggest disappointment is the reaction of politicians in general. You can never generalize, because there are some politicians, with whom I have a great relationship, but..... it is desperate; there is a desperate lack of capacity in decision-making, in general, the lack of being able to commit to something in the long run. The way, in which they change their criteria, especially when they move from opposition to government. How people you talked to when they were in the opposition suddenly become airtight when they are in government and do not want to listen to anyone. Well ... this may be the worst part of all this experience

Interview Code (IDIN31ESE, M, Spain, Collective decision making)

Finally, the structure of the EU is also regarded as a source of uncertainty, as all member countries are believed ultimately to be trying to protect their own interests:

The issue, I think, has to do with the allocation effects between countries. It's not done controllable in a way. So it is difficult for countries to agree about this because they don't know entirely beforehand how it is going to turn out in each country. So if you are in Germany, and there is a risk that the windmills will be built in the Nordic region and the solar panels will be built in Spain, and nothing happens in Germany, then you will be a little skeptical, right. But there is no doubt that it is the most effective instrument.

Interview Code (IDIN43NOI, M, Norway, Formal Social Unit)

To sum up, the situation with uncertainty barriers, we can clearly conclude that innovation/product related risks are a factor that impedes rapid diffusion of the low carbon solutions, however particularly for higher level decision making units, this is an issue that has been already completely or partially resolved. However, such uncertainty still exists on the lower level decision making processes. In addition, higher-level decision making units face uncertainty due mainly to contextual factors, which include technological, regulatory, and political-legislative uncertainties. The risks associated with these uncertainties increase the tension and appear to be clear obstacles for efficient implementation of low carbon solutions.

Administrative Barriers

A final emergent theme with regard to barriers relates to administrative issues. These are generally due to problems in organizational processes, which include resource scarcity, mismanagement, transparency issues, difficulties associated with collective decision-making and intra-organizational conflicts. A great proportion of these barriers have common grounds with the barriers previously discussed, such as lack of quality information, training or expertise, mismatch of political interests, yet we found it appropriate to categorize these under a separate heading in order to open up a new venue to discuss relatively managerial obstacles.

Procedural barriers are the result of complicated and burdensome requirements that create a difficulty for individuals or organizations with a direct interest in investing in energy efficient solutions. However, procedural barriers may also arise due to absence of necessary documentation, creating a puzzle for potential investors:

To get decisions in housing companies takes a long time, it is a democratic process, relatively strictly democratically regulated too. That is, the usual story that we hear is that this won't happen unless the last residential buyer with the lowest income can carry the extra cost. Because you do not have mechanisms and cost allocation models that can handle it differently.

Interview Code (IDIN35NOA, M, Norway, Collective decision making)

[I]f you have a house and you want to put solar panels for electricity, the whole procedure has to be developed step by step so that a person or an association can realize it. At present, monopolies may create administrative obstacles, but this is regulated in legislation, so there is what to be done to change this process.

Interview Code (IDIN17BGA, F, Bulgaria, Formal Social Unit)

And in some cases, administrative problems arise due to a lack of direction, even on a state level:

Turkey still has problems in determining sustainable development targets and norms. For this reason, the policies cannot be developed properly. The domestic and foreign incentives and the advantages of domestic production are always on the agenda. The idea of a green economy has always been a hot topic. However, none of the hybrid car users is encouraged. Moreover, they pay a higher amount of tax for hybrid cars. Turkey still deals with issues regarding energy policies such as the establishment of nuclear energy power plants and hydroelectricity.

Focus Group Code (FOGR2TRB, Turkey, Individuals engaging in joint contracts)

As noted in some interviews, state-wise inertia may be the result of maintaining status-quo and existing power relationships. In this case, necessary legislations are logging behind targets, as these may damage the interests of monopolies or other big players in the market. This being the case, lower level decision-making units are left with no choice but to wait and hope for the proper regulatory measures. However, this discourages individuals and organizations that have a desire to take action, and eventually lead to dissolving of sense of community:

Because everything is based on the political will at the moment. My opinion is that the political will in Bulgaria, concerning RES sources, possibly including electric mobility, is not particularly insistent and big. Experience shows it. Past taken decisions show it. Without making any distinction to the left or right, it is probably all connected to that one thing and that it is related to monopolies and the satisfaction of different interests. Monopoly interests, in any case these are not the interests for developing of the branch and the business.

Interview Code (IDIN20BGD, M, Bulgaria, Individuals engaging in joint contracts)

It is seen that the mentality of the central government and Ministry of Energy is oriented to provide investment opportunities for large scale businesses and private companies. Ministry of Energy wants these large-scale businesses to meet Turkey's energy demand. The reason behind the fact that central government encourages big businesses rather than small scale energy cooperatives, stems from high costs in energy cooperatives and problems in offsetting. Therefore, Ministry of Energy tries to maintain its energy policies by encouraging larger companies to generate energy.

Focus Group Code (FOGR3TRC, Turkey, Formal Social Unit)

Spanish legislation is not the most advanced at the moment. Please, write this very clear: Spain needs to change its legislation, we need to be able to do self-consumption, and we need micro-networks.

Interview Code (IDIN29ESC, F, Spain, Formal Social Unit)

Another type of administrative barrier pertains to lack of qualified personnel in the decision-making process. These people may also include those final decision-makers who do not have a sufficient level of information or expertise on the subject.

Another barrier, which is perhaps not a small one, because we talked about municipal administrations... I think the poor expertise in the municipalities, which of course is a consequence from a number of other factors. But now we are talking about the end result insufficient expert potential. They have many obligations. It is difficult for the people. They do not always succeed to be at the expert level, to get the necessary knowledge and training or anything. It is often observed that there is no succession of policies at the municipal level. It takes

too much time to enter into a responsibility for anything, for enforcements for efficiency and renewable sources. So this is a barrier from time to time.

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

Due to our lack of personnel, we are unable to go directly to the end customer, but I do not believe that this is an administrative task either. I don't think that's a task for the authorities either, but people earn their money doing so, and so it's an entrepreneurial undertaking that should be carried on the free market, and I think it belongs there. In that case, we can only pave the way.

Interview Code (IDIN62ATC, M, Austria, Formal Social Unit)

While technology is important, the human resources needed to utilize technology towards implementations of energy transition are also crucial:

There comes the crucial moment for these technologies, for the adequate support of this system. Because you must have an adequate support for all these facilities and systems. Accordingly, there must be people who are familiar with and can maintain these systems. And very often it happens that the system is being built and the maintenance then is being started by someone, then someone else undertakes, and then another and this also is a bad example and creates a bad reputation.

Interview Code (IDIN21BGE, M, Bulgaria, Collective Decision Making)

It's already a matter of design, you mentioned this. Actually, the designers who can make a quality project are very few. Most things have been already designed, so you are doing some kind of pseudo-design on the basis of this already welded project, it's as if you are some kind of magician ... If you have the basics of the project as it should be from the very beginning, then things happen much more realistically and appropriately.

Interview Code (IDIN21BGE, M, Bulgaria, Collective Decision Making)

According to one respondent, the lack of qualified personnel is closely tied to politics, as particularly recruitment in public administration is not merit based, but depends on politicians' interests:

A great deal of money is wasted on bureaucracy because it is politically desirable. It would make a lot of sense to create a department based on an objective. In politics, however, unfortunately, it is often a matter of each party wanting to put its people in the administration and not to implement goals.

Interview Code (IDIN60ATA, M, Austria, Formal Social Unit)

In a similar vein, lack of knowledge and expertise is also a barrier in disseminating energy information, particularly in the media industry. As journalists do not hold sufficient knowledge pertaining to efficient and low carbon energy solutions, it becomes very difficult for mass media to adequately cover this issue:

I think the role of the media is not small and you rightly mentioned that it is also not quite familiar with it. I have also been watching TV and tried to get the journalists themselves to produce some more valuable report, but since there is no knowledge they do not really cover these topics. Reality cannot reach people and I do not know, maybe they should raise their awareness if not their expertise.

Interview Code (IDIN24BGH, F, Bulgaria, Formal Social Unit)

To sum up, our findings address four main categories of barriers and disablers, which can be categorized as perceived value of energy, personal and social barriers, uncertainty and perceived risk, and administrative barriers. While some of these barriers are already discussed in literature, we assert that the dynamics in which these barriers operate require a substantial reframing of the concepts to include the relationships within and among decision-making levels.

CONCLUSIONS

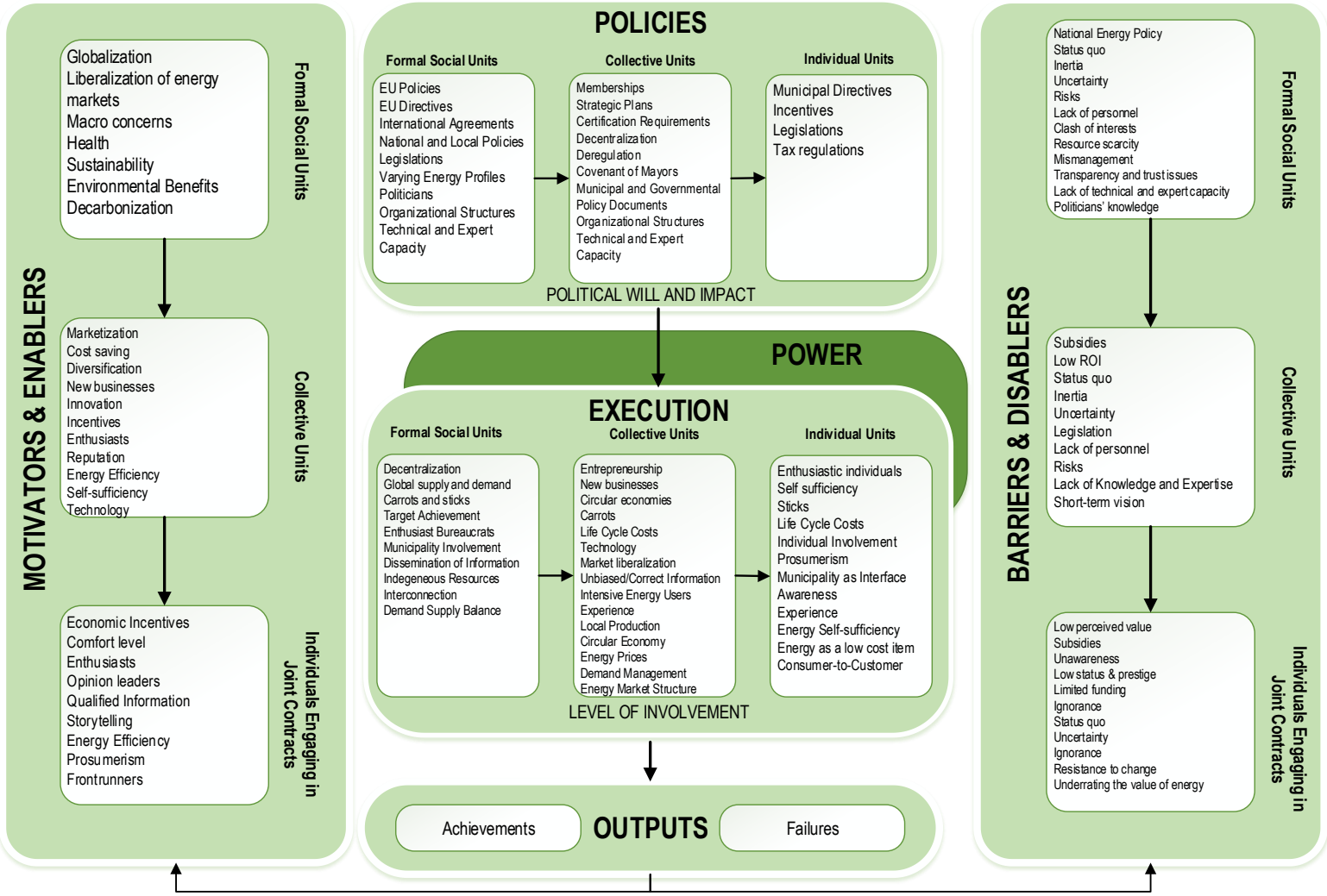

Figure 19 Final general model of formal social units for energy transition

While some factors are congruent with previous findings in the literature on the transition to low-carbon economy, a new set of factors emerging from the above analysis offers novel insights into understanding the dynamics of formal social units for energy efficiency and low carbon alternatives. Based on our findings, a general model for formal social units in transition to a low carbon economy is as depicted in Figure 19. While the components of this model have been thoroughly discussed in the findings section, the following discussion focuses on how the dynamics within this model translates to a general understanding of collective decision-making for a low carbon economy and policy implementations for future targets. In this section, we first provide a general overview of our findings, and then follow with some practical recommendations for the three levels of formal social units: individuals engaging in joint contracts, collective decision-making units and policy-makers.

Based on the framework of general decision-making approach widely acknowledged in literature (e.g. Dewey, 1910; Engel, Kollat & Blackwell, 1968; Webster & Wind, 1972), policies appear to be the main input which can develop an awareness of the problem, and identify its difficult facets. Society transfers the ruling power to the governments, for the administration of public resources and for implementing policies for the society. That is, in terms of roles and responsibilities, governments are expected to design, monitor, and assure the implementation of the processes towards energy transition. This viewpoint implies a top-down approach for decisions and actions that contribute to energy transition. To this end, the overarching guidelines at the top level, triggering the overall process, emanate from national and international policymaking. In this sense, policies may be seen as the main factor in facilitating collective decision-making processes. At the level of formal social units, the basic components that constitute policies are top-level EU policies and directives, international agreements such as Kyoto and Paris, and using these as inputs, national and local policies. These documents not only form the basis for decision-making processes, but they also identify the framework, objectives, and possible approaches and methods for transitioning to low carbon economies.

This process of policy deployment is initiated with the transposition of EU policies and targets as well as the international agreements into national policies and targets. These are further broken down into local policies and targets to be implemented by municipalities or local or regional governments. As with the policy deployment in any context, the policy deployment regarding energy transition or climate and energy issues turns out to be a sophisticated one, due to a multiplicity of factors affecting the associated mechanisms. The foremost and the first set of factors are related with the policymaking itself. On the EU level, the policies and targets are set forth through phases of negotiations among member countries. Therefore, as also stressed by the respondents, the resulting set of policies reflect a compromise between member states' and, in part, associate countries' interests and priorities. Hence, governments in each member state and associate country are constrained to develop policies that are to be deployed from a set of EU policies and targets, and that, by definition, do not totally reflect their countries' interests. At this point, there are three significant determinants of this international policymaking mechanism, as repeatedly emphasized by the respondents: the first one is related with the degree at which the interests and priorities of each country is reflected in EU policies and targets. This, in turn, is a result of several factors, including the relative economic and political powers of the member states, the cultural dynamics that, interestingly, significantly affect the negotiation attitudes of representatives, and the political interests and orientations of the politicians.

The second determinant refers to the effect of where the member state stands in terms of the energy transition. Member states that are closer to achieving their targets or have already achieved their targets in terms of energy transition are more reluctant to take the decisive role in the EU-level policymaking process. This is due to the targets being already or almost achieved, and also the limited room for additional policy tools within their states to achieve more ambitious targets. The third determinant is specific to associate countries. These countries, such as Norway and Turkey, do not directly participate in the EU policymaking; however, they are committed to implementing these policies. That is, the associate countries do not have the mechanisms to comprehensively reflect their specificities into the process, thus, are likely to face a higher discrepancy of national policies and interests versus the binding EU policies.

In addition to the policy making on the national and international levels, there is more to the roles of governments in the energy transition process. The politicians possess legislative power as executives of the governments, and on behalf of their societies act as two-way interfaces between these policies and their citizens (potential voters). In general, this situation will imply a set of issues and conflicts that are to be resolved. The politicians have to act within the

framework set forth by the binding policies and targets that either they themselves or former representatives of the country have undersigned. On the other hand, politicians need to consider the interests of their citizens, who will eventually decide and vote for or against the politicians. Often, conflicts arise at this point, in part, due to the aforementioned differences between the EU policies and individual member states' interests.

Another component that causes conflict is the mismatch between the government's strategic approach to energy transition and energy related issues versus the perceptions of the collective decision making units (such as industries) and individuals. The latter factors become even more severe when the domestic factors affecting politics are concerned. The politicians need to address the interests of their citizens/voters from different parts of the society, who, in turn, have different priorities and interests. The common understanding, as reflected by the respondents' comments, is that politicians irrationally favour the priorities of their voters, not considering what is good for the society. However, it is usually often not a choice between the interests of a group versus the interests of the whole society; it is rather a need to balance the interests and priorities of different layers of the society, that all deserve to be cared for. That is, the politicians must base their decisions in terms of domestic policy making on an optimal allocation of resources in the presence of a set of conflicting objectives implied by international policymaking and internal dynamics. In this respect, factors regarding the organizational constructs on the formal social units, along with their capabilities, the legislative framework within the state, and the market structure, play a key role.

As far as policymaking and policy deployment is concerned, the formal social units are in charge. The process of policy deployment also includes the planning, design and implementation of means and measures for the actual execution of these policies. Policy makers also develop monitoring processes that are to be used as feedback mechanisms to redesign or update their policies. Undoubtedly, the success of the policies set forth by the policy makers is also dependent, to a great extent, on how they are perceived, accepted and implemented by other levels of decision making units, that is, collective decision making units and individuals. Collective decision-making units that include industries, companies, NGOs, and associations operate in an environment defined by a set of inputs emanating from policies and targets developed by policy makers. To this end, certification requirements such as ISO standards, membership to organizations formed around these policies, and the obligations arising from those memberships, future vision and respective strategic plans of the organization can be examined under the heading of policies, as these documents also have a decisive influence on identifying low carbon targets and how to take subsequent steps in collective decision-making processes. However, a number of different strong drivers act as basis for the energy related decisions of collective decision-making units.

The framework in which the collective decision making units co-exist and interact is defined by the structure of the energy market. The market structure determines the extent of decision-making power and the rationality of decisions such as energy investments. The legislative setup pertaining to the energy market, level of maturity of the market, risks and uncertainty involved, type of ownership are the most influential main characteristics. Another driver that affects the process for energy transition on the collective decision-making units level is the interplay associated with the well-known motives of the collective decision making units and the requirements of energy transition. Industries, in this respect, probably exhibit the most convenient example.

Every industrial company has its own strategies, priorities and interests. Following the same lines of the discussion concerning international policies and national policies, the national policies, in general, are not in line with these strategies, priorities and interests of companies. Since energy transition usually calls for energy investments, companies evaluate the associated decisions from the perspective of justification of investments. Hence, this brings in discrepancies between the planning horizons, investment return periods, costs, benefits, as perceived by the companies, versus those set forth by the policies concerning energy transition. This issue remains as an outstanding factor affecting energy transition. Governments in this respect commonly use motivating tools such as incentives or tax benefits. However, as many respondents, within a mature market, have expressed it these tools can only have limited effects over a limited time, usually within the initial phases of market development. There are also numerous examples of negative effects of such regulations on the market players, due to the perception of creating injustice among stakeholders, or incentives creating expectations for further incentives each time. Hence, regarding the collective decision making units, the policy toolbox needs to be reinforced with more structural tools to foster the development of

a mature energy market, to discover a formulation of the requirements of energy transition that fits to the priorities of the industries, and to increase the availability of correct and unbiased information and awareness on benefits of energy transition and lifecycle costs. Market deregulation, rapidly emerging technologies, especially in the area of renewables and smart grids, are expected to provide considerable contribution in this area. Another key factor is the energy-intensive industries.

The third decision-making level is the stakeholders, who act as individuals themselves, or as individuals engaging in joint contracts. Energy transition relies on individuals in several aspects. First, the active involvement and participation of individuals is a requirement for the execution of the policies developed by the formal social decision making units. That is, the strategies and decisions of policy makers are realized only through collective decision making units or individuals. The other aspects regarding the significance of individuals for energy transition are the intangible aspects. Respondents from all levels of decision-making units repeatedly emphasized the significance of these factors.

Unlike the formal social units and collective decision-making units, individuals by themselves or as a society, cannot be defined within frameworks of strict rules, guidelines and definitions. To begin with, individuals have their demographic characteristics, backgrounds, perceptions, priorities, habits, and beliefs. The composite effects of all of these factors determine how individuals respond and react to the policies and their counterparts regarding the execution process. In addition to the determinant characteristics of the individuals, one other aspect that must be addressed is social factors. Individuals constitute societies, and in terms of energy transition, the decisions and their execution are very much dependent on social characteristics. These are the collective features represented by groups of individuals sharing common characteristics.

As far as energy decisions are concerned, the level of awareness, perceptions regarding advantages and disadvantages of energy investments and the demand profiles turn out to be outstanding social characteristics. Social acceptance of policies and goals related with energy transition is critical to the execution of associated processes. Therefore, any energy-related policy should include strategies for social deployment and acceptance. As with collective decision making units, this includes similar components for increasing level of awareness, providing correct information regarding the policies, targets, individual and social benefits of energy transition. In order to involve energy related considerations as part of their decision-making processes, the individuals should be able to access correct and up-to-date information regarding energy transition, the alternatives that they can consider, and their outcomes. At this point, two important mechanisms are in effect. The first concerns the motivating effects of social dynamics regarding energy transition. Society is inclined to follow the traditional courses of actions in their decisions and actions. Although contemporary alternatives with obvious advantages may emerge, people are reluctant to change their habits, partly due to the uncertainties involved with the new alternatives, such as in the case of switching to electric vehicles from conventional vehicles. At this point, those who adopt the new alternatives for the first time play a key role. Once these people implement and utilize their decisions without major problems and start enjoying the benefits, the rest of society feels much more comfortable in adopting these alternatives themselves. Therefore, the frontrunners are of key importance for energy transition on the individual level.

The other mechanism is a rather more organizational construct; that is the local governments or municipalities. As verified by the viewpoints of the respondents, municipalities are crucial in establishing the interface between policies of the central governments and the society or individuals. Based on the governmental structure in many of the member states as well as associate countries, the central governments are far from touching the individuals, especially in terms of implementing energy-related decisions. The interactions of governments and individuals in this respect are usually limited to central governments' setting the legislative framework, and in some cases, implementing incentive measures. Therefore, without a mediating factor, the participation and contribution of the individuals to energy transition remains as a solely individual decision, where the alternatives are restricted partially by legislations. The municipalities are effective at this very point. As stakeholders of cities, and based on their local role as authorities and responsibilities, municipalities are in direct contact with citizens. Through their mechanisms of impact, municipalities can be advisories, co-actors and sometimes, examples for citizens concerning building renovations, choice of heating/cooling appliances, or mobility decisions.

The active interaction regarding energy decisions on the local level also supports the new trends in the energy field that are in line with energy transition. These are local energy production through energy cooperatives and the associated concept of energy self-sufficiency. Local production and energy self-sufficiency in turn point to a rather decentralized structure of the energy market.

Once the problem is identified and the targets are determined, the decisional process is channelled into the executional stage. According to our findings, the main parameters at this stage are decision-making actors, contextual factors that form the environmental framework of the decision-making process, the means and mechanisms used to achieve change and transformation, and the power relations and dynamics that surround this whole process.

When we look at the decision-making actors, we see five leading institutions here: Governments, local authorities (especially municipalities), businesses, associations, and consumers. Governments, obviously, represent political will in the transformation of EU policies and objectives into legislations. Therefore, state-level governments act as a foremost source of change. Additionally, results of our analysis suggest that local administrations are at least as effective as governments, since they transform these legislations into practice. In particular, municipalities provide serious support for the low carbonization process through their energy efficiency projects, which constitute one of their main areas of activity today, as well as their undertaking of communication related tasks, such as educating the community and raising awareness. Considering the three technological foci, it is also seen that the municipalities are decisive and effective in terms of facilitating electric mobility, transformation of buildings, and implementation of smart systems. Businesses (and industry in general) have become an effective force in providing transition through marketization. In other words, industrial actors play a crucial role in promoting low carbon transition into new business areas, accelerating innovation and realizing change through market dynamics. Another main actor is the associations, which may be in the form of unions, platforms, initiatives, lobbying groups etc., which take on the role of establishing supporting relationships between actors. By accelerating exchange of information between consumers and businesses, businesses and local administrations, local administrations and consumers, these structures play a leading role at the point of project generation, and therefore, should be considered as one of the sine qua non actors.

The environmental factors that make up the context of the decision-making process include the market structure, decentralization trends and self-sufficiency, new economic models such as circular economy, as well as market forces, such as demand and supply balance. Decentralization is the most important factor that influences decision making at policymaking level. One of our key research findings is that the transition is now realized through free market dynamics, particularly in those countries, which have managed to advance in low carbon transition, while a similar process is underway in other countries. The liberalization of the energy market is one of the causes of this change. In addition, one of the ultimate consequences of decentralization is a pull economy, where consumers demand low-carbon solutions, rather than a push market, where the higher order decision-making bodies push these products and services by creating supply. In this framework, self-sufficiency, prosumerism and circular economy are emerging as new issues that are effective in context.

Besides the contextual elements, the means by which the transition is realized is also one of our emerging themes. At this point, we question the extent to which particular forms of rewarding or punishment are effective. When we look at the level of formal social units, we observe that both punishment (e.g. carbon tax) and rewards (e.g. incentives) are used to stimulate the market. It is noteworthy that mid-level collective structures are no longer mobilized by top-level incentives or penalties, but rather encouraged to invest in low carbon alternatives regarding this as an opportunity to be exploited within market dynamics. On the other hand, it is possible to say that individuals and individuals engaging in joint contracts are still reluctant to change, and therefore both the rewarding and punishment mechanisms are effective in the decision-making process.

One of the most important parameters in the execution phase is power dynamics. At this point, the type and degree of power exercised by individuals or groups during the decision-making process is an important finding. Our results indicate that, for instance, all types of power addressed in literature (French and Raven, 1959) are also influential in collective decision-making units. For example, coercive, rewarding and legitimate power are extremely important at the

level of formal social units, while charismatic, referent and expert power are very effective at both collective levels and the level of individuals engaging in joint contracts.

As in general typologies of decision-making processes, the execution stage is completed with an output, which translates to either achievements or failures. Our findings suggest that both results are common in practice. Moreover, it is not possible to link success or failure to a certain decision-making level, technological foci, or country. For example, in Norway, e-mobility has been extremely successful, while there are no tangible results in Austria or Finland. Similarly, adaptation of businesses to decarbonisation is extremely high, while it is not possible to say the same for individual consumers or consumer groups. Success and failure are highly dependent on the presence of enablers and disablers, while the experiences of success and failure also transform into enablers and disablers, which creates a bilateral mechanism of action.

In our analysis, we used the phrases “motivators and enablers” versus “barriers and disablers” to indicate aspects that affect the decision-making process in a positive (initiate, catalyse, strengthen and ease) or negative (prevent, discourage and impede) manner, respectively. In this context, we are inclined to conceptualize motivators and barriers as higher-level factors, which are rather in effect during earlier steps of decision-making, while enablers and disablers influence the process throughout execution. However, it is also likely that all these factors work simultaneously, and, at times, distinctions between these are blurred. As depicted in our general model, motivators/enablers and barriers/disablers interact and counteract each other with the decision-making process in every stage.

Apart from policies, some other factors may prompt decision-making bodies to pursue decarbonisation goals and allow them to carry out relevant processes in an efficient and timely manner. We classify these factors as motivators and enablers in general, and conclude that they may appear as both the input and process variables in decision-making. While the literature lists a large number of motivators and enablers that facilitate energy transition in collective and individual decision-making processes, in our analysis, we identified three key themes: Economic motivators, personal and social motivators, quality information and storytelling.

Our results show that the global economy is an important motivator for higher levels of decision-making, as it stimulates cost minimization and consequently energy efficiency. As part of their competitive strategies, companies seek to decrease their costs. Accordingly, they are involved in efficiency and savings practices in different areas. Especially for energy-intense industries, energy costs form an important potential field for cost savings. This, in turn, is seen as a mobilizing agent for new business development and innovation. Our findings indicate that the transfer of power from policy-makers to businesses is likely to continue with a similar transfer of power to consumers, where future energy market dynamics will be rather based on demand characteristics.

In addition to economic motivations, our findings address a second theme of personal and social motivations that refer primarily to the demographic and psychographic traits of individuals. Characteristics such as pro-environmental attitudes, behaviours and lifestyles play an important role in driving individuals in particular, and collective structures in which such individuals are leading opinion, in general, to low carbon and energy efficient solutions. While this group of motivators are presumed to be more effective at lower level collective structures, our findings also underline the role and impact of enthusiastic individuals in directing energy decisions of businesses, industries, and even a nation on their own account.

A third emerging issue in our analysis is the impact of communication, and our findings emphasize the need to turn well-crafted messages into effective stories, as well as utilizing appropriate channels that effectively convey them to the appropriate audiences. In this context, ensuring that high-quality communication is achieved is an important driver for change in energy efficiency. The role of communication is very critical for lower levels of decision making, particularly to enhance transition in society.

Many previous studies have examined the barriers to a decarbonized economy and concluded that various factors could be at work, including economic, technological, political, personal and social barriers. An important finding of our study is that barriers and disablers are often considered to be limited to lower levels of collective decision-making, i.e., individuals and individuals engaging in joint contracts. At higher levels, the transition to low carbon economy is

considered inevitable, and while the respondents acknowledge the existence of numerous disablers and barriers, there is a determination and a strong desire that these difficulties will be overcome. Four key themes that pertain to barriers include perceived value of energy, personal and social barriers, uncertainty and perceived risk, and administrative barriers.

The perception of energy as a low valued asset is a major barrier to persuading individuals, organizations or society as a whole to make a considerable effort towards energy efficiency. In addition, the concept of energy and energy efficiency is abstract, which hinders individuals from making informed choices. Underestimation of the value of energy combined with such vagueness leads to a reluctance to invest in energy efficient, low-carbon alternatives.

Another reason for the reluctance is mainly due to a common belief among individuals and small businesses that energy investments will not pay off for them within a reasonable period. On the other hand, the value of energy is better understood as we move towards middle and higher-level collective decision-making structures.

Personal and social barriers play an important role in successful implementation of energy efficient solutions. In this context, we can address the lack of quality information, as well as ignorance and inertia stemming from it. Moreover, there is a strong resistance to change, due in part to the misunderstanding of the real value of energy; individuals see no advantage in investing in a low-carbon product, which is regarded as an unnecessary expense. Scepticism, fear and anxiety constitute another category of personal barriers, as decision-makers are usually risk-aversive regarding these new technologies. Finally, cultural barriers, such as considering low-carbon solutions as inferior alternatives to existing ones, are also at work.

A third barrier pertains to uncertainty and perceived risk. We can conclude that the risks associated with innovative products hinder the rapid diffusion of low-carbon solutions, in all levels of collective decision-making. In addition, higher-level collective structures face more uncertainty as stemming from contextual factors, including technological, regulatory and political-legal uncertainties.

A final barrier as part of our key themes refers to administrative issues and difficulties. These are particularly due to problems in the organizational processes, which include resource scarcity, mismanagement, transparency issues, difficulties in collective decision-making, and organizational conflicts.

From an overall perspective, this model and its components can both contribute to theory and practice in a number of ways. First, this study showed that the formal social units' decision-making processes follow a standardized structure in general, while parameters and related factors at work in each stage vary with regard to different levels, in particular. For instance, it has been found that policy is an imperative input at each level of the formal social units' decision-making, however the dynamics and variables of the execution stage vary from level to level. In addition, motivators and barriers are seen to be different for each level of decision-making.

A myriad of studies explores motivators and barriers in the literature. Although numerous motivators and barriers have been identified in this huge corpus of scholarly work, we have found that decision-makers are only influenced by a few thematic categories. This is an important finding, given that this study was carried out in 6 countries with 15 focus groups and 67 in-depth interviews, and hence, methodologically is very strong in terms of generalizability. At this point, it emerges that the criteria used in individual or collective decision-making processes are in fact determined according to the potential responses to simple questions that pertain to functional and hedonic aspects of the choice object, such as "Will we economically benefit from this investment?", "Is this product socially acceptable?", "Will this investment increase our level of comfort?" or "Is this product congruent with our self-concept?" This suggests that, in reality, heuristic methods to decision making are more effective as compared to complex problem-solving approaches.

This finding also suggests that communication, which has an extremely important role in transition to the low carbon economy, should be designated in parallel these parameters. In other words, the criteria that are significant in the persuading collective decision-making units must be communicated in a fashion to increase awareness, interest, and enthusiasm. This is especially important at the level of individuals engaging in joint contracts, who have a particular reluctance to change. From our findings, it is also evident that opinion leaders are extremely effective in rapid diffusion

of innovations. All these factors considered together, it should not be overlooked that one of the critical domains that such processes permeate in marketing, which can assume a vital role in energy transition.

Another important finding of our study is that low-carbon energy transition is quite established, and follows a foreseeable path for the future, particularly at higher levels of collective decision-making. Despite variances between countries, we can confidently assert that there exists a certain commitment towards change. The paper also offers an important insight in the identification of the power shift from policy makers to industry, and the anticipation anticipated that it will be transferred to consumers in the next stage. At this point, low carbon transition is highly likely to be achieved through marketization, and it is important to draw attention to the need for policy makers to provide this process with facilitating frameworks. Thus, instead of trying to accelerate change through incentives or subsidies, contextual arrangements are of vital importance to ensure that resources are channelled into areas that are more appropriate.

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