

## **Shedding light on Energy Communities**

*Policy challenges towards a high share of Energy communities  
in Greece*

*Konstantinos Pantazis*

---

Master Thesis Series in Environmental Studies and Sustainability Science,  
No 2022:055

A thesis submitted in partial fulfillment of the requirements of Lund University  
International Master's Programme in Environmental Studies and Sustainability Science  
(30hp/credits)



# **LUCSUS**

Lund University Centre for  
Sustainability Studies



**LUND**  
UNIVERSITY

---

## **Shedding light on Energy Communities**

Policy challenges towards a high share of Energy communities in Greece

Konstantinos Pantazis

A thesis submitted in partial fulfillment of the requirements of Lund University International  
Master's Programme in Environmental Studies and Sustainability Science

Submitted September, 2022

Supervisor: Busch Henner, LUCSUS, Lund University



**Abstract:**

In 2018 Greece enacted the Energy Communities (EC) Law which promotes energy democracy and Justice. Although there are several successful examples of ECs in Greece, they are far from becoming mainstream as they face many problems. I used the policy challenges framework provided by Busch et al. (2021) in order to analyze the problems related to the diffusion of ECs in Greece and propose solutions to address them. I found that the challenges related to all the analytical lenses provided by the framework -Directionality, Demand Articulation, Experimentation, Policy Learning, and Coordination. In addition, I suggest some measures that can strengthen ECs. Finally, I stress the need for further research. In particular, I propose to integrate the current analytical framework with the power and justice dimension as I believe it can shed light on the different trajectories that can emerge from the development of different ECs models.

**Keywords:** Energy Community, Energy Justice, Socio-technical transition, Energy policy, Community Energy, Transition challenges.

**Word count:** 11.993 (counted from page 1 to page 38, excluding figures and their captions).

## **Acknowledgments**

Someone can argue that the outcome of an action is based on individual efforts. I'm afraid I have to disagree. If I did good work these two years, especially in my thesis, it is not only due to my personal willingness and efforts. I owe it to the people who supported me.

First, I want to thank all those people who participated in my research and shared all these valuable ideas and thoughts. Without you, it would have been impossible to do this study. But also, and most importantly, it would be impossible to have actual examples of ECs.

I also want to express my gratitude to my supervisor, Henner, who spent all this time guiding me and answering all my questions. Also, I want to thank my peers in the thesis group who share their thoughts with me.

Finally, I want to express my deepest thanks to my family and friends, as well as to my flatmates. Your support over these two years is of great importance to me. You have also made the thesis process fun and enjoyable.

Thank you all.

# Table of Contents

## List of Figures

## Abbreviation

<b>1 Introduction .....</b>	<b>1</b>
<b>2 Background Information .....</b>	<b>3</b>
<b>2.1 Country's Overview .....</b>	<b>3</b>
<b>2.1.1 The Liberalization of the energy market .....</b>	<b>4</b>
<b>2.2. Citizen participation in energy projects .....</b>	<b>6</b>
<b>2.2.1 Energy community .....</b>	<b>7</b>
<b>2.3. Benefits of Energy Community .....</b>	<b>8</b>
<b>3 Theory .....</b>	<b>10</b>
<b>3.1 Sustainability transition .....</b>	<b>10</b>
<b>3.1.1 Socio-technical transition .....</b>	<b>10</b>
<b>3.2 Analytical Framework .....</b>	<b>12</b>
<b>4 Methodology .....</b>	<b>14</b>
<b>4.1 Research strategy.....</b>	<b>14</b>
<b>4.1.1 Ontological and Epistemological stance .....</b>	<b>14</b>
<b>4.2. Data collection and analysis .....</b>	<b>15</b>
<b>4.2.1. Pre-existing knowledge .....</b>	<b>15</b>
<b>4.2.2 Data and coding .....</b>	<b>15</b>
<b>4.3. Challenges and Limitations .....</b>	<b>17</b>

4.4. Ethical considerations .....	19
<b>5 Results.....</b>	<b>20</b>
5.1 Directionality .....	20
5.2. Demand articulation .....	22
5.3. Experimentation .....	24
5.4. Policy learning & Coordination .....	25
<b>6 Discussion.....</b>	<b>27</b>
6.1 Lack of vision or discrepancy of vision?.....	27
6.2 Market strategy or public strategy? .....	28
6.3. Testbeds and the role of intermediaries.....	29
6.4. Coordination and Standardization at a different level .....	31
6.5. Reflection and limitation of the analytical framework.....	34
6.5.1. <i>The dimension of Power</i> .....	34
6.5.2. <i>The dimension of Justice</i> .....	35
<b>7 Conclusion .....</b>	<b>36</b>
<b>References .....</b>	<b>38</b>
<b>Appendices</b>	

**List of Figures**

Figure 1: Liberalization of Greek energy market (Authors creation, inspired by: Heinrich Böll Stiftung (n.d.)). ..... 5

Figure 2: REScoop network of ECs in Europe (REScoop, 2022b) ..... 6

Figure 3: Number of new ECs registered to the system in Greece per year (Electra Energy, 2020)..... 8

Figure 4: Social impact associated to ECs projects (REScoop et al., 2021):  
<https://my.visme.co/view/q687k34e-social-impacts-related-to-energy-communities#s1> ..... 9

Figure 5: The different disciplinary approaches to study sustainability transition, socio-technical, socio-ecological, and socio-institutional (Loorbach et al., 2017). ..... 11

Figure 6: The figure illustrates the iceberg metaphor regarding the level of analysis of Critical Realism ontology (Fletcher, 2020). ..... 14

Figure 7: CR and GT techniques applied in this study (Authors' creation, inspired by Hoddy (2018)). 17

Figure 8: The figure illustrates how I have cited the quotes from the interviews in the text, e.g. In1 Q1 means, Interviewee 1 Quote1. The quotes from the interviews can be seen in Appendix D, Table D3 (Authors’ creations)..... 20

Figure 9: Policy recommendation based on the transition policy challenges framework that has been used in this study (Authors creation). ..... 34



## **Abbreviation**

**CE:** Community Energy

**CEC:** Citizen Energy Community

**CEP:** Clean Energy Package

**CR:** Critical Realism

**EC:** Energy Community

**EJ:** Energy Justice

**EP:** Energy Poverty

**EU:** European Union

**FiT:** Feed in Tariffs

**GHG:** Green House Gas

**GT:** Grounded Theory

**IEMD:** Internal Electricity Market Directive

**IPCC:** Intergovernmental Panel on Climate change

**MLP:** Multi-Level Perspective

**NECP:** National Energy & Climate Plan

**NNIs:** Non-interconnected Islands

**PPC:** Public Power Corporation

**RAE:** Energy Regulatory Authority

**REC:** Renewable Energy Community

**RED II:** Renewable Energy Directive II

**RES:** Renewable Energy Systems

**SNM:** Strategic Niche Management

**TIS:** Technological Innovation Systems

## 1 Introduction

Based on the IPCC 6th Assessment Special Report, human activities have already led to an increase in global average temperature of about 1.0°C. In addition, energy-related CO<sub>2</sub> emissions increased in 2021 to their highest level, reaching 41GT CO<sub>2</sub> equivalent (International Energy Agency, 2021). Assume that GHG emissions continue to increase at the same rate. In this case, global temperature will increase by 1.5°C probably sometime during the 21st century (IPCC, 2022). Thus, the threat of a climate crisis has led to an increase in renewables in global energy production. In particular, renewable energy production has increased, from 1,000 TWh in 1965 to nearly 8,000 TWh in 2021 (Ritchie & Roser, 2020a).

Although increasing renewable energy in the energy mix is a prerequisite for tackling the climate crisis, it is creating global conflicts. Numerous studies have analyzed these conflicts from an Energy Justice (EJ) perspective (Avila-Calero, 2017; Avila, 2018; Fairhead et al., 2012; Temper et al., 2020; Leach et al., 2010). Furthermore, some cases raise concerns regarding environmental degradation, such as large-scale hydroelectricity production (Islar, 2013; von Sperling, 2012). As a result, many researchers have stressed the need not only to increase the number of renewables but also to change lifestyles and minimise consumption (Wiedmann et al., 2020). Primary energy consumption has risen by 144,824 TWh in 69 years, from 28,516 TWh in 1950 to 173,340 TWh in 2019 (Ritchie et al., 2020).

Community Energy (CE) has emerged and tried to address the issues above (Busch et al., 2021). Nevertheless, what constitutes a CE project is not entirely clear (Walker & Simcock, 2010) because it can differ on the technology they use, the purpose as well as "the model of social arrangement under which community energy projects are set up, developed, managed and operated" (Walker & Simcock, 2010 p. 195). However, it can be defined as projects that are "governed by and for local people" (Busch et al., 2021, p.1). In addition, they are usually small-scale and decentralized (Walker & Devine-Wright, 2008; Walker & Simcock, 2010).

CE can provide various social and environmental benefits, such as fighting Energy Poverty (EP), benefits for local economies, reducing environmental pollution, etc. (REScoop et al., 2021). Therefore, in recent years the concept has received political attention in both the EU and Greece; although the legal term is slightly different-that of the Energy Community (EC) (Chapter 2, background information)- they share many common elements.

Regardless of the benefits that ECs can offer in society, they are far from becoming dominant or even gaining a significant share of energy production in Greece (Electra Energy, 2020). At the EU level, it is evident that the institution is more developed in Northwestern European countries than in Eastern and Southern EU countries (Figure 2). Therefore, political and policy support is needed for the dissemination of ECs (Walker & Simcock, 2010). However, there is a lack of scientific literature on the policy challenges to the dissemination of ECs in Greece. Therefore, the research question of this study is:

*RQ: What are the policy challenges for the diffusion of ECs in Greece?*

In order to fill in the gap, I use the transition policy framework developed by Busch et al. (2021). The following chapters are divided as follows: Chapter two (2) is background information explaining the concept of the EC at the EU level and in Greece. Chapter three (3) presents the theoretical starting point of this study and the analytical framework used to answer the RQ. Chapter four (4) illuminate the research strategy and method. Chapters five (5) and six (6) present the results and the discussion, respectively, while chapter seven (7) presents the conclusions.

## **2 Background Information**

The long-run strategy of the EU regarding environmental protection and well-being can be seen in the European Green Deal, which was presented to the European Commission and, inter alia, commits all European member countries to be climate neutral by 2050. In addition, the European Green Deal set an interim target to reduce CO<sub>2</sub> emissions by 55% from the 1990 level by 2030 (European Commission, 2021).

The European Green Deal is transposed into law through the European Climate Law, which includes measures to monitor progress and adapt actions accordingly, building on existing systems such as the governance process of Member States' National Energy and Climate Plans (NECP) (European Council, 2021). In order to achieve the above-mentioned objectives, the Commission adopted in 2019 the Clean Energy for all Europeans package (CEP). The CEP sets out eight legal acts, based on which the EU has set not only specific targets for the share of renewable energy in the energy mix, but also targets relating to EP and equity (European Commission, 2019). In addition, Renewable Energy Directive (RED II), and the Internal Electricity Market Directive (IEMD) define the concept of energy community (Coenen & Hoppe, 2021). However, a more detailed presentation will be given in the next chapter (Chapter 2.2. Citizen participation in energy projects).

### ***2.1 Country's Overview***

Greece is a country in southeast Europe with very high wind and solar potential (Scholten & Crikemans, 2018, pp. 54-59). The share of RES in the electricity mix has increased in recent years, representing, in 2021, almost 40% of total electricity production (Appendix A, Figure A1). However, the share of primary energy from renewable sources is smaller, namely 19,39% in 2021 (Appendix A, Figure A2). Oil has a vital role in electricity generation partly because islands are not connected to the mainland<sup>1</sup>

However, through the NECP, Greece has set very ambitious goals regarding reducing GHG emissions. Specifically, Greece has to reduce its GHG emission by 42% based on 1990 levels and by 56% based on 2005 emissions levels by 2030 (National Energy and Climate Plan-NECP, 2019). For this reason, the national target for the share of RES in gross final energy consumption was set at 35% by the end of the decade (NECP, 2019).

---

<sup>1</sup> Greece has 29 autonomous-Non-interconnected Islands (NIIs)- energy systems, and some of them consist of several islands- island clusters- and they use either fuel oil or diesel to cover their energy needs (Regulatory Authority for Energy, n.d.)

Nevertheless, the role of natural gas remains crucial since it is conceptualized as a “transition fuel” (International Energy Agency, 2018, p. 119-213). Because of that, natural gas has increased remarkably in the past few years, in Greece, representing more than 20% of the share of primary energy consumption and more than 40% of the share of electricity production in 2020 (Ritchie & Roser, 2020b). In addition, according to the final draft of the NECP, the role of natural gas in clean electricity generation for the year 2030 will increase, as lignite plants are planned to be closed by 2028 (NECP, 2019, pp 50).

### ***2.1.1 The Liberalization of the energy market***

Another crucial parameter is the liberalization of the Greek energy market. Although the liberalisation of the energy market in the EU started in the mid-1990s with four "Energy Packages" (Vlados et al., 2021) (Appendix A, Figure A3), after 2008, this process was more intense due to the overall neoliberal restructuring of the Greek economy (IEA, 2017). In 2010, Greece enacted legislation for the liberalisation and deregulation of the wholesale and retail markets (IEA, 2017).

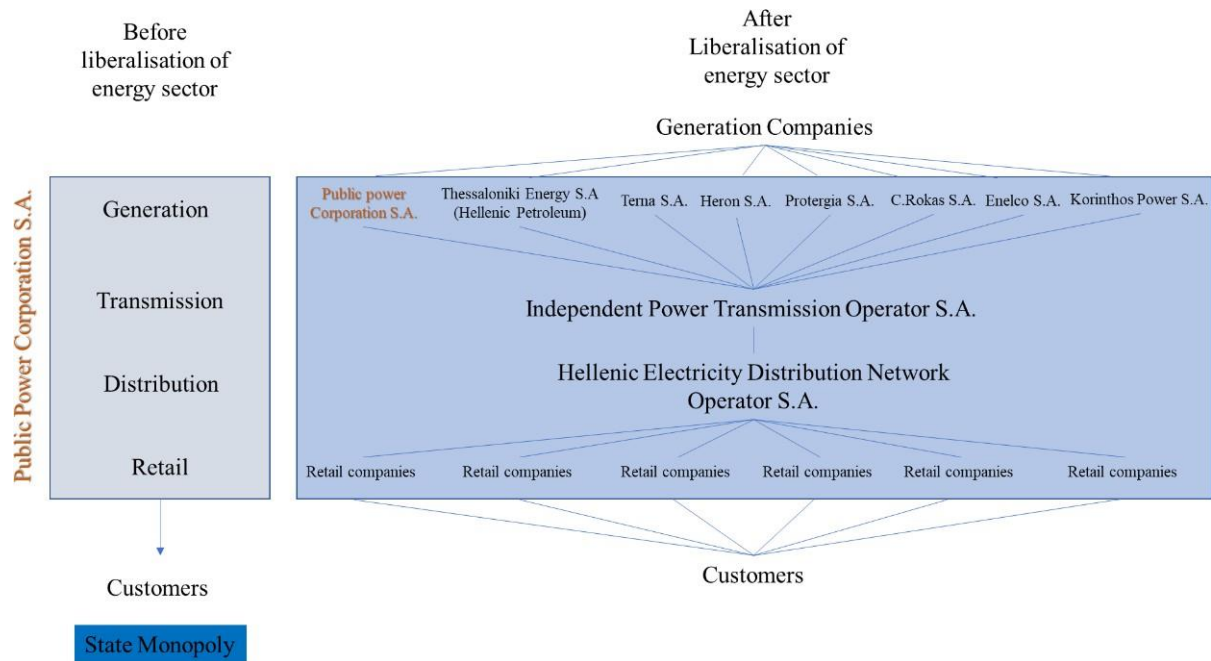
The main change in the Greek energy market is that the state monopoly under Public Power Corporation (PPC) was replaced by a liberalized market. Today there are eight-generation companies and several retail companies in the electricity market (Siamanta, 2019). Furthermore, transmission and distribution had to be separated from the Public Power Corporation (PPC) (Figure 1). Thus, four new companies were created: the Independent Power transmission Operator (ADMIE) for electricity, the National Gas System Operator (DESFA) for gas transmission, the Operator of the Greek Electricity Distribution Network (DEDDIE), and the National Gas Distribution Network (DEPA) with three subsidiaries throughout the country (IEA, 2017).

Additionally, At the same time, DESFA and DEPA infrastructure were privatized, while ADMIE and DEDDIE, and PPC are being partially privatized in order to fulfil the memorandum commitments on debt reduction<sup>2</sup> (IEA, 2017). Finally, the Energy Regulatory Authority (RAE) was created to maintain fair competition in the market. The reasoning behind these changes is that a liberalized energy market will increase the competition, and prices will fall (Vlados et al., 2021). However, in recent years, energy

---

<sup>2</sup> The memorandum commitments on debt reduction have been signed between the Greek government and the International Monetary Fund (IMF), the European Central Bank (ECB) and the European Commission (EC), well known as Troika. It was a bailout of financial support to Greece after the financial crisis in 2008. In exchange Greece had to introduce a series of regulations to liberalize its economy, such as the privatization of public assets.

prices have increased in Europe, especially in Greece, (Eurostat, 2022) making evident the shortcomings of the current market structure.



**Figure 1:** Liberalization of Greek energy market (Authors creation, inspired by: Heinrich Böll Stiftung (n.d.)).

The liberalisation of the energy market, the creation of the electricity exchange, but also the increase in the share of natural gas in the country's energy mix and power generation mix are important, as they create opportunities but also problems. These problems are related to EJ and EP, as well as to the achievement of climate targets.

To be more precise, the previous model of state monopoly did not allow cooperatives to participate in energy production; thus, energy liberalization is a key prerequisite for the development of ECs (Busch et al., 2021). On the other hand, liberalization does not necessarily lead to the development of cooperatives. In western Europe the institution is more developed than in south-eastern Europe (REScoop, 2022b) (Figure 2). This is partly due to the misuse of the concept of cooperatives during the Soviet period (Friends of the Earth Europe et al., 2020); but also due to the fact that the state monopoly in Greece was replaced by a private oligopoly (Siamanta, 2019). Thus, becomes apparent that policy consistency and coordination is needed for the development of ECs. However, I will discuss this issue in the next sections.

## 2.2. Citizen participation in energy projects

There are numerous terms related to citizen participation in energy projects, such as "community energy", "energy citizens", "local energy initiative" and "local energy organisation" (Busch et al., 2021). Furthermore, there are different definitions in relation to the above-mentioned concepts (Busch et al., 2021). Some focus on collective ownership and control (Gunderson et al., 2018; Becker et al., 2017; Hicks & Ison, 2018), others on decentralized and collective decision-making (Busch et al., 2021), and others emphasize the importance of 'collective benefits for the local community' (Walker & Devine-Wright, 2008, p. 498). Nevertheless, most of the terms seem to agree on the fact that CE initiatives are non-commercial organizations (Busch et al., 2021).

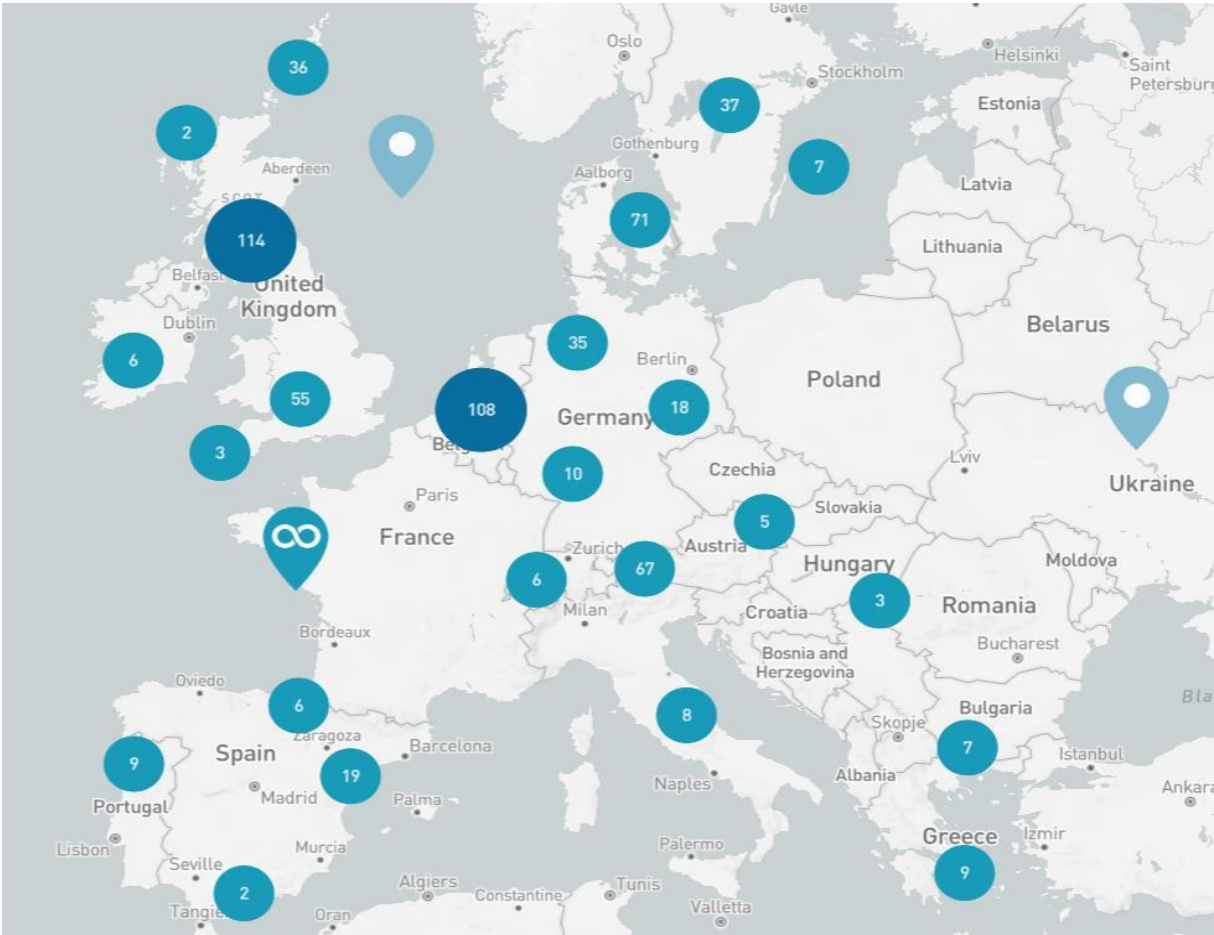


Figure 2: REScoop network of ECs in Europe (REScoop, 2022b)

In 2019 the EU published the CEP which introduced the concept of Energy Community in two separate directives. The revised Renewable Energy Directive (RED II) introduced the concept of Renewable Energy Community (REC), whilst the Internal Electricity Market Directive (IEMD) introduced the concept of Citizen Energy Community (CEC) (Coenen & Hoppe, 2021). The two directives share some of the International Cooperative Alliance principles (Appendix B). Thus, EC under the CEP can be understood as "a way to 'organise' collective energy actions" (Caramizaru & Uihlein, 2020, p. 4). "Both types incorporated a non-commercial type of market actors which organizing collective citizen action in the energy system" (Caramizaru & Uihlein, 2020, p. 7). Moreover, both share certain conceptual elements. First, the participation of individuals must be open and voluntary (*Governance*), second, both emphasize on participation and effective control by citizens (*Ownership and control*), and, third, their purpose is to generate social and environmental benefits rather than financial profits (*Purpose*) (Caramizaru & Uihlein, 2020). However, there are also some differences between these two definitions. More precisely they differ on I) Geographical scope, II) Activity III) Participants, IV) Autonomy V) Effective control (Caramizaru & Uihlein, 2020) (Appendix C).

**2.2.1 Energy community**

In Greece, the concept of Energy community was introduced by law 4513/2018 with the title "*Energy Communities and Other Provisions.*" Although the legal framework governing cooperatives already existed, through Law 1667/1986 on civil cooperatives and Law 4430/2016 on the social and solidarity economy, the new law boosted ECs (Figure 3). This is of great importance since Greece does not have a developed network of ECs compared to other European countries (look figure 2).

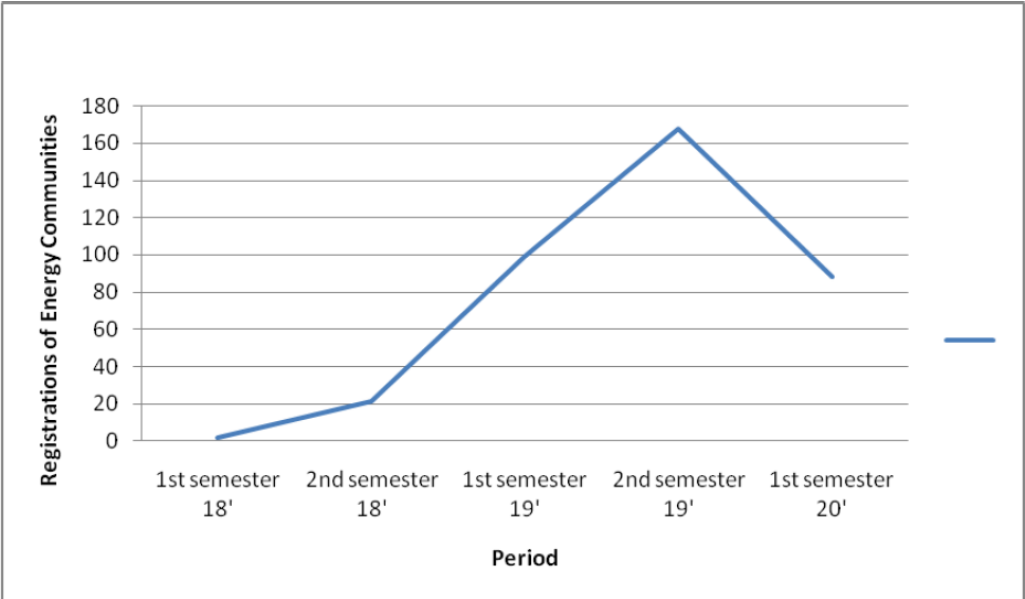


Figure 3: Number of new ECs registered to the system in Greece per year (Electra Energy, 2020).



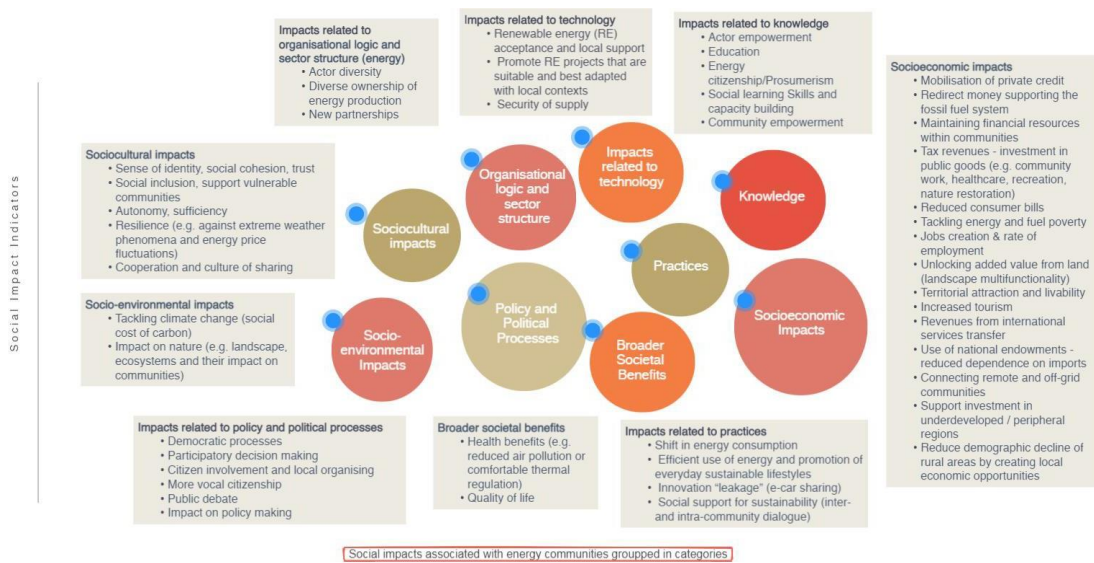
According to the law 4513/2018, ECs are citizens' cooperatives aiming to promote the social and solidarity economy, innovation, tackle energy poverty and promote energy sustainability (Douvitsa, 2019). An EC can be active in various areas such as the production, storage, self-consumption or sale of electricity, reducing energy consumption and the use of conventional fuels, improving efficiency, distributing electricity within the region in which it operates, supplying electricity or gas, providing energy services (REScoop, 2020). It must be mentioned that EC is not strictly identified to REC or CEC concepts, but shares characteristics with both. For example, gas supply is defined by the CEC but not by the REC. On the other hand, the Greek law is quite strict regarding the local proximity of projects, which is an element defined in the REC but not in the CEC (Appendix C).

### **2.3. Benefits of Energy Community**

The financial crisis in Greece after 2010 has affected people's ability to pay their bills, increasing EP. Specifically, 17,1% of households in Greece are unable to keep their home adequately warm, whilst the same indicator for the poor households is 39,1%, and for non-poor households is 12,4% (Hellenic Statistical Authority, 2021).

While addressing energy poverty is perhaps one of the most important issues to which ECs can contribute (REScoop et al., 2021), the benefits are not limited to this (Adams et al., 2021). According to Busch et al. (2021), five categories are listed in terms of the benefits that EC projects could have; I) benefits to the local economy, II) behavioral change, III) environmental benefits IV) increased social cohesion, and V) acceptance of renewable energy technology (Busch et al. 2021). Van der Waal, (2019) highlights thirteen potential positive local impacts that EC projects could have, including, among others, knowledge and skills development, energy literacy, impacts on regional sustainability, impacts on health and safety, political efficiency and mobilization, democratic impacts and renewable energy tourism.

However, there are challenges regarding the measurement of benefits that ECs could have, especially in relation to social benefits (Berka & Creamer, 2018). Furthermore, the social benefits of a project do not only depend on who owns it or on the equitable distribution of its benefits, but also depend, among other things, on the scale of the project, on whether the chosen technology is controversial, on landscape values and on previous experience with similar projects (Van der Waal., 2019). The survey conducted by intermediary organizations (REScoop et al., 2021) illustrates a comprehensive map of social impacts associated with ECs (Figure 4). The following chapters will discuss the policy measures needed to increase the share of EC projects in Greece and to achieve the aforementioned positive impacts they may have.



**Figure 4:** Social impact associated to ECs projects (REScoop et al., 2021): <https://my.visme.co/view/q687k34e-social-impacts-related-to-energy-communities#s1>

## **3 Theory**

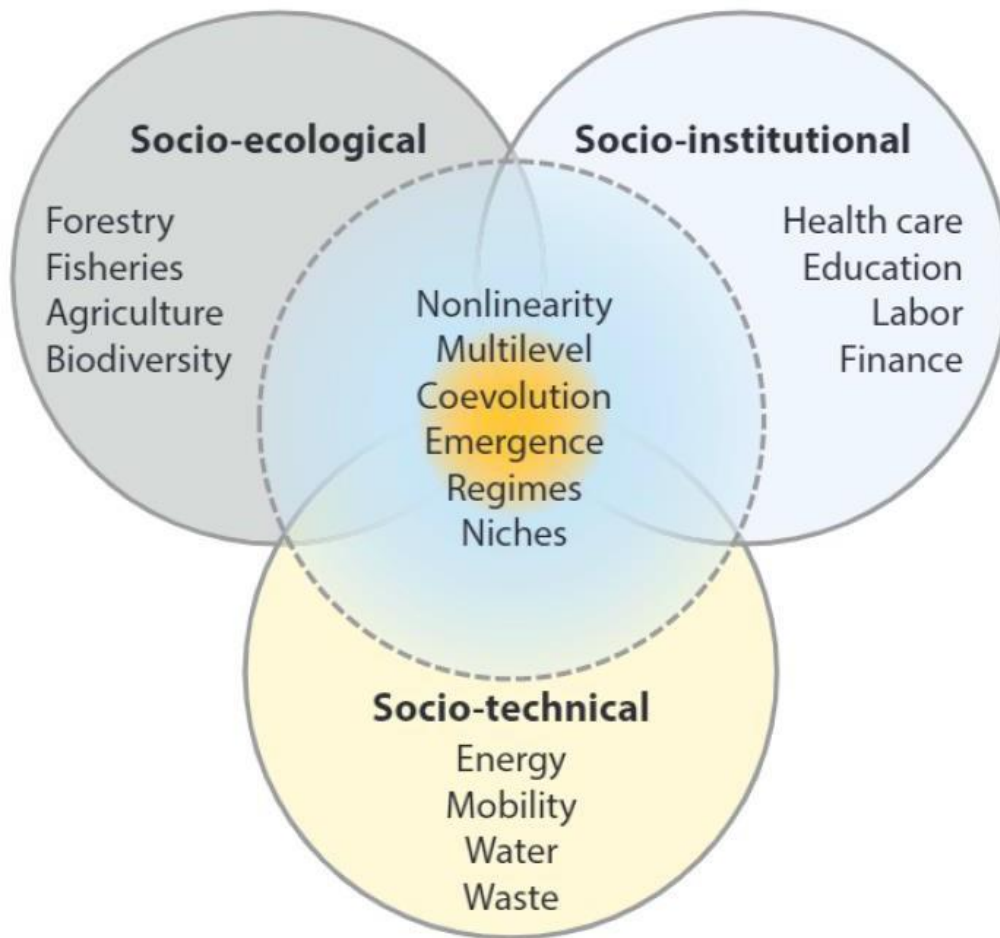
### **3.1 Sustainability transition**

The term *transition* can simply be understood as a change from one state to another. However, the term has been used in various disciplines, such as ecology, psychology, and demography, and refers to a non-linear change "from one dynamic equilibrium to another" (Loorbach et al., 2017, p. 600). The term *sustainability transition* refers to the large-scale changes needed to overcome the current sustainability challenges associated to social and environmental justice issues (Jerneck et al., 2011) such as water contamination, energy poverty, air pollution, and global warming (Markard et al., 2012). In other words, it refers to "long-term, multi-dimensional, and fundamental processes through which established socio-technical systems shift to more sustainable modes of production and consumption" (Markard et al., 2012, p. 956).

Although there are different approaches to sustainable transition, all of them share some common features (Loorbach et al., 2017). They are non-linear, multilevel and occurring in different domains, complex, and finally they are characterized by emergence of new experimentation (Figure 5). Thus, transitions are systemic changes that represent metamorphoses at different levels and domains that interact with each other in a complex way, resulting in qualitative changes in the system (Loorbach et al., 2017).

#### **3.1.1 Socio-technical transition**

Despite the common features regarding the concept of transition, there are different approaches. These differences are related to distinct epistemological and disciplinary backgrounds in which transition is examined. The basic disciplinary perspectives are socio-technical, socio-institutional, and socio-ecological transition (Figure 5) (Loorbach et al., 2017). The socio-technical transition implies not only changes in the technological dimension but also changes in institutions and practices of use. It is thus differentiated from a simple technological transition in the sense that it implies changes in other dimensions: technological, organizational, political, economic, etc. (Markard et al., 2012).



**Figure 5:** The different disciplinary approaches to study sustainability transition, socio-technical, socio-ecological, and socio-institutional (Loorbach et al., 2017).

The theoretical starting point of the present study is placed in the context of socio-technical transitions since the energy transition has typical socio-technical characteristics (Loorbach et al., 2017). To be more precise, under the current environmental threats and technological improvements in RES (landscape level), a window of opportunity opens for new innovations, such as ECs (niche level), to emerge and transform the current energy system (regime level) into a more democratic and equitable future—a Multi-Level Perspective approach (MLP).

Nevertheless, there are different analytical lenses within socio-technical transition theory. The most prominent frameworks that have been used are Multi-Level Perspective (MLP) and Technological Innovation Systems (TIS) (Loorbach et al., 2017). Although TIS was introduced quite recently (Bergek et al., 2008; Markard and Truffer, 2008); it can be traced back to Carlsson and Stankiewicz's (1991) term 'technological system', which emphasizes that the key factor driving the diffusion, creation and

use of new innovations is the systematic interaction between market actors and user preferences under specific institutional infrastructures (Markard et al., 2012; Loorbach et al., 2017).

However, TIS do not explicitly take account of the current incumbent regime actors (Loorbach et al., 2017), and thus do not cause a strategic transformation of current mode of production and consumption although more recent studies have shifted the focus from innovation "contributing to the economic growth...to new technologies as nuclei for fundamental sociotechnical transitions" (Markard et al., 2012, p. 959). On the other hand, this long-term transformative approach is at the heart of MLP and related approaches such as Strategic Niche Management (SNM). However, it is not closely linked to innovation policies and therefore does not have sufficient impact since "innovation systems approach is still the dominant perspective for devising innovation policy" (Weber & Rohracher, 2012, p. 1037).

### **3.2 Analytical Framework**

Weber & Rohracher (2012) argue that the integration of MLP and the structurally oriented innovation system approach could improve the transformation-oriented innovation policies. Hence, Weber & Rohracher "propose a comprehensive framework that allows legitimizing and devising policies for transformative change that draws on a combination of market failures, structural system failures, and transformational system failures" (Weber & Rohracher, 2012, p. 1037). In this study, I used the transition challenges policy framework provided by Busch et al. (2021), who tried to consolidate knowledge of policy challenges regarding the diffusion of community energy initiatives in the E.U. Busch et al. (2021) based their analysis on Weber & Rohracher (2012) as well as on Grillitsch et al. (2019), defining four policy challenges regarding CE initiatives in the EU, *Directionality Experimentation, Demand articulation as well as Policy Learning, and Coordination*.

**Directionality** emphasizes the future vision, and the specific policies needed to achieve the desired future (Busch et al., 2021). Directionality is vital since it not only underlines the necessary innovation for the transition but also the "particular direction of the transformative change" (Weber and Rohracher, 2012, p. 1042). Additionally, it highlights the importance of distributed and embedded agency since regime sifts are highly dependent on the actors "who propel institutional change" (Grillitsch et al., 2019, p. 1049).

**Experimentation** underlines the importance of testing new innovations and the related practices needed for their adoption and diffusion. It focuses not only on technical knowledge, which is important but also on policies to overcome structural barriers (Busch et al., 2021; Grillitsch et al., 2019).

**Demand articulation** is about making the technology or innovation desirable from a market perspective; it accentuates the importance of introducing the 'product' and establishing it in markets (Grillitsch et al., 2019). This can be done either by making the technology more attractive or by making the dominant technology less desirable than the alternative (Busch et al., 2021). Feed-in- tariffs (FiT) is a very good example of demand articulation in relation to RES (Busch et al., 2021).

**Policy Learning and Coordination** underscore the importance of policy coherence and consistency across different domains and levels (Grillitsch et al., 2019). Furthermore, it draws attention to required adjustments, modifications, and reflexivity of policy processes since the new novelties are characterized by a high degree of uncertainty (Grillitsch et al., 2019; Busch et al., 2021).

Therefore, this analytical framework, although not exhaustive, which means that other policies are potentially important (Busch et al., 2021), allows us to focus on and analyses to the key policy challenges related to the energy transition in Greece. Specifically, to answer the RQ question of this study: What are the policy challenges towards a high share of EC in the energy sector in Greece.

## 4 Methodology

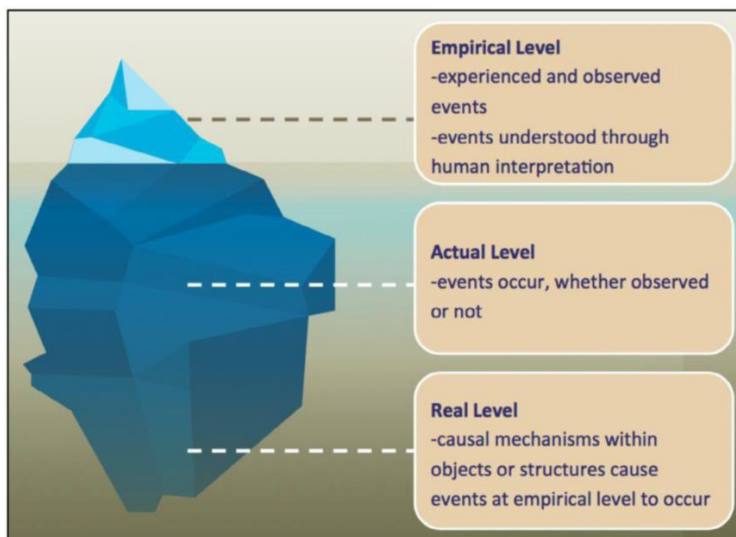
### 4.1 Research strategy

#### 4.1.1 Ontological and Epistemological stance

This research's epistemological and ontological position is placed within the critical realism (CR) perspective. Furthermore, I used Grounded Theory (GT) techniques regarding data collection, coding, and analysis.

Critical realism is particularly important in explaining the causal and generative mechanisms of a phenomenon. According to CR, reality consists of three pillars. The first is the pillar of the "real," consisting of objects, physical or social, and their structures and mechanisms. The second one is the pillar of the "actual" which consists of "facts, that is, what happens when mechanisms are activated." (Hoddy, 2018, p. 112). Finally, the "empirical" pillar describes how people perceive and experience these events (Hoddy, 2018) (Look at figure 1). Thus, "...there is a distinction between the objects that are the focus of their investigations and the terms used to describe, explain and understand them" (Bryman, 2012, p. 29).

Furthermore, critical theorists not only seek to understand reality but also to change it for the better (Bhattacharjee, 2012). In summary, the way changes will occur is based on the objective reality that is out there, but the way we interpret and perceive events substantially limits or supports our ability to change the status quo (Bhattacharjee, 2012).



**Figure 6:** The figure illustrates the iceberg metaphor regarding the level of analysis of Critical Realism ontology (Fletcher, 2020).

This ontological and epistemological way of thinking is present in this inquiry. I addressed the empirical level through semi-structured interviews. I addressed the actual level using Busch et al. (2021) framework transition policy challenges. Finally, I tend to approach the 'real' through integrating and evaluating empirical data with the theoretical framework and new concepts or theories that may emerge.

Last but not least, the mode of reasoning is neither inductive nor deductive. It is rather a retroductive, a simultaneous process "that moves from concrete to abstract and back again" (Fletcher, 2020, p. 189) (Figure 7).

## **4.2. Data collection and analysis**

In this research, I used semi-structured interviews to answer the research question. In addition to the interviews, a policy scoping and literature review were conducted. The following sections present the process of data collection, coding, and analysis (Figure 7).

### **4.2.1. Pre-existing knowledge**

Although a literature review was not my objective, a review of previous studies on ECs was conducted, as well as a policy review. The pre-existing knowledge about ECs helped me shape the research process and select the appropriate theoretical framework that could answer the RQ. In addition, the literature review helped develop the interview guide (Appendix D, Table D5). It also helped hypothesize causal mechanisms prior to conducting the interviews that could potentially be at play. Finally, the analysis of the pre-existing knowledge was divided into two categories: global policy challenges for EC projects and understanding the specificities applicable in Greece.

### **4.2.2 Data and coding**

Based on the literature review, I conducted an interview guide to extract the empirical data. After collecting empirical data through coding, theoretical re-description (abduction) followed " in which empirical data are re-described using theoretical concepts" (Fletcher, 2020, p. 188). In this study, the theoretical insertion point was based on the study by Busch et al. (2021). However, the theoretical entry point was only provisional, meaning that the analytical framework used to compare the findings of this study may be "fallible" (Fletcher, 2020, P. 188).

Semi-structured interviews were chosen instead of closed-ended questions or questionnaires. The rationale behind the choice of this method is that semi-structured interviews allow participants to express their deepest thoughts and opinions (Shackleton et al., 2021). This is crucial because it



enables the researcher to test whether there is a correlation between the framework used and the policy challenges that respondents highlighted as important. Furthermore, it also allows discovering new data that may not correspond to the analytical framework that has been used.

I conducted seven interviews with people involved in eight ECs. One of the interviewees is involved in two ECs. The choice of the interviewees was based on three factors. The first is the year of establishment of the EC. Some ECs have many years of operation and have already implemented projects, while others have not. In addition, the "Energy Communities" law came into force in 2018, so some participants started operating after the new law, while others did earlier. This is particularly important to determine how the new Law 4513/2018 affected new and old cooperative systems.

The second factor that was taken into account was the scope of the EC. According to the law, energy communities can implement various projects, such as producing energy from various resources, such as biomass and wind energy, and be active in various fields beyond energy production, such as storage or control of the electricity grid. The above-mentioned characteristics could shed light on how developed and diverse are the cooperative schemes in Greece and the consistency and coherence between different policy domains.

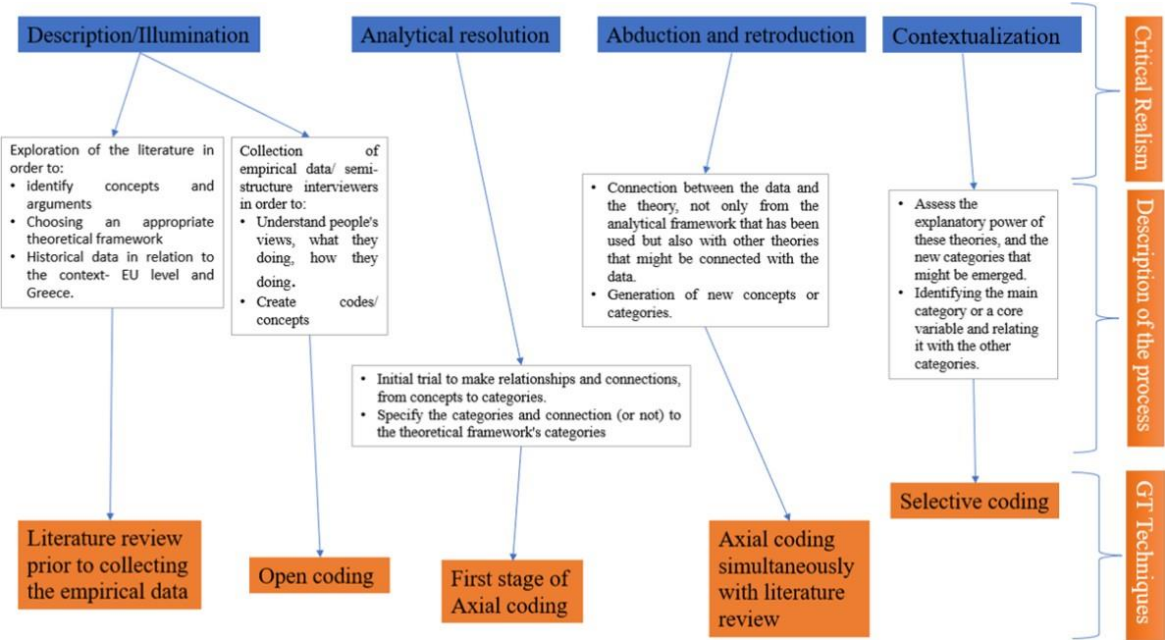
Lastly, Greece has particular geographical characteristics with many isolated areas and islands not connected to the network. Hence, the spatial factor was the third criterion. Two out of eight ECs operate in islands, with different characteristics, in terms of size and population. Three ECs operate in the Region of Attica. Finally, one is from central Greece, and one is an international intermediary organization. I tried to sample ECs with different characteristics in order to have a representative sample of energy communities in Greece. The sampling is of great importance since a genuinely representative sample can increase the validity of generalization back to the population of interest (Bhattacharjee, 2012). In addition, the choice to interview people from intermediary organizations is based on the underlined importance mentioned in previous studies (Busch & Hansen, 2021; Hargreaves et al., 2013; Mignon & Kanda, 2018) regarding sustainability transition policies.

Regarding policy documents, the focus is on the new law on energy communities, i.e., Law 4513/2018, and the legislation on cooperatives that precedes this law. In addition, I studied EU directives such as RED II and the Electricity Directive. However, an extensive policy scope analysis was beyond the objectives of this study. Thus, as already mentioned, policy scoping was mainly used as a study guide.

In terms of coding, I used the NVivo program to categorize and analyze the data. Additionally, I used GT techniques to make codes (Bhattacharjee, 2012) (Figure 7). First, I sought to identify key ideas or

**concepts** present in the data potentially linked to the analysis framework (*open coding*). The next step was to group these concepts at a higher level, that of **categories or sub-categories**. In my case, these categories refer to the analytical lens depicted by the framework, namely, directionality, demand articulation, experimentation, policy learning & coordination. However, I created a few more categories that were not part of the framework (Appendix D, Table D4).

The next step was to examine whether there was a relationship between the categories used (*axial coding*). This was particularly important to determine whether there was any relationship, explicit or implicit, with the categories that were not part of the analytical framework. Finally, I tried to identify whether there was any key variable that could potentially be categorized as a central category (*selective coding*).



**Figure 7:** CR and GT techniques applied in this study (Authors creation, inspired by Hoddy (2018)).

### 4.3. Challenges and Limitations

The challenges of this study are related to: I) the scientific field of study, namely, socio-technical transition, II) the chosen strategy, i.e., qualitative research, and finally, III) the researcher's experience in conducting qualitative research.

Regarding the challenges arising from Sustainable Development (SD) field, I want to stress that these challenges are mainly related to typology. As Faran (2010, p.6) points out, the question is, "what is to be sustained?". Additionally, the way that we answer this question reflects the "choice of tools," which "is at the same time the choice of a particular conception of sustainability" (Faran 2010, p.7). In

my study, I focus on the socio-technical transition and policy challenges associated with the diffusion of EC in Greece. The concept of EC implies a more democratic and just transition, but how do we define the content of justice and democracy in the first place? Thus, to paraphrase the aforementioned statement "what is to be sustained" someone could ask: what is just? The epistemological and ontological stance of this study seeks to address these concerns. Critical realism conceptualization of 'need' provides an approach whereby the 'real' is based on collecting data from people facing social exclusion (Hoddy, 2018). These unmet 'needs' should be addressed in order to achieve the socio-technical transition towards the 'desired' future.

The second challenge is related to the subjectivity of qualitative research (Bryman, 2012). One may argue that because perception of reality from people is subjective, confirmation is required from other "observation-based approaches" (Shackleton et al., 2021, p. 112). Nevertheless, people who participated in the study not only perceive change but also experienced it and observed it. Thus, the above-mentioned statement could be reversed since people who experience the changes could "corroborate or correct scientific observation" (Shackleton et al., 2021, p. 112). In addition, previous tested theories on the same field can be used from the interviewer to extract valid data and overcome the challenges of reliability and validity both internal and external, which are the main issues in qualitative research (Bryman, 2012; Bhattacharjee, 2012). Therefore, researcher experience plays a pivotal role regarding conducting an interview, which is the third challenge (Shackleton et al., 2021).

Additionally, challenges concern the reproducibility of the findings. This has a two-sided effect. On the one hand, how can we use existing knowledge from studies conducted in a different context, for example, in a different country? On the other hand, how can our findings be useful for extending current knowledge? However, choosing the appropriate theoretical framework tends to overcome this problem. In addition, explaining the background and contextual information could be useful.

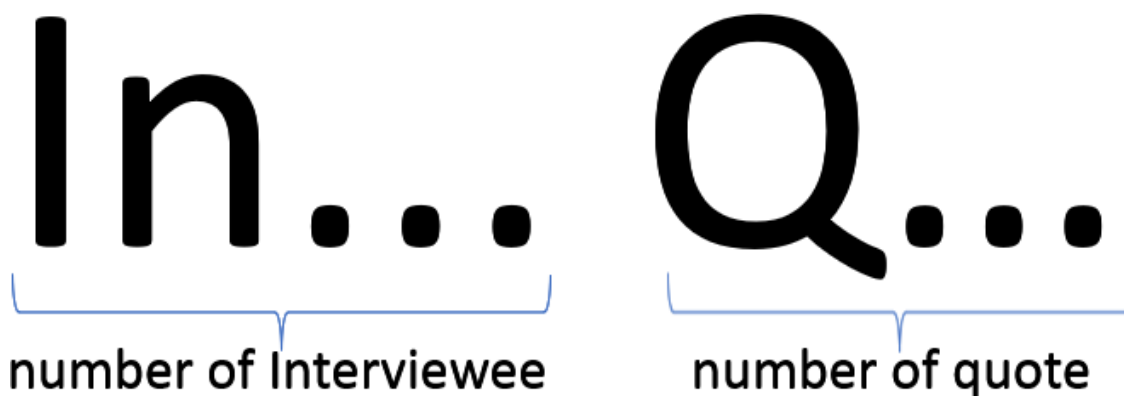
Another practical problem concerns audio transcriptions. Transcribing spoken speech into written speech is quite difficult, as the meaning may not be captured well. To overcome this problem, I tried not only to record what the interviewee said but also how. In other words, I tried to include the morphological parts of speech, such as volume of voice, irony, time gap, etc. in the quotations (Appendix D, Table D1). Finally, the last challenge is related to the de-framing of the discourse. When a text is quoted it can be excluded from a biggest body of reasoning, thus changing its meaning. This problem can be overcome by citing the whole transcription document, so it can be accessible to anyone. Furthermore, the use of NVivo during the analysis allows the researcher to have access to the whole document related to the phrase that has been quoted, minimizing the de-framing of the discourse during the analysis of the results.

#### 4.4. Ethical considerations

Ethics is of great importance in order to produce moral, academic inquiries (Bryman, 2012). With regard to the ethical considerations for this study, several issues were taken into account. First, the primary data for this study were interviews conducted via zoom. The interviewees were informed of the **anonymity** of this study, as well as its **confidentiality**. The interviews were then recorded and transcribed. The interviewees were informed prior to the recording, and their consent was sought. In addition, before the interview, participants were informed of the purpose of the study, through which institution it was performed, and what the interviewer's status was. The secondary data, namely policy documents, was cited and explicitly referred to.

Another ethical issue concerns how the interviewer interprets the opinions or beliefs of the interviewees. Also, any disclosure of information that the interviewees wish not to be made public. To overcome this problem, I sent to interviewees the survey results, but only the data relating to their own interviews.

In the next section, I will present the results based on the analytical framework I used. To better present the quotes I used in this study, I have created citations that can be seen in figure 8.



**Figure 8:** The figure illustrates how I have cited the quotes from the interviews in the text, e.g., In1 Q1 means, Interviewee 1 Quote1. The quotes from the interviews can be seen in Appendix D, Table D3 (Authors' creations).

## 5 Results

This section presents the results and how respondents' answers relate to the four policy challenges outlined in section three (3). First, directionality is presented, then demand articulation, followed by experimentation, and finally, policy learning and coordination.

### 5.1 Directionality

According to the respondents, some fundamental challenges regarding policies toward a high share of ECs in Greece are linked to visions and targets. Busch et al. (2021) state that targets and visions influence each other. However, differentiating between the two serves the clarity of the analysis. Therefore, following the same reasoning, they are presented separately below.

In terms of vision, all interviewees are inspired by a more **democratic energy system** in Greece (In1 Q2; In3 Q1; In7 Q1). They argue that this vision is embodied in the "Energy Communities" Act, Law 4513/2018, and the Clean Energy for All Europeans package adopted by the EU in 2019 (In1 Q1; In5 Q4; In6 Q1). One of the interviewees asserts that:

*"... because we believe very much in the democratic character that communities have and we believe that they can also push change and that they create great opportunities for opening up an industry that until now was oligopoly and based only on dirty energy sources, while now it is very innovative what is happening. (In7 Q1)."*

Moreover, the law of EC has helped the development of existing cooperative schemes (In2 Q1; In2 Q5; In4 Q1; In5 Q1), as well as the creation of new ones (In6 Q12; Electra Energy, 2020). As a result, many of the existing cooperative schemes changed their legal form from a "civil cooperative" to an "Energy Community" (In2 Q1; In5 Q1). According to interviewee 5, the new law benefits are making it easier for poorer groups to participate in cooperative schemes and investors who want to invest their money. In addition, it makes it easier for municipalities to participate in ECs (In2 Q5).

However, all respondents highlighted that many of the new ECs are actually private investors seeking to take advantage of the new law's benefits (In1 Q5; In2 Q2; In5 Q5; In7 Q2). As interviewee 6 put it:

*"So, with the Greek law, it's a good legal provision. However, there were some problems after the enactment of the law. We had the hijacking problem in Greece. This means that many energy communities were created by private investors to take advantage of whatever incentives there were for energy communities" (In6 Q13).*

The issue, as mentioned earlier, involves not only the absence of a clear vision from individuals but also from the state. The reasons for this are manifold. Firstly, in Western Europe, energy cooperatives developed partly as a reaction against nuclear power generation, which did not happen in Greece, since there is no nuclear energy (In6 Q5). Secondly, the governance model in Greece is relatively centralized and the top-down approach is quite prominent (Ziozas & Tsoutsos, 2021; In1 Q6; In4 Q5; n2 Q4). Moreover, the concept of cooperatives was misused in the past in Greece (In2 Q3). The above results suggest that the vision is influenced by historical factors (lack of current analytical framework) but also interacts with the fourth dimension of the present framework, that of Policy learning and Coordination.

The most essential factor that all responders agree on is that **no concrete and shared vision** favours ECs in Greece (In4 Q2; In5 Q2; In5 Q3; In5 Q4; In6 Q2). As interviewee 1 states:

*"I would also say there is no shared vision around the energy community in Greece. The motives are diverse -profit, savings, environmental action, democratic management, independence - without a unifying factor of all of them being prominent. This is, of course, dynamically evolving, it is not fixed. For example, now with the price of fossil gas soaring, a lot of talk about renewables and energy self-sufficiency has started, a window of opportunity to change the narrative." (In1 Q3).*

Furthermore, the absence of concrete vision regarding ECs in Greece becomes apparent because there is a **lack of specific targets** set by the State (In1 Q4; In4 Q8; In5 Q2; In5 Q4; In5 Q6; In6 Q2). Interviewee 1 claimed that:

*"There are no percentage targets for the participation of Energy communities in the total RES share of the country. There is, of course, a reference to 400 MW of self-consumption in the 2019 NECP, which is the first step towards this." (In1 Q4).*

Another explanation for this may not be the absence of a clear vision but the existence of a different vision that prioritizes large investments and centralize infrastructures by international and large national companies that guarantee low electricity prices instead of the EC (Ruggiero et al., 2018; In4 Q5; In2 Q13; In3 Q7; In1 Q8). The fact is that the revised NECP gives priority to gas, which, among other things, creates a **lock-in mechanism** that favors centralized infrastructure (NECP, 2019, pp. 50; In1 Q7).

Therefore, according to interviewees, first and foremost, a coherent plan towards a high share of EC in the energy mix in Greece is what is needed. This can be done not only by general targets set by the State but also with the active participation of municipalities and regions (In2 Q5; In5 Q1; In7 Q14). In addition, municipalities and regional bodies can play a crucial role in spreading EC across the country

and fighting EP (In1 Q9). However, one of the participants underlines that the local authorities, most of the time, **have quite a narrow vision** and, in many cases, **lack specific targets** (In4 Q4; In4 Q6). The bureaucracy can also be an obstacle for ECs to scale up. Hence, the importance of **citizens' participation and the role of leadership** was underlined as a substantial factor (In4 Q6; In4 Q7).

Finally, the link with other visions, such as the regional development of the country (In4 Q 21), security of supply (In6 Q6), and independence from fossil fuels (In2 Q7) but also as the myriad social benefits that EC can play at the local level (In4 Q22; In5 Q7) could boost EC projects.

## 5.2. Demand articulation

According to the respondents, many policy instruments can help disseminate EC projects in Greece. However, we can divide them into two main categories. The first category regards **financial tools**, while the second category regards **technical and administrative tools** such as priority connection to the grid.

Regarding financial instruments, all respondents agree that the State does not provide financial incentives to ECs, or subsidies (In7 Q3). Moreover, there is a **lack of funding from banks**, especially for non-profit initiatives. Banks do not provide loans for two main reasons. Firstly, they do not consider the ECs as reliable partners, as their organizational structure does not allow for private risk-taking. Secondly, since these projects are non-profit, banks do not consider these investments profitable (In1 Q10; In6 Q7). Moreover, with the 2020 law, the FiT system was replaced by auction procedures, including for-profit ECs (In4 Q10; In7 Q5; In1 Q17; In4 Q18; In6 Q17). As a result, ECs will have to compete with private investors in order to connect to the grid. In addition, the lower price on the wholesale market makes it difficult for ECs to finance their projects on their own or to find investors interested in investing money in these projects (In3 Q4).

Therefore, respondents underlined the importance of financial instruments that can play a vital role in the diffusion of ECs across Greece (In1 Q11). According to respondent 4, the National State could guarantee the loans provided by banks to EC. This measure would be an indirect form of subsidy from the State (In4 Q9).

However, there is more to be done in order to make the ECs more attractive. All respondents stress the importance of **upgrading the electricity grid** in the country. The fact that the electricity grid is saturated leads to delays in installing new renewable energy sources, which in turn increases the administrative costs for companies (In7 Q4; In4 Q11; In1 Q15; In5 Q15; In6 Q19). This fact is crucial, especially for ECs, as they are usually small companies with little administrative capacity and poor financial muscles.

Furthermore, in addition to grid upgrades, it is vital to **prioritize grid connection to energy communities**, both for-profit and non-profit. This could be achieved through a mechanism where each region has a percentage of electrical share reserved only for energy community projects (In4 Q17; In3 Q2). As interviewee 1 put it:

*"So, one issue is to upgrade the grid to accommodate new RES. However, what particularly can be done to benefit the ECs, is to create space<sup>3</sup> in each region, especially for Net-metering and virtual-net-metering for energy communities; that is, not all the space should be tied-up by big companies building giant photovoltaic panels. " (In1 Q15).*

### 5.3. Experimentation

Although the overall states' legislature does not favor EC projects, there are many ambitious examples of communities across the country. An in-depth analysis of these projects is beyond the scope of this study. However, talking to people involved in these projects provided vital insights into how testing new technological and social innovations can stimulate the adoption of new EC projects across the country and strengthen existing ones.

First of all, the mobilization of local communities is the cornerstone for developing ECs, as human capital is a crucial parameter for their expansion. After an in-depth semi-structured discussion with people involved in community programs, we found that almost all **ECs have developed training programs** (In4 Q12; In1 Q12; In1 Q13). As "interviewee 1" said, *"99% of our work is awareness-raising, education, information...."* (In1 Q12).

Nevertheless, I distinguish educational programs as "knowledge exchange" (In7 Q9) and "knowledge dissemination" (In6 Q8). The former refers to how existing ECs communicate and share experiences and knowledge. This is particularly important to overcome political, social, technical, or economic barriers; in other words, it is the exchange of know-how. On the other hand, 'knowledge dissemination' is more about raising local communities' awareness of the collective benefits of cooperative energy projects. These could be the benefits of e-cars and eco-mobility, the economic benefits for the local community from the EC project, or the social aspects such as fighting EP. However, one of the respondents does not highlight training programs as an essential aspect of developing their EC. Thus, their EC didn't participate in any training program (In3 Q2).

---

<sup>3</sup> The word space here does not mean land, but a specific share in the electricity grid.



Another significant finding is that there are several examples of experimentation in Greece. Some focus on overcoming **financial barriers** (In5 Q8; In6 Q10; In7 Q10; In4 Q14), while others focus on **technological and business novelties** (In2 Q7; In4 Q13; In6 Q11). Furthermore, according to interviewees, their experimentation projects are not a mere by-product but rather a goal on their own. As interviewee 5 put it:

*"Which step would be necessary to set up a unit responsible for setting up that supply chain so that when the financial resources are found in the future, and the technology matures, the supply chain will be there?"*

It is worth mentioning that many of their projects are supported by the available EU programs. For example, four out of seven survey participants underline the **Horizon projects** they participate in (In5 Q10). However, there is no support from the national state, as none of the participants referred to a specific programme. The gap is partly filled by grassroots initiatives with the support of the Regions and municipalities.

Therefore, the role of **Intermediaries** is crucial in terms of experimentation, as they disseminate knowledge (In1 Q2; In1 Q13; In1 Q14) but also help financially (In6 Q9). For example, different participants mentioned intermediary organizations such as REScoop several times during the interviews. The way in which intermediary organizations help ECs is basically through training programs, direct or indirect financial support, creation of networking groups, and also legislative support (In6 Q9; In4 Q13; In5 Q9; In7 Q9; In6 Q8; In7 Q8).

Finally, I distinguish the role of **international** and **national intermediaries**. International intermediaries, such as REScoop, mainly help existing EC projects to develop (knowledge exchange). In contrast, national intermediaries mainly focus on mobilizing local communities (knowledge dissemination). However, this distinction is not absolute, as training projects can be found at the international and national levels.

#### **5.4. Policy learning & Coordination**

According to respondents, although Law 4513/2018 on energy communities is a big step towards creating and disseminating community energy systems, many things still need to be done. All participants highlighted the fact that after 2018 many ECs are registered in the system. However, they highlighted the problem that most of the new communities are actually private investors who took advantage of the benefits provided by the law to ECs (In1 Q5; In2 Q2; In5 Q5; In7 Q2; In6 Q13).

The interviewees assert that this problem could be overcome by changing article two of Law 4513/2018, that is, by **increasing the number of members** required to start an EC. The change, as mentioned earlier, can solve the problem because private investors cannot attract many people with equal rights in the company/EC (In1 Q19; In4 Q15;). In addition, **creating a body in each region** to check the eligibility of applications is required (In1 Q16).

The proposals above imply a need for coordination at the policy level. The interviewees agree that there is a lack of policy coordination at different levels and between different levels. Firstly, there is a lack of coordination at the EU and national levels (In7 Q13). According to respondent 6, the EC law in Greece was published before the publication of RED II which introduced the concept of REC, and the Electricity Directive, which introduced the concept of CEC. Therefore, Law 4513 incorporated features from both concepts (In6 Q12; In6 Q14; In6 Q15). According to REScoop, the integration of EU law into national legislation needs improvement (REScoop, 2022c).

Moreover, at the European level, the State Guidelines on the conditions under which state aid is allowed have no reference to energy communities (In6 Q16). On the other hand, the European regulation on EC projects exempted from auctions procedures enables the installation of up to 6MW for Renewable Energy Sources and 18MW for wind farms (In6 Q17). Nevertheless, the Greek law is not compliant with the EU directive since community energy projects exempted from auction procedures have not to exceed 1MW (In4 Q19; In4 Q18).

However, there is a lack of coordination at the national level but also between the national and regional levels (In4 Q16). As far as the national level is concerned, there is no clear plan for financing projects by EC (In4 Q9; In6 Q7; In1 Q11). Moreover, no specific percentage of electricity share is reserved for Net-Metering or Virtual-Net-Metering. Additionally, no grid share is reserved for energy communities (In4 Q17; In5 Q15; In6 Q19; In3 Q6; In7 Q11; In4 Q11; In1 Q8; In1 Q15). Furthermore, EC projects do not have priority access to the grid since they have to compete with private investors (In1 Q17; In4 Q5). Therefore, while the legislation exists in reality, it is challenging to implement.

This is partly explained by the incumbents with a well-established position in the energy network system, making policy coordination difficult. Thus, there is a **lock-in mechanism** that favors large companies. As interviewee 1 put it:

*"At the same time, Mitsotakis (Prime Minister) is prioritizing gas instead of ECs and the storage and demand response technologies that we have been discussing, which among other things leads to a lock-in of carbon and centralized infrastructure." (In1 Q7).*

Moreover, there is **no horizontal directive** from the state level for developing ECs by municipalities or regions (In1 Q4; In1 Q18), although, there is guidance from the European Commission for at least one energy community in municipalities with more than 10,000 inhabitants (In7 Q14). However, municipalities could play a decisive role in the diffusion of ECs (In1 Q9). Thus, creating regional bodies is a necessary step toward better coordination between different levels (In1 Q20).

This is particularly important in Greece due to the geographical characteristics that create the need for regional administrative support. As already mentioned, many isolated energy microgrids are on the Greek islands. However, in line with respondent 2, there is a lack of regulatory framework in the Islands, especially regarding the **hybrid systems and the energy storage**. As he put it:

*"However, there is a lack of a regulatory framework, there is a lack of regulatory framework. We cannot generate power on an isolated micro-grid as they can on an interconnected island." (In2 Q10).*

In addition, Law 4513/2018 allows ECs to have a variety of activities, such as the production and distribution of energy and the production of energy from various resources, such as biomass. Respondent 5 claims that the regulatory framework regarding biomass generation is quite old. Therefore, it needs to be modernized in order to properly utilize biomass from forests or crops and create additional value for local communities. Furthermore, respondent 5 argues that biomass production, unlike other renewable energy sources, has an additional labor cost meaning the selling price cannot be the same. However, there is no regulatory framework that grants higher prices from biomass (In5 Q11; In5 Q12; In5 Q13; In5 Q14).

Finally, the last obstacle to disseminating the EC initiative in the country is policy changes; four of the seven interviewees stressed the **fragmentation of Greek legislation**, which discourages new schemes and increases administrative costs (In2 Q11; In 1 Q23; In5 Q16).

Due to the abovementioned problems, respondents stress the importance of network learning to overcome these problems. In addition, all respondents noted that institutional political pressure is necessary. Furthermore, the role of the intermediary organization is crucial for **lobbying** at a higher political level (In4 Q20; In7 Q17; In 1 Q22; In7 Q15). Law 4513/2018 allows for the creation of a national representative body. However, this has not yet been done (In4 Q20; In6 Q18; In7 Q16).

## 6 Discussion

The analysis of results reveals policy challenges related to all four analytical lenses of the framework that has been used. The main policy challenges associated with the development of ECs and some policy recommendations are presented below.

### 6.1 Lack of vision or discrepancy of vision?

The EU has adopted a number of regulations and laws to be carbon neutral by the end of 2050, but also to address the issues of EP and EJ. European climate act states that "this transition must be fair and inclusive, leaving no one behind" (Regulation 2021/1119, p. 1). In the same vein, RED II (Directive 2018/2001) and the IEMD (Directive 2019/944) refer to EJ, energy self-consumption, and the importance of citizen participation. For this reason, they define RECs and CECs, respectively, as citizen participation schemes to address the issues above.

The above-mentioned objectives are, to some extent, being implemented in Greece through the NECP (Section 2.1.: Country's Overview). Specifically, it is targeting to "reduce the relative energy poverty footprint to levels below the EU average by 2030" (NECP, 2019, pp. 80-81). In addition, it sets the target of self-consumption "mainly with a view to meeting own needs of more than 600 MW by 2030" (NECP, 2019, pp. 80-81).

However, both the EU and Greece have placed great emphasis on the *role of natural gas* in the energy transition, as it is considered a *transitional fuel*. In 2022, the European Council published the REPowerEU plan, which aimed to minimize the EU's dependence on Russian fossil fuels (REScoop, 2022). This publication is a very good first step, as it refers to energy communities as one of the key elements of EU policy. However, the criticism is that the main objective of the REPowerEU plan is not to wean the EU off the gas quickly but to diversify suppliers (REScoop, 2022). Similarly, the revised Greek NECP pays great attention to the role gas should play in the energy transition (NECP, 2019, pp. 80-81), with investments in new gas infrastructure reaching 5.5 billion euros (WWF Greece, 2020).

The above discussion highlights the role of *incumbents* in the transition to a low-carbon economy. In this study, I found that the role of natural gas is one of the most important incumbent actors hindering the development of ECs (Section 5.4. Policy learning and coordination). This issue has also been mentioned in previous studies (Szabo, 2022; Nolden, 2013).

Moreover, the above discussion highlights the **discrepancy of visions** regarding energy transition, which is a barrier in terms of ECs development (Busch et al., 2021); given that the political vision is to secure cheap energy through large centralized infrastructure (Busch et al., 2021; Ruggiero et al., 2018; Roby & Dibb, 2019). This may partly explain why, although the EC law exists, there is neither a common vision regarding ECs in Greece (In1 Q3) nor specific targets regarding the participation of EC in electricity generation (Section 5.1. Directionality)

However, like Haf & Parkhill, (2017), I found that **local vision** and municipal participation are vital to the development of ECs (Section 5.1. Directionality). Forman (2017) concludes that interventions in the energy system at the local level can promote energy justice and equity. Moreover, regional vision can mobilize different actors to facilitate the diffusion of EC projects (Busch et al., 2021). Furthermore, ECs could enhance the transition to a low-carbon economy, as €176 billion could be gained by citizens willing to co-fund community projects by 2030 (Pons-Seres de Brauwer & Cohen, 2020). It is also tangible that by 2050 almost half of renewable energy production will be controlled by citizens (REScoop, 2022; Kampman et al., 2016).

I also found that **local authorities might have a narrow vision** regarding the diffusion of ECs (In4 Q4; In4 Q6), which can be a barrier to its development (Busch et al., 2021). Hence it is crucial that local energy schemes are not based only on municipalities but also on people who envision a just transition. Moreover, individuals and their expertise are substantial social capital that can facilitate ECs (Armstrong & Bulkeley, 2014).

## **6.2 Market strategy or public strategy?**

Undoubtedly, Law 4513/2018 on energy communities is necessary for the dissemination of cooperative systems; however, more needs to be done. What is needed is the set of tools that can make ECs thrive. I found that **FIT** is an essential tool in terms of developing ECs which is in line with previous studies (Nolden, 2013; Saunders et al., 2012; Schreuer, 2016; Busch et al., 2021). FIT can increase independence from government subsidies and increase the economic validity of EC systems (Busch et al., 2021). However, Article 160 of Law 4759/2020 replaces FIT with auctions, which according to the respondents in this study, is a step backward (Law 4759/2020).

Several studies present evidence on the impact of auction processes strengthening large companies and harming small cooperative companies. (Grashof, 2019; Toke, 2015; Salm et al., 2016; Walker & Baxter, 2017; D. Couture & Bollweg, 2021). The reason for that is manifold. Initially, auctions, most of the time, apply to all enterprises regardless of the size. Thus, small energy systems, such as ECs, cannot compete with large companies, as competition tends to minimize prices and thus, profits. Hence, small

ECs cannot easily recover their costs and in turn, find financing through loans from banks. Furthermore, auctions require high administrative costs since they often include financial and technical prerequisites and must be completed by a specific time (D. Couture & Bollweg, 2021).

On the other hand, Busch et al. (2021, p. 8) argue that *FiT* can act as a “*double-edged sword*” because the security it creates can increase the dependence of ECs, making them vulnerable to possible changes in legal frameworks. Therefore, increasing revenue sources for EC, such as grants, FiTs, and loans provided by banks, is necessary. Nolden (2013) explained that regional state banks played a key role in the diffusion of ECs in Germany. I found similar results in my own research as one of the participants reported that one of the main reasons why their community thrives is that they work with the local cooperative bank. The above example could be extended to the whole country. The Hellenic Development Bank (ETE) as a guarantor, could provide loans for the implementation of EC projects, similar to the “exiconomo” program (Hellenic Development Bank, 2020). Also, significant financial support could be drawn from the Recovery and Resilience Facility (RRF) (Electra Energy, 2021). The RRF will provide around €30 billion through loans and grants, 37.5% of which will be targeted towards meeting climate targets (European Commission, 2022a).

However, the “double-edged sword of FiT” described by Busch et al. (2021, p. 8) does not only imply the need to diversify the financial instruments necessary for disseminating EC, It also means that ***solid administrative support*** is needed for the development of EC initiatives and the creation of ***new business models***. (Busch et al., 2021; Roby & Dibb, 2019). For example, Roby & Dibb (2019) suggest that shifting ECs focus projects from selling to self-consumption will help these projects. Furthermore, Roby & Dibb underlines the importance of flexible local markets that allow peer-to-peer projects, where individuals or companies can buy energy directly from the producers. Nevertheless, there is a lack of regulatory framework in Greece that allows these projects to develop. The debate mentioned above implies not only financial instruments for the dissemination of EC systems but also public intervention to guarantee their development. This is what I call shift from market strategy to public strategy.

### **6.3. Testbeds and the role of intermediaries**

Experimentation with social and technological innovation is essential for EC's development. It facilitates learning and reflects local specificity regarding identity, social practice, and cultural values (Busch et al., 2021). Contrary to Busch et al. (2021), most EC initiatives referred to socio-technical experimentation they developed as a goal rather than a by-product of their activities. Nevertheless, they didn't use the word experimentation explicitly. Additionally, most of ECs that participate in the

current study are intermediary organizations at the national or international level. Therefore, experimentation and dissemination of EC projects is their main activity (Appendix G).

The aforementioned remark underlines the importance of *intermediary organization*, which is also underlined in previous studies. (Mignon & Kanda, 2018; Busch & Hansen, 2021; Glaa & Mignon, 2020; Hargreaves et al., 2013). Moreover, based on the findings of this research, I draw three conclusions. First, the analysis of this research shows that although there are many experiments in Greece (Appendix G), they are derived from grassroots initiatives with little or no state support. Secondly, intermediary organizations at different levels - international, national, and local – are crucial since it facilitates simultaneous top-down and bottom-up knowledge transfer and network learning. Thirdly, intermediary organizations differ not only in the activity level but also in the scope of action. Some are more active in knowledge transfer and network learning, while others are more active in knowledge dissemination.

However, there are many more types of intermediate organizations, and the differences are not limited to the type of action or the level of action (Busch & Hansen, 2021; Mignon & Kanda, 2018). In addition, there are different conceptualizations of an intermediary (Hargreaves et al., 2013). Finally, intermediary organizations can facilitate EC during different phases of its development (Glaa & Mignon, 2020). Thus, these discrepancies can confuse policymakers regarding the role these organizations should have (Mignon & Kanda, 2018).

Nevertheless, the type of intermediary organizations involved in the present research and how they can facilitate the dissemination of EC in Greece is beyond the scope of the present study. Yet, it is a vital policy recommendation to mention the significance of these intermediaries for disseminating ECs and the need for support from the National State. One immediate measure could be the creation of regional "efficiency agencies" (Mignon & Kanda, 2018, p. 107) to link Communities with other actors, such as banks. Moreover, it can provide administrative, financial, technical, or other forms of assistance (Mignon & Kanda, 2018).

Differences in ideology, local specifics, objectives, or approaches that ECs have (Moroni et al., 2019) make coherent and standardized niches unfeasible and undesirable (Hargreaves et al., 2013). Furthermore, as Seyfang & Smith (2007) argue, there is a distinction between strategic positions that seek more radical and broad regime transformation and those that aim at change or adaptation. Consequently, policy should **support different types of intermediations**. It should also support independent intermediary organizations, as Busch et al. (2021) suggested.

#### 6.4. Coordination and Standardization at a different level

Policy coordination between the different levels is needed so as to address the abovementioned issues (Busch et al., 2021). Arguably, there is a lack of coordination between the EU and national levels and between the national and regional levels. First, as already mentioned, at the EU level, there are two definitions of community energy: REC under RED II and CEC under IEMD. Although these definitions are quite similar, they have differences. REC aims to increase citizens' participation in renewable energy through self-consumption. Thus, it seeks to minimize EP. On the other hand, The CEC aims to expand the electricity market and increase citizens' participation in the market (REScoop, 2020). However, Greece has not yet transposed the directives into national law, so there is a lack of coordination between the two policy levels, which creates confusion to people who want to establish an EC.

Article 16 (1) of the IEMD states that "The Member States shall provide a favorable regulatory framework for citizens' energy communities." (Directive 2019/944, p. 151). In addition, Article 22 (4) of the RED II states that "Member States shall provide a favorable framework to promote and facilitate the development of renewable energy communities. This framework shall ensure, inter alia, that: (a) unjustified regulatory and administrative barriers to renewable energy communities are removed" (Directive 2018/2001, p. 121). However, according to Article 160 of law 4759/2020, ECs will participate in auctions (Law 4759/2020). Therefore, Greek legislation does not recognize the specific characteristics of ECs as it treats them on the same terms as private investors. What is more, it does not comply with Article 22(7) of RED II on a level playing field (Directive 2018/2001).

Furthermore, I found that the top-down and centralized nature of the Greek state leads to limited governmental freedom for local authorities and communities, as Ziozas & Tsoutsos (2021) mention. Also, it minimizes network learning, which is crucial for the development of ECs (Busch et al., 2021). This does not mean the central government does not play an essential role in brokering low-carbon and just transition. Although the discussion on different governance modes is beyond this research's scope, the above discussion suggests that a governance model that supports coordination and cooperation at different scales and levels needs to be developed (Markantoni, 2016). Thus, a policy proposal that emerges from the analysis of the results is the creation of **one-stop shops** in each Region. This institution will be beneficial for the cooperative energy initiatives as it can provide administrative and technical support as well as knowledge transfer to the ECs. Moreover, it can provide a bottom-up reverse knowledge transfer, helping integrate local specificities into national policies, which is another important element for disseminating ECs (Busch et al., 2021).



Another very important finding that reveals the lack of coordination and threatens the EC in Greece is that the electricity grid is saturated (big companies - natural gas etc.) and new projects cannot be easily connected. Therefore, the creation of an “electric share” in each Region exclusively for net-metering and virtual-net-metering projects and the priority of connecting these projects over those aimed at selling energy is necessary for developing ECs. In addition, there should be an institutional framework for energy storage and micro-grids development. However, the absence of these policies is not only the result of technical or technological shortcomings. It is mainly an example of a particular perception of the role of energy as a commodity. Therefore, conceptualizing **energy governance as a common good is necessary** (Giotitsas et al., 2022).

Based on the above discussion, some practical policy measures are proposed in order to overcome the problem above regarding the diffusion of ECs in Greece. Figure 9 illustrates the policy recommendation for the diffusion of energy communities in Greece.

<b>Directionality</b>
A good measure is the proposal of WWF Hellas that beyond 600MW of self-consumption, there should be a target for the participation of municipalities and ECs. Specifically, incorporation in the NECP of the mandatory installation of 1.3 GW by ECs in which municipalities participate. In Greece, there are 332 municipalities where on average, they will have to install 4MW of RES by 2024. In addition, a long-term target of 50% energy production from ECs by 2050.
The state should set an explicit target - in the NECP - on ECs as the main way to address energy poverty and Justice. Therefore, the state should guarantee a certain share of electricity for EC projects without auctions, especially for non-profit communities (Net-metering and Virtual Net-metering).
Explicit referent to local ownership and self-consumption from renewable energy production to secure energy of supply.
<b>Demand articulation</b>
Abolition of auction procedures for all ECs and introduction of <u>FiT</u> system. An alternative would be the WWF-Greenpeace proposal for a progressive scale concerning which ECs will participate in the auction procedures (See Appendix E).
Financing of ECs through loans that can be provided by the Hellenic Development Bank (HDB)
Economic support could be derived from the recovery and resilience Facility (RRF) and Just Transition Fund (JTF).
<b>Experimentation</b>
A percentage of financial support should be directed to socio-technical innovations. Namely, to projects other than simple energy production, for instance, energy storage or smart micro-grid. This can be done by collaborating with different types of intermediary organizations, for example universities with state agencies or other intermediary organizations. The purpose of this proposal is to support experimentation.
<b>Policy learning &amp; Coordination</b>
Amendment of article 2 of law 4513/2018 on “energy communities” regarding the number of natural persons required to establish an EC. That is, increasing the number of natural persons from 5 to 30. However, this proposal must be taken after public consultation. This measure aims to address private investors’ distortion of the institution of energy communities.
Creation of One-Stop-Shops (state agencies), to inspect the eligibility of application and provide administrative, financial, and other technical support to ECs.
Specific energy storage targets in NECP and an institutional framework for energy storage.
Integration into national legislation of the RED II & Electricity Directive-regarding REC & CEC.

**Figure 9:** Policy recommendation based on the transition policy challenges framework that has been used in this study (Authors creation).

## **6.5. Reflection and limitation of the analytical framework**

This chapter presents the reflection on the analytical framework used in this study, as well as the limitations arising from it. In addition, suggestions for further studies are also presented.

### **6.5.1. The dimension of Power**

As already mentioned, the transition policy challenges framework has been used in this study inspired by Busch et al. (2021). This framework attempts to integrate the MLP approach with the innovation system approach (Weber & Rohracher., 2012). Thus, the current study is located in the broader middle-range socio-technical transition theory. Nevertheless, the theory of socio-technical transition has been criticized for not taking into account the concept of power (Lawhon & Murphy, 2011; Avelino, 2017). According to Geels et al. (2008), innovation studies and socio-technical dynamics are multidimensional; therefore, different scientific approaches and intersections are required in order to understand the socio-technical transition. Geels et al. (2008) highlight economics, sociology, political science, and cultural studies as the necessary disciplines for studying socio-technical transition (Geels et al. 2008). However, "political science and cultural studies appear to be less institutionalized on these dimensions, at least with regard to the topic of technological change" (Geels et al., 2008, p. 526).

Although more recent studies have elaborated on this aspect (Geels, 2014), the analytical framework I used lacks an explicit reference regarding the concept of power and justice. On the one hand, the concept of energy communities is by definition linked to the notion of justice and challenging the status quo. Therefore, lobbying, coalition building, and bargaining could emerge from the analytical frameworks. On the other hand, it is easy to fall into the "local trap," making the generalization that because a project occurs at local level is by definition just or democratic (Catney et al., 2013).

Moreover, Catney et al. (2013) distinguishes positive and negative localism, with the latest being a "strategic component within new forms of neo-liberalism." (Catney et al., 2013, p. 717). In addition, researchers suggested that a distinction should be made between the "radical" and "moderate" niches (Avelino, 2017; Seyfang & Smith, 2007). The former has a transformative character, aiming to transform macro-trends such as "capitalism, individualism, globalization" (Avelino, 2017. p. 511). Although transformative in character, the latter tends to be in line with current macro-trends Avelino (2017). Therefore, future studies could be inspired by the notion of power in order to analyze the policy challenges towards a high share of ECs in energy transition and the different trajectories that could emerge. The analytical framework and the three concepts of power at all levels of MLP processes analyzed by Avelino (2017) could be combined with the existing framework in order to analyze the different pathways that ECs can have and the necessary policy measures that are needed in order to

transform the current macro-trends.

### **6.5.2. The dimension of Justice**

Future research can also be inspired by the concept of justice in order to explore the different paths that ECs could take. The analysis of the interviews in this study suggests a different understanding of justice and, in turn, different goals that ECs have. For example, as already mentioned, one of the respondents defined democracy as increasing the participation of companies/EC in the energy market and reducing the oligopolistic characteristics of the Greek energy market. On the other hand, some interviewees emphasized that energy is a common good and not a commodity, focusing on marginalized people who do not have access to energy. The above observations, although possibly complementary, still focus on a different dimension of justice, with the former primarily focusing on procedural justice and the latter on recognition Justice.

The previous debates are not well represented in this study since the analytical framework I used does not take into account the ways of conceptualizing justice. Although there are different philosophical starting points regarding the concept of justice (Sovacool & Dworkin, 2014), it is proposed to incorporate three dimensions of justice, as explained by Jenkins et al. (2016), into the current framework (Appendix F).

## 7 Conclusion

The climate crisis is the greatest challenge for humanity, the shift to renewables and the abandonment of fuels is inevitable. However, this transition is not peaceful, as conflicts have arisen around the world regarding the deployment of renewable energy (Avila-Calero, 2017; Avila, 2018; Fairhead et al., 2012; Temper et al., 2020; Leach et al., 2010). Therefore, the concept of ECs has emerged in recent years. ECs are cooperative energy schemes that seek to address the aforementioned problem by putting power in the hands of citizens (Section 2, Background). However, to date they have not been developed in Greece, as they account for a very small percentage of the total energy production in the country.

In my study I tried to analyse the reason for this stagnation and also to propose policy measures to increase the share of ECs in the energy mix. To this end, I used the analytical framework defined by Busch et al, (2021) which includes four analytical lenses on the policy challenges faced by ECs, namely, **directionality, experimentation, demand articulation, policy learning & coordination** (Section 3.2). I found that the policy challenges in relation to ECs in Greece are related to all the analytical lenses described by Busch et al. (2021). I found that the liberalization of the energy market in Greece occurred after the 1990s, although important for the development of ECs, has led to the development of an oligopoly in the energy market, with gas playing a prominent role in electricity generation. The existence of incumbents limits the vision toward a just energy transition and reduces the role that ECs could have. However, there are many ambitious projects in Greece, mainly as a result of the enactment of 4513/2018 law of ECs as well as the EU directives. Nonetheless more needs to be done since these projects, although ambitious, face a lot of problems.

I propose some policy measures based on the analytical framework that I used to analyze the policy challenges (Figure 9). These proposals are very important since they seek to envision different rationality regarding energy (energy as common, not as a commodity) and thus propose a vision as well as a set of targets in order to achieve the desired future (directionality). Additionally, I try to propose tangible measures that relate to how EC can be attractive (demand articulation), what policy measures are needed in order to have a coherent plan for the development of energy communities (Policy learning & coordination), and finally, how new novelties can be tested and offer knowledge that is essential for the diffusion of ECs (experimentation).

However, in analyzing the results, I found that the analytical framework used does not explicitly capture the characteristics of power and justice (Section 6.5). Many of the codes are not related to the analytical framework (Appendix D, Table D4). Thus, I suggest that future studies integrate the current

analytical framework with that developed by Avelino (2017) and the three analytical lenses of justice provided by Jenkins et al. (2016) (Section 6.5.1 &6.5.2)

## References

- Adams, S., Brown, D., Cárdenas Álvarez, J. P., Chitchyan, R., Fell, M. J., Hahnel, U. J. J., Hojckova, K., Johnson, C., Klein, L., Montakhabi, M., Say, K., Singh, A., & Watson, N. (2021). Social and Economic Value in Emerging Decentralized Energy Business Models: A Critical Review. *Energies*, *14*(23), 7864. <https://doi.org/10.3390/en14237864>
- Armstrong, A., & Bulkeley, H. (2014). Micro-hydro politics: Producing and contesting community energy in the North of England. *Geoforum*, *56*, 66–76. <https://doi.org/10.1016/j.geoforum.2014.06.015>
- Avelino, F. (2017). Power in Sustainability Transitions: Analysing power and (dis)empowerment in transformative change towards sustainability. *Environmental Policy and Governance*, *27*(6), 505–520. <https://doi.org/10.1002/eet.1777>
- Avila-Calero, S. (2017). Contesting energy transitions: wind power and conflicts in the Isthmus of Tehuantepec. *Journal of Political Ecology*, *24*(1), 992. <https://doi.org/10.2458/v24i1.20979>
- Avila, S. (2018). Environmental justice and the expanding geography of wind power conflicts. *Sustainability Science*, *13*(3), 599–616. <https://doi.org/10.1007/s11625-018-0547-4>
- Becker, S., Kunze, C., & Vancea, M. (2017). Community energy and social entrepreneurship: Addressing purpose, organisation and embeddedness of renewable energy projects. *Journal of Cleaner Production*, *147*, 25–36. <https://doi.org/10.1016/j.jclepro.2017.01.048>
- Berka, A. L., & Creamer, E. (2018). Taking stock of the local impacts of community owned renewable energy: A review and research agenda. *Renewable and Sustainable Energy Reviews*, *82*, 3400–3419. <https://doi.org/10.1016/j.rser.2017.10.050>
- Bhattacharjee, A. (2012). *Social science research : principles, methods, and practices* (2nd ed.). Anol Bhattacharjee. [https://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa\\_textbooks](https://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa_textbooks)
- Bryman, A. (2012). *Social research methods* (Fourth edition). Oxford University Press.
- Busch, H., & Hansen, T. (2021). Building communities in times of crisis - Impacts of the COVID-19 pandemic on the work of transition intermediaries in the energy sector. *Energy Research & Social Science*, *75*, 102020. <https://doi.org/10.1016/j.erss.2021.102020>
- Busch, H., Ruggiero, S., Isakovic, A., & Hansen, T. (2021). Policy challenges to community energy in the EU: A systematic review of the scientific literature. *Renewable and Sustainable Energy Reviews*, *151*, 111535. <https://doi.org/10.1016/j.rser.2021.111535>
- Caramizaru, A., & Uihlein, A. (2020). Energy communities: an overview of energy and social innovation. In *European Commission*. [file:///C:/Users/Kosths/Documents/Lund%20University/2nd%20Year%20Courses/Master%20Thesis/Bibliography/Energy%20Communities/energy\\_communities\\_report\\_final%20\(2\).pdf](file:///C:/Users/Kosths/Documents/Lund%20University/2nd%20Year%20Courses/Master%20Thesis/Bibliography/Energy%20Communities/energy_communities_report_final%20(2).pdf)

- Carlsson, B., & Stankiewicz, R. (1991). On the nature, function and composition of technological systems. *Journal of Evolutionary Economics*, 1(2), 93–118. <https://doi.org/10.1007/bf01224915>
- Catney, P., MacGregor, S., Dobson, A., Hall, S. M., Royston, S., Robinson, Z., Ormerod, M., & Ross, S. (2013). Big society, little justice? Community renewable energy and the politics of localism. *Local Environment*, 19(7), 715–730. <https://doi.org/10.1080/13549839.2013.792044>
- Coenen, F. H. J. M., & Hoppe, T. (2021). *Renewable Energy Communities and the Low Carbon Energy Transition in Europe* (F. H. J. M. Coenen & T. Hoppe, Eds.). Springer International Publishing. <https://doi.org/10.1007/978-3-030-84440-0>
- D. Couture, T., & Bollweg, J. (2021, December 21). *Auctions for energy communities*. Friends of the Earth Europe. <https://friendsoftheearth.eu/publication/auctions-energy-communities-why-central-energy-transition/>
- Directive 2018/2001. *Promotion of the use of energy from renewable sources*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EL>
- Directive 2019/944. *Common rules for the internal market for electricity and amending Directive 2012/27/EU*. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944&from=EL>
- Douvitsa, I. (2019). The new law of energy communities in Greece. *Cooperativismo E Economía Social*, 40. <https://doi.org/10.35869/ces.v0i40.1385>
- Electra Energy. (2020, December 7). *Mapping of Energy Communities in Greece*. Electra Energy. <http://electraenergy.coop/wp-content/uploads/2021/05/DRAFT-Mapping-of-energy-communities-in-Greece.pdf>
- Electra Energy. (2021, February). Κοινή έκθεση της ευρωπαϊκής ομοσπονδίας ενεργειακών κοινοτήτων REScoop.EU, της Greenpeace, WWF Hellas και της οργάνωσης Electra Energy. [Joint report by the European federation of Energy communities REScoop, Greenpeace, WWF Hellas and Electra energy.] [http://electraenergy.coop/report\\_feb21/](http://electraenergy.coop/report_feb21/)
- European Commission. (2019). *Clean energy for all Europeans package*. Energy.ec.europa.eu. [https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package\\_en](https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en)
- European Commission. (2021). *A European Green Deal*. [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)
- European Commission. (2022a). *Greece's recovery and resilience plan*. European Commission. [https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/greeces-recovery-and-resilience-plan\\_el](https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/greeces-recovery-and-resilience-plan_el)
- European Council. (2021). *Council adopts European climate law*. Wwv.consilium.europa.eu. <https://www.consilium.europa.eu/en/press/press-releases/2021/06/28/council-adopts-european-climate-law/>
- Fairhead, J., Leach, M., & Scoones, I. (2012). Green Grabbing: a new appropriation of nature? *Journal of Peasant Studies*, 39(2), 237–261. <https://doi.org/10.1080/03066150.2012.671770>



- Faran, T. (2010, September 30). *Sustainable Development: A Typology of Perspectives*. [https://lucris.lub.lu.se/ws/portalfiles/portal/71279350/Turaj\\_Faran\\_Sustainable\\_Development\\_A\\_Typology\\_of\\_Perspectives.pdf](https://lucris.lub.lu.se/ws/portalfiles/portal/71279350/Turaj_Faran_Sustainable_Development_A_Typology_of_Perspectives.pdf)
- Fletcher, A. J. (2020). Applying critical realism in qualitative research: methodology meets method. *International Journal of Social Research Methodology*, 20(2), 181–194. <https://doi.org/10.1080/13645579.2016.1144401>
- Forman, A. (2017). Energy justice at the end of the wire: Enacting community energy and equity in Wales. *Energy Policy*, 107, 649–657. <https://doi.org/10.1016/j.enpol.2017.05.006>
- Friends of the Earth Europe, REScoop, & Energy Cities. (2020). *Community Energy- a practical guide to reclaiming power*. <https://www.rescoop.eu/uploads/rescoop/downloads/Community-Energy-Guide.pdf>
- Geels, F. W. (2014). Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society*, 31(5), 21–40. <https://doi.org/10.1177/0263276414531627>
- Geels, F. W., Hekkert, M. P., & Jacobsson, S. (2008). The dynamics of sustainable innovation journeys. *Technology Analysis & Strategic Management*, 20(5), 521–536. <https://doi.org/10.1080/09537320802292982>
- Giotitsas, C., Nardelli, P. H. J., Williamson, S., Roos, A., Pournaras, E., & Kostakis, V. (2022). Energy governance as a commons: Engineering alternative socio-technical configurations. *Energy Research & Social Science*, 84, 102354. <https://doi.org/10.1016/j.erss.2021.102354>
- Glaa, B., & Mignon, I. (2020). Identifying gaps and overlaps of intermediary support during the adoption of renewable energy technology in Sweden – A conceptual framework. *Journal of Cleaner Production*, 261, 121178. <https://doi.org/10.1016/j.jclepro.2020.121178>
- Grashof, K. (2019). Are auctions likely to deter community wind projects? And would this be problematic? *Energy Policy*, 125, 20–32. <https://doi.org/10.1016/j.enpol.2018.10.010>
- Grillitsch, M., Hansen, T., Coenen, L., Miörner, J., & Moodysson, J. (2019). Innovation policy for system-wide transformation: The case of strategic innovation programmes (SIPs) in Sweden. *Research Policy*, 48(4), 1048–1061. <https://doi.org/10.1016/j.respol.2018.10.004>
- Gunderson, R., Stuart, D., Petersen, B., & Yun, S.-J. (2018). Social conditions to better realize the environmental gains of alternative energy: Degrowth and collective ownership. *Futures*, 99, 36–44. <https://doi.org/10.1016/j.futures.2018.03.016>
- Haf, S., & Parkhill, K. (2017). The Muillean Gaoithe and the Melin Wynt: Cultural sustainability and community owned wind energy schemes in Gaelic and Welsh speaking communities in the United Kingdom. *Energy Research & Social Science*, 29, 103–112. <https://doi.org/10.1016/j.erss.2017.05.017>
- Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change*, 23(5), 868–880. <https://doi.org/10.1016/j.gloenvcha.2013.02.008>

- Hellenic Development Bank. (2020, December 1). *ΕΞΟΙΚΟΝΟΜΩ – ΑΥΤΟΝΟΜΩ*. Ελληνική Αναπτυξιακή Τράπεζα. <https://hdb.gr/exoikonomo-avtonomo/>
- Hellenic Statistical Authority. (2021). *infographic-living-conditions-2020 - ELSTAT*. Wwww.statistics.gr. <https://www.statistics.gr/en/infographic-living-conditions-2020>
- Heinrich Böll Stiftung. (n.d.). “*Discussing the energy market and the energy crisis in simple terms. How can consumers be protected?*” | Heinrich Böll Stiftung - Thessaloniki Office. Heinrich-Böll-Stiftung. Retrieved September 24, 2022, from <https://gr.boell.org/en/media/remote-video/discussing-energy-market-and-energy-crisis-simple-terms-how-can-consumers-be>
- Hicks, J., & Ison, N. (2018). An exploration of the boundaries of “community” in community renewable energy projects: Navigating between motivations and context. *Energy Policy, 113*, 523–534. <https://doi.org/10.1016/j.enpol.2017.10.031>
- Hoddy, E. T. (2018). Critical realism in empirical research: employing techniques from grounded theory methodology. *International Journal of Social Research Methodology, 22*(1), 111–124. <https://doi.org/10.1080/13645579.2018.1503400>
- International Cooperative Alliance. (2018). *Cooperative identity, values & principles | ICA*. Wwww.ica.coop. <https://www.ica.coop/en/whats-co-op/co-operative-identity-values-principles>
- International Energy Agency. (2017). *Energy Policies of IEA Countries: Greece 2017 Review – Analysis*. IEA. <https://www.iea.org/reports/energy-policies-of-iea-countries-greece-2017-review>
- International Energy Agency. (2018). *World Energy Outlook 2018*. International Energy Agency. [https://iea.blob.core.windows.net/assets/77ecf96c-5f4b-4d0d-9d93-d81b938217cb/World\\_Energy\\_Outlook\\_2018.pdf](https://iea.blob.core.windows.net/assets/77ecf96c-5f4b-4d0d-9d93-d81b938217cb/World_Energy_Outlook_2018.pdf)
- International energy agency. (2021). *Global Energy Review: CO2 emissions in 2021, Global emissions rebound sharply to highest ever level*. <https://iea.blob.core.windows.net/assets/c3086240-732b-4f6a-89d7-db01be018f5e/GlobalEnergyReviewCO2Emissionsin2021.pdf>
- IPCC, 2022: Summary for Policymakers. In: *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.001.
- Islar, M. (2013). *Private Rivers : Politics of Renewable Energy and the Rise of Water Struggles in Turkey*. Lup.lub.lu.se. <https://lup.lub.lu.se/record/3735486>
- Jenkins, K., McCauley, D., Heffron, R., Stephan, H., & Rehner, R. (2016). Energy justice: A conceptual review. *Energy Research & Social Science, 11*, 174–182. <https://doi.org/10.1016/j.erss.2015.10.004>
- Jerneck, A., Baier, M., Kronsell, A., Hickler, T., Lovbrand, E., Persson, J., Olsson, L., Ness, B., Anderberg, S., Clark, E., & Hornborg, A. (2011). Structuring sustainability science. *Sustainability Science, 6*, 69–82. <https://doi.org/DOI 10.1007/s11625-010-0117-x>

- Kampman, B., Blommerde, J., & Afman, M. (2016, September). *The potential of energy citizens in the European Union*. CE Delft - EN. <https://cedelft.eu/publications/the-potential-of-energy-citizens-in-the-european-union/>
- Law 4759/2020. Εκσυγχρονισμός της Χωροταξικής και Πολεοδομικής Νομοθεσίας και άλλες διατάξεις [Modernization of the Spatial and Urban Planning Law and other provisions]. <https://www.taxheaven.gr/law/4759/2020>
- Lawhon, M., & Murphy, J. T. (2011). Socio-technical regimes and sustainability transitions. *Progress in Human Geography*, 36(3), 354–378. <https://doi.org/10.1177/0309132511427960>
- Leach, M. (2010). *Dynamic Sustainabilities Technology, Environment, Social Justice*. Routledge.
- Loorbach, D., Frantzeskaki, N., & Avelino, F. (2017). Sustainability Transitions Research: Transforming Science and Practice for Societal Change. *Annual Review of Environment and Resources*, 42(1), 599–626. <https://doi.org/10.1146/annurev-environ-102014-021340>
- Markantoni, M. (2016). Low Carbon Governance: Mobilizing Community Energy through Top-Down Support? *Environmental Policy and Governance*, 26(3), 155–169. <https://doi.org/10.1002/eet.1722>
- Markard, J., & Truffer, B. (2008). Technological innovation systems and the multi-level perspective: Towards an integrated framework. *Research Policy*, 37(4), 596–615. <https://doi.org/10.1016/j.respol.2008.01.004>
- Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research Policy*, 41(6), 955–967. <https://doi.org/10.1016/j.respol.2012.02.013>
- Mignon, I., & Kanda, W. (2018). A typology of intermediary organizations and their impact on sustainability transition policies. *Environmental Innovation and Societal Transitions*, 29, 100–113. <https://doi.org/10.1016/j.eist.2018.07.001>
- Moroni, S., Antonucci, V., & Bisello, A. (2019). Local Energy Communities and Distributed Generation: Contrasting Perspectives, and Inevitable Policy Trade-Offs, beyond the Apparent Global Consensus. *Sustainability*, 11(12), 3493. <https://doi.org/10.3390/su11123493>
- National Energy and Climate Plan, (2019). [https://energy.ec.europa.eu/system/files/202003/el\\_final\\_necp\\_main\\_en\\_0.pdf](https://energy.ec.europa.eu/system/files/202003/el_final_necp_main_en_0.pdf)
- Nolden, C. (2013). Governing community energy—Feed-in tariffs and the development of community wind energy schemes in the United Kingdom and Germany. *Energy Policy*, 63, 543–552. <https://doi.org/10.1016/j.enpol.2013.08.050>
- Pons-Seres de Brauwer, C., & Cohen, J. J. (2020). Analysing the potential of citizen-financed community renewable energy to drive Europe’s low-carbon energy transition. *Renewable and Sustainable Energy Reviews*, 133, 110300. <https://doi.org/10.1016/j.rser.2020.110300>
- Regulation 2021/1119. *Establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (“European Climate*

- Law*). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1119&from=EL>
- Regulatory Authority for Energy. (n.d.). *Non-Interconnected Islands*. Rae Website. Retrieved April 18, 2022, from <https://www.rae.gr/non-interconnected-islands/?lang=en>
- REScoop, Electra Energy, & Heinrich Böll Stiftung. (2021). *Mapping the Social Impact of Energy Communities*. <http://electraenergy.coop/wp-content/uploads/2022/01/4pager-report.pdf>
- REScoop. (2020, June 24). *Energy Communities under the Clean Energy Package - REScoop*. [Www.rescoop.eu](https://www.rescoop.eu). <https://www.rescoop.eu/news-and-events/press/energy-communities-under-the-clean-energy-package>
- REScoop. (2022, April 12). *A REPowerEU for Energy Citizens Manifesto - REScoop*. [Www.rescoop.eu](https://www.rescoop.eu). <https://www.rescoop.eu/news-and-events/news/a-repowerEU-for-energy-citizens-manifesto>
- REScoop. (2022b). *REScoop network*. [Www.rescoop.eu](https://www.rescoop.eu). <https://www.rescoop.eu/network/map/>
- REScoop. (2022c). *Transposition Tracker*. [Www.rescoop.eu](https://www.rescoop.eu). <https://www.rescoop.eu/policy#transposition-tracker>
- Ritchie, H., & Roser, M. (2020a). *Renewable Energy*. Our World in Data. <https://ourworldindata.org/renewable-energy>
- Ritchie, H., & Roser, M. (2020b). *Energy*. Our World in Data. <https://ourworldindata.org/energy/country/greece>
- Ritchie, H., Roser, M., & Rosado, P. (2020). *Energy Production and Consumption*. Our World in Data. <https://ourworldindata.org/energy-production-consumption>
- Roby, H., & Dibb, S. (2019). Future pathways to mainstreaming community energy. *Energy Policy*, 135, 111020. <https://doi.org/10.1016/j.enpol.2019.111020>
- Ruggiero, S., Martiskainen, M., & Onkila, T. (2018). Understanding the scaling-up of community energy niches through strategic niche management theory: Insights from Finland. *Journal of Cleaner Production*, 170, 581–590. <https://doi.org/10.1016/j.jclepro.2017.09.144>
- Salm, S., Hille, S. L., & Wüstenhagen, R. (2016). What are retail investors' risk-return preferences towards renewable energy projects? A choice experiment in Germany. *Energy Policy*, 97, 310–320. <https://doi.org/10.1016/j.enpol.2016.07.042>
- Saunders, R. W., Gross, R. J. K., & Wade, J. (2012). Can premium tariffs for micro-generation and small scale renewable heat help the fuel poor, and if so, how? Case studies of innovative finance for community energy schemes in the UK. *Energy Policy*, 42, 78–88. <https://doi.org/10.1016/j.enpol.2011.11.045>
- Scholten, D., & Criekemans, D. (2018). *The geopolitics of renewables*. Cham Springer International Publishing Ag.
- Schreuer, A. (2016). The establishment of citizen power plants in Austria: A process of empowerment? *Energy Research & Social Science*, 13, 126–135. <https://doi.org/10.1016/j.erss.2015.12.003>

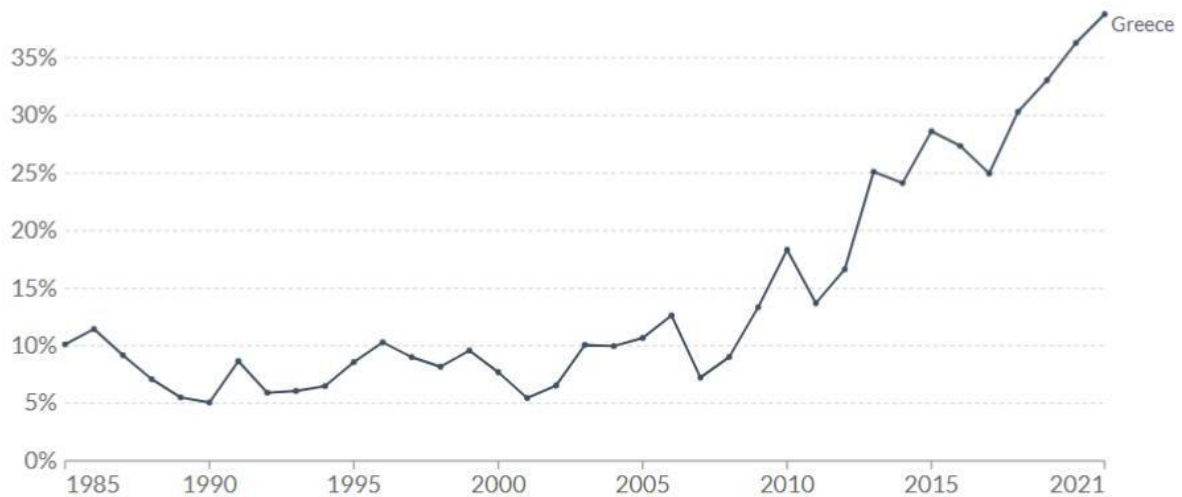
- Seyfang, G., & Smith, A. (2007). Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics*, 16(4), 584–603. <https://doi.org/10.1080/09644010701419121>
- Shackleton, S., Carlos Bezerra, J. C. B., Cockburn, J., G. Reed, M., & Abu, R. (2021). Interviews and surveys. In *The Routledge Handbook of Research Methods for Social-Ecological Systems* (pp. 107–118). Routledge. <https://doi.org/10.4324/9781003021339-7>
- Siamanta, Z. C. (2019). Wind parks in post-crisis Greece: Neoliberalisation vis-à-vis green grabbing. *Environment and Planning E: Nature and Space*, 2(2), 274–303. <https://doi.org/10.1177/2514848619835156>
- Siamanta, Z. C., & Dunlap, A. (2019). “Accumulation by Wind Energy.” *ACME: An International Journal for Critical Geographies*, 18(4), 925–955. <https://acme-journal.org/index.php/acme/article/view/1718>
- Sovacool, B. K., & Dworkin, M. H. (2014). *Global Energy Justice*. Cambridge University Press. <https://doi.org/10.1017/cbo9781107323605>
- Szabo, J. (2022). Energy transition or transformation? Power and politics in the European natural gas industry’s trasformismo. *Energy Research & Social Science*, 84, 102391. <https://doi.org/10.1016/j.erss.2021.102391>
- Toke, D. (2015). Renewable Energy Auctions and Tenders: how good are they ? *International Journal of Sustainable Energy Planning and Management*, 08, 43–56. <https://doi.org/dx.doi.org.10.5278.ijsepm.2015.8.5>
- Temper, L., Avila, S., Bene, D. D., Gobby, J., Kosoy, N., Billon, P. L., Martinez-Alier, J., Perkins, P., Roy, B., Scheidel, A., & Walter, M. (2020). Movements shaping climate futures: A systematic mapping of protests against fossil fuel and low-carbon energy projects. *Environmental Research Letters*, 15(12), 123004. <https://doi.org/10.1088/1748-9326/abc197>
- van der Waal, E. C. (2019). Local impact of community renewable energy: A case study of an Orcadian community-led wind scheme. *Energy Policy*, 138, 111193. <https://doi.org/10.1016/j.enpol.2019.111193>
- Vlados, C., Chatzinikolaou, D., & Kapaltzoglou, F. (2021). Energy Market Liberalisation in Greece: Structures, Policy and Prospects. *International Journal of Energy Economics and Policy*, 11(2), 115–126. <https://doi.org/10.32479/ijeep.10804>
- von Sperling, E. (2012). Hydropower in Brazil: Overview of Positive and Negative Environmental Aspects. *Energy Procedia*, 18, 110–118. <https://doi.org/10.1016/j.egypro.2012.05.023>
- Walker, C., & Baxter, J. (2017). “It’s easy to throw rocks at a corporation”: wind energy development and distributive justice in Canada. *Journal of Environmental Policy & Planning*, 19(6), 754–768. <https://doi.org/10.1080/1523908x.2016.1267614>
- Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? *Energy Policy*, 36(2), 497–500. <https://doi.org/10.1016/j.enpol.2007.10.019>
- Walker, G., & Simcock, N. (2010). Community Energy Systems. *Elsevier Ltd.*, 25, -. <https://doi.org/https://doi.org/>

- Weber, K. M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change. *Research Policy*, *41*(6), 1037–1047. <https://doi.org/10.1016/j.respol.2011.10.015>
- Wiedmann, T., Lenzen, M., Keyßer, L. T., & Steinberger, J. K. (2020). Scientists' warning on affluence. *Nature Communications*, *11*(1). <https://doi.org/10.1038/s41467-020-16941-y>
- WWF Greece. (2020). *Blueprint for a green recovery in Greece*. [https://wwfeu.awsassets.panda.org/downloads/wwf\\_greece\\_green\\_recovery\\_report\\_eng.pdf](https://wwfeu.awsassets.panda.org/downloads/wwf_greece_green_recovery_report_eng.pdf)
- Ziozas, N., & Tsoutsos, T. (2021). Clean Energy Transition in Southeast Europe: The Paradigm of Greece from a Fossil Fuel Mediator to a Community Energy Hub. *Renewable Energy Communities and the Low Carbon Energy Transition in Europe*, 75–95. [https://doi.org/10.1007/978-3-030-84440-0\\_4](https://doi.org/10.1007/978-3-030-84440-0_4)

## Appendices

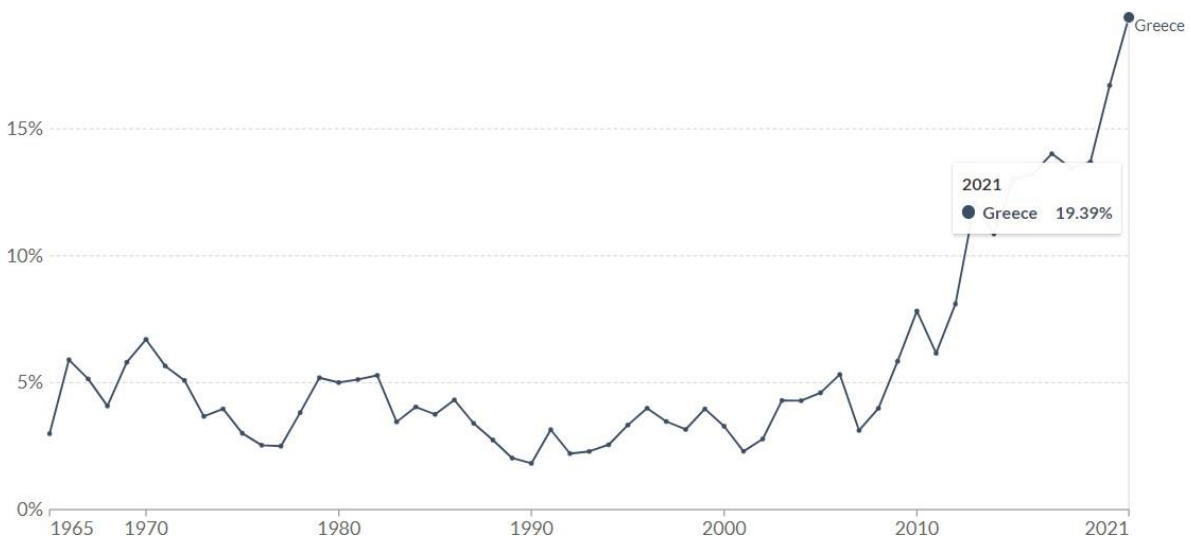
### Appendix A

**Figure A1:** Share of Electricity production from renewables, from 1985 to 2021.



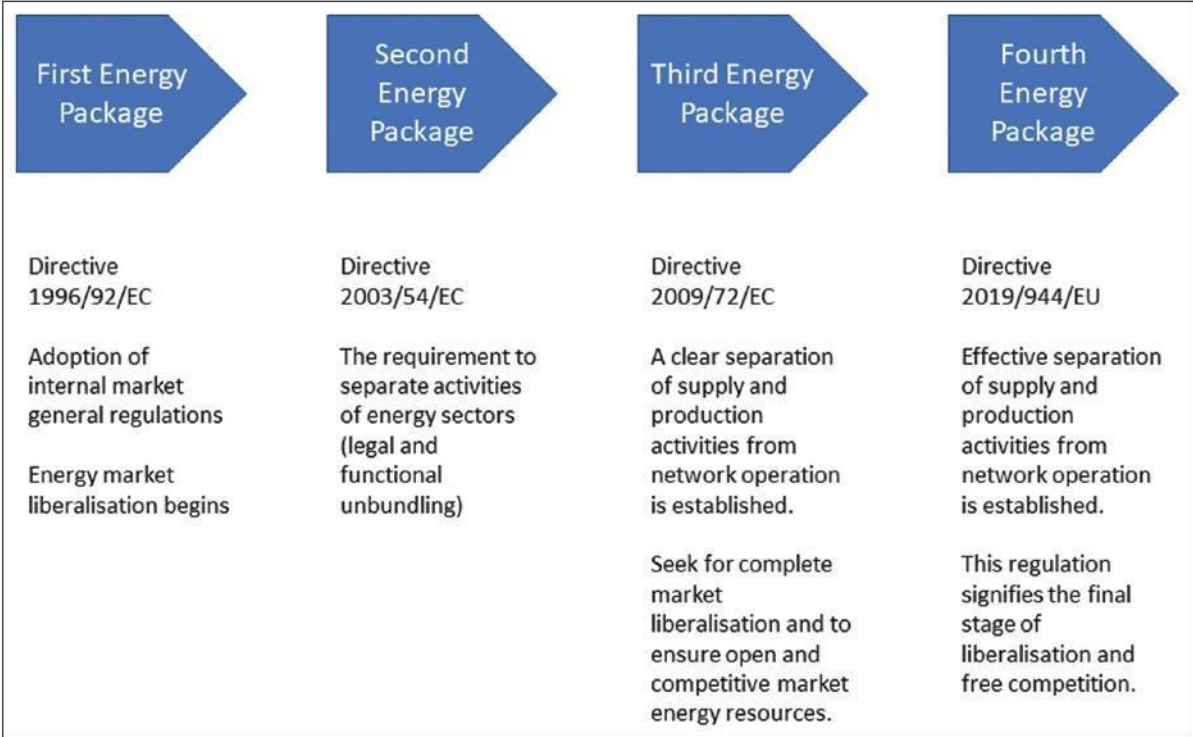
Note: The renewable energy sources presented here include hydropower, solar energy, wind energy, geothermal energy, bioenergy, wave and tidal energy. Traditional biofuels are not included (Our World in Data, 2021b).

**Figure A2:** Share of primary energy from Renewables sources, from 1965 to 2021



Note: the renewable energy sources presented here include hydropower, solar, wind, biomass & waste, geothermal, wave and tidal sources (Our World in Data, 2021a).

**Figure A3:** Liberalisation of the EU energy market, Energy package (Vlados et al., 2021).





**Appendix B:** International Cooperative principles (International Cooperative Alliance, 2018): <https://www.ica.coop/en/whats-co-op/co-operative-identity-values-principles>

<p><b><i>Voluntary and Open Membership:</i></b> Cooperatives are voluntary organizations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.”</p>
<p><b><i>Democratic Member Control:</i></b> “Cooperatives are democratic organizations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary cooperatives members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner.”</p>
<p><b><i>Member Economic Participation:</i></b> “Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing their cooperative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; and supporting other activities approved by the membership.”</p>
<p><b><i>Autonomy and Independence:</i></b> “Cooperatives are autonomous, self-help organisations controlled by their members. If they enter into agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their cooperative autonomy.”</p>
<p><b><i>Education, Training, and Information:</i></b> “Cooperatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their cooperatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of co-operation.”</p>
<p><b><i>Cooperation among Cooperatives:</i></b> “Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures.”</p>
<p><b><i>Concern for Community:</i></b> “Cooperatives work for the sustainable development of their communities through policies approved by their members.”</p>

**Appendix C: Differences and similarities between REC and CEC (Caramizaru & Uihlein, 2020, p. 8)**

<i>Differences</i>	<i>REC</i>	<i>CEC</i>
<i>Geographical scope</i>	Energy communities should be "organized near renewable energy projects owned and developed by that community".	Energy communities are not required to be in "close proximity or in the same geographic location between generation and consumption".
<i>Activities</i>	Energy communities can have "a broad range of activity referring to all forms of renewable energy in the electricity and heating sectors."	Energy communities "can be renewable and fossil-fuel based (i.e. technology-neutral)".
<i>Participants</i>	"Renewable energy communities have a more restricted membership and only allow natural persons, local authorities and micro, small and medium-sized enterprises whose participation does not constitute their primary economic activity (REScoop. EU, 2019). A separate provision requires Member States to ensure that participation in renewable energy communities is accessible to consumers in low-income or vulnerable households."	There is no restriction regarding membership as far as shareholders "that are engaged in large-scale commercial activity and for which the energy sector constitutes a primary area of economic activity do not exercise any decision-making power." Participants can be "natural persons, local authorities and micro, small, medium and large enterprises."
<i>Autonomy</i>	Energy community should be autonomous and traditional market actors can participate only as member or shareholders, thus it's more democratic than Energy community under CEC.	there is no reference to autonomy but "decision-making powers should be limited to those members or shareholders that are not engaged in large-scale commercial activity and for which the energy sector does not constitute a primary area or economic activity."
<i>Effective control</i>	The energy community can be controlled by any member without reference to size, as long as it is close to the energy project.	Energy community can be control by natural persons, micro and small enterprises and local authorities.

## Appendix D

**Table D1:** Transcription symbol

Symbols	Meaning
(.....)	Important pause in the speech
.....	Omit redundant part of the quote.
[ ]	Laughter / Sarcasm
<u>Underline words or sentences</u>	Indicates emphasis by raising the volume and tone of the voice
*****	Names replaces for anonymity

**Table D2:** Description of the energy communities in which the interviewees in this study are involved.

Codes of interviewers	Description of the EC that interviewees participate.
Interviewee 1	Participate in two ECs. One of them operates as an intermediary organisation. The second one operates in the region of Attica.
Interviewee 2	Participate in an EC that operates in an Islands in Aegean sea. Municipality is a member of the community.
Interviewee 3	Participate in an EC in the region of Attica.
Interviewee 4	Participate in an EC in the island of Creta. It operates as intermediary.
Interviewee 5	Participate in an EC in the Region of Thessaly, central Greece.
Interviewee 6	REScoop, International intermediary organisation.
Interviewee 7	Greenpeace Greece. NGO, it can be considered as intermediary organisation.

**Table D3:** Quotes/codes from the interview transcripts of all seven interviews translated into English (25 pages).

In the following link you can find the table with the quotes from the interviews used for the analysis of the results of this study. The full set of interviews can be requested from k\_pantazhs@hotmail.com and are saved for the examiners of this thesis in zip file format:












<https://docs.google.com/document/d/1j3BJXAAA54CcNjjm27f4cri6hc5TOSd3/edit#>

**Table D4:** The tables given below provide information on the processing procedure, categories as well as the nodes used for the analysis of the results using NVivo.

## Nodes

Name	Files	References
beliefs-ideology	5	25
Free Market	3	6
Social & solidarity economy	1	2
class struggle	2	4
Demand articulation	2	2
Access to the grid	7	8
Financial	7	12
FIT	7	11
Subsidies	8	11
Lack of Electricity space	7	11
Liberation of Market	3	3
raising awareness	3	3
Democracy	2	2
Directionality	0	0
Fake EC	5	6
Leadership	1	1
Municipality	4	4
Targets	6	14
Security	2	2
Vision	8	31
Bottom-up visions	3	9
connection with other Visions	3	7
Different visions	8	21
Experimentation	6	9
Bussiness	1	5
Education	0	0
Share knowledge	8	28
Social experimentation	1	1
spread of knowledge	6	13
EXP Financial	6	22
Gender balance	1	1

## Nodes

Name	Files	References
Intermediary organisations		6
Motivate		2
National Intermediaries		4
Self-assesment		1
Management		1
Share interest		1
Technological		9
Historical perspective		5
Civic engagement and Social Capital		2
Acts neighbourliness		3
Justice		0
Distribution		2
Recognition		2
Procedural		3
Local Vs Global		1
Policy Learning & Coordination		5
Coordination		9
Incumbent		8
lobbying		6
network learning		4
Policy changes		6
Standardisation		7

**Table D5:** Interview guide

**1. Background questions**

**Firstly, I would like to talk about:**

- Your community?
- How/why do you involved with ECs?
- Your role in the EC.
- You describe to me some projects and goals that you have set for the future. how do you come up with these ideas? what motivate you?

**2. Questions related to barriers and challenges**

- What's the problems that you have faced till now or you think that you will face in the future in relation the creations, development and diffusion yours EC?
- The region, municipality or the state facilitate the development of the ECs? And how?
- Do you think the vision you described to me earlier for your community is in the same direction as the state's vision? Are there any goals from the state to realize this vision?

**3. Questions related to Solutions**

- In every project there is an amount of uncertainty/risk. How did you deal with this issue? Was there any external help? which actors did they help you? Do you participate in any program?
- Which policy measure do you think could be advantageous for the ECs? And overcome the aforementioned problems?
- What kind of resources (financial tolls or other) did you used/ or think that are necessary in order to overcome the obstacles that you referred to?
- Which actors involved to solved your problem/ to develop your project.
- Do you thing that the state can help to solve the obstacles that you described earlier, and if yes how? What kind of resources do you think that are necessary?

**4. Questions concerning current policies that are related to ECs**

- If I ask you which policy measure - law, directive, regulation, etc. facilitated your functioning as an EC, what would you say?
- Do these different levels are coordinate? For example, some specific programs/conference/ legislation?
- You describe to me some very important thoughts about your community. Do you think that EU, the national state or regional policies are in line with your views?
  - Do you think this is important for the development of your EC: If not, why? / If yes, how?
- Apart from the laws you mentioned at the beginning of our discussion, do you think there is a need for any other intervention (legislative, directive?)

**Appendix E: WWF-Greenpeace proposal concerning exception of EC for auctions**

---

<b>Number of Members</b>	<b>Coefficient Participation natural persons</b>	<b>Natural persons who will participate (rounding)</b>	<b>MW out of tenders</b>
15	55%	8	3
30	55%	17	6
35	55%	25	9
60	55%	33	18

---

**Appendix F: Dimensions of Justice by Jenkins et al., (2016).**

---

<b>Tenets</b>	<b>Evaluative</b>	<b>Normative</b>
Distributional	Where are the injustices?	How should we solve them?
Recognition	Who is ignored?	How should we recognise?
Procedural	Is there fair process?	Which new processes?

---

**Appendix G:** Examples of experimentation in Greece

Experimentation	Description	Category	Link
Genervest	It is a platform created by intermediary organisations seeking to bring investors and projects together. It is a form of crowd investment and seeks to solve the problem of EC funding.	Financial	<a href="https://genervest.org/el/">https://genervest.org/el/</a>
Hyperion coffees	Hyperion coffees start from an Energy Community and seek to increase people's knowledge about environmental issues. From technical issues, e.g. how the grid system works in Greece, to theoretical issues, e.g. what is degrowth.	Social	
European citizen energy academy	“Our Mission: To create and support a democratic, local, 100% energy system. An energy autonomy. Citizens own and control their local renewable energy plants. All decision making is in their own hands. With the EUCENA project we want to support this process through education, networking and information exchange.	Social-Education	<a href="https://citizenenergy.academy/">https://citizenenergy.academy/</a>
MECISE	“REScoop MECISE is a Horizon 2020 PDA project that aims to mobilise citizens and municipalities in the transition to a more sustainable and decentralised energy system. With support from the EASME, a consortium of established energy cooperatives developed projects for renewable energy and energy efficiency. <i>We also set-up a financial facilitation service for energy communities and foster collaborations between energy cooperatives and local municipalities.</i> ”	Financial	<a href="https://www.rescoop-mecise.eu/financial-services">https://www.rescoop-mecise.eu/financial-services</a>
A practical guide to setting	A practical guides to set-up an energy community	Knowledge dissemination,	<a href="https://www.greenpeace.org/greece/epir ease/solar-project-">https://www.greenpeace.org/greece/epir ease/solar-project-</a>



up an energy community		education.	<a href="https://www.greenpeace.org/static/planet4-greece-stateless/2021/05/b52e6e5e-odigos_systasis_energeiakon_koinotiton.pdf?fbclid=IwAR0gXOw77KKKSis8J1W8nonDmpiX93CTaTvLQ5sspJbdUMy3IoNwt44KMXE">greenpeace/?fbclid=IwAR1_FQkS_Q52v_v8AljZnoU1KNE2z_ob7k48ucV2HU6KZtE-KERPhqQvCew</a>  <a href="https://www.greenpeace.org/static/planet4-greece-stateless/2021/05/b52e6e5e-odigos_systasis_energeiakon_koinotiton.pdf?fbclid=IwAR0gXOw77KKKSis8J1W8nonDmpiX93CTaTvLQ5sspJbdUMy3IoNwt44KMXE">https://www.greenpeace.org/static/planet4-greece-stateless/2021/05/b52e6e5e-odigos_systasis_energeiakon_koinotiton.pdf?fbclid=IwAR0gXOw77KKKSis8J1W8nonDmpiX93CTaTvLQ5sspJbdUMy3IoNwt44KMXE</a>
One-stop-shop (chris)	“A one-stop-shop is a virtual and/or physical place where homeowners can find all information and services they need to implement an ambitious global energy renovation project.” In my study I found that an EC in Greece try to establish the same principle regarding ECs. Hence, One-stop-sops could work as facilitator in order to support new EC concerning, financial, technical, business models etc.	Financial, technical, business model, support.	<a href="https://energy-cities.eu/wp-content/uploads/2020/11/INNOVATE_publishable_report_final_web-1.pdf">https://energy-cities.eu/wp-content/uploads/2020/11/INNOVATE_publishable_report_final_web-1.pdf</a>
Mapping the social impacts of energy communities	A report published by intermediaries regarding the social impact that ECs have.	Knowledge dissemination	<a href="file:///C:/Users/Kosths/Downloads/Mapping-the-Social-Impact-of-Energy-Communities.pdf">file:///C:/Users/Kosths/Downloads/Mapping-the-Social-Impact-of-Energy-Communities.pdf</a>
BECOOP	It has multiple purpose concerning bioenergy, such as, network learning, business model, market uptake, training programs etc.	Multiple purpose.	<a href="https://www.becoop-project.eu/">https://www.becoop-project.eu/</a>
ELENA (European Local Energy Assistance)	“ELENA provides technical assistance for energy efficiency and renewable energy investments targeting buildings and innovative urban transport.”	Technical Assistance.	<a href="https://www.eib.org/en/products/advising/elena/index.htm">https://www.eib.org/en/products/advising/elena/index.htm</a>

