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"How to increase customers' participation in Enenrgy Communities: An empirical study to improve Enel Business Model"

Prof. Cinzia Calluso

SUPERVISOR

Prof. Daniele Mascia

CO-SUPERVISOR

Edoardo Torri

ID: 756491

CANDIDATE

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Introduction

This dissertation wants to study the effects that the activity of a multinational energy producer and supplier can have in order to benefit the generation of new Energy communities in Italy.

Energy Communities are a very recent phenomenon; however, they have a very strong potential for what concerns the fight against climate change and energy poverty. In their current understanding, energy communities allow participants to produce clean energy, and consume what they need and in case of surpluses, they can dispose of it in different ways. In this sense, a broad diffusion of such enterprises would reduce the demand for energy from thermoelectric plants, and would consistently reduce the issue of energy poverty, which affects around 8% of the European population[1] and 8.5% of the Italian population[2].

There are huge expectations on RECs, in fact a study conducted by REScoop and EREF (European Renewable Energy Federation) prospects that about 83% of European citizens may become part of an energy community by 2050,[3] as this may be one of the strongest instruments in order to achieve the Net Zero balance by that time.

However, the setup of a community involves a number of hurdles that private citizens or SMEs may find hard to overcome: the initial investment is usually very high also for relatively small plants; in addition, the community as a legal entity has rights and duties to fulfil. Last but not least, since participants are not supposed to be experts in the field of energy production, the lack of knowledge may negatively influence their initiative.

An answer to these obstacles can be looking for support from a larger company operating in the sector. Nevertheless, also in this case there are some problems, in fact, the European directive states clearly that multinationals cannot participate in Energy Communities. In addition, it is in the spirit of Communities themselves to be independent from larger national or multinational organizations. Concerning this matter, Enel is building a strategy in order to enter the market of Energy Communities, while, at the same time, respecting the directive,

[1] https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumer-rights/energy-poverty-eu_en
[2] https://oipeosservatorio.it/poverta_energetica/ss
[3] https://www.enelgreenpower.com/stories/articles/2023/02/cer-net-zero-objective

benefitting actual and potential participants of energy communities, and getting an economic profit from this activity.

Eventually, the objective of this work is to analyse the current situation of ECs in Italy and its participants and provide insights to improve the Enel business model to increase participation and enhance the diffusion of ECs on the Italian territory.

In order to get to the target, the thesis starts, in the first chapter, analysing the regulatory framework in Europe with a focus on the Italian regulation. Then, the main benefits and barriers for participants are set out together with the more diffused business models adopted in Italy according to the existing literature. In the second chapter, the Enel business model for energy communities is described to provide a broad perspective of the services provided, points of strength, and areas of improvement. The third Chapter, through empirical research based on the data gathered through a survey, the essay aims at understanding what factors mostly influence consumers' willingness to use, or better to participate in ECs. Specifically, the empirical analysis investigates the influence of trust in multinational suppliers and in energy communities, and the environmental attitude of respondents. In the last chapter the insights drawn for Enel to improve the business model in light of the results gathered from the empirical study are described.

1. Energy Community Introduction

The concept of Energy Community (ECs) as it is, is based on the idea of self-consumption. In a simplistic way, it originates from the will of a group of people or entities to join forces and build a private infrastructure tailored to satisfy the demand of the group. At first, communities developed in those areas that national grids could not reach, as for example, isolated villages situated in remote areas or places where large infrastructure could not get. The concept of energy community was then associated with renewable sources of energy.

The first Renewable Energy Community was born in Samsø, Denmark in 1997, and from that point on many others have been built. In Europe, the northern countries are paving the way for the development of Communities. On the other hand, in southern Europe countries, this diffusion is less widespread. To get a grasp in 2020 in Germany there were 1750 communities against only 12 in Italy. It is interesting to note that northern countries like Denmark, Netherlands, and Germany have been pioneers while Italy and others are considered laggards. The main difference between these two groups is that in the former there are already a number of well settled communities with strong functioning and implementation standards. In the latter, on the contrary, countries are characterized by a number of hurdles and shortcomings to the formation of ECs and immature policies (Tarpani et al., 2022). (Sciullo et al., 2022) tried to analyse the political, economic, and cultural components influencing the way countries interpret and concretize the concept of Energy Community, thus studying the market structure in the energy sector, how concentrated is it and when the free market has been introduced in different countries. The second factor is the implementation of policies aimed at enabling the creation of new ECs, and the transposition of the European directives. Lastly, the cultural factor has strong effects on the diffusion of ECs in different countries: MSs have different approaches to the concept of Community and cooperative according to their historical background and political heritage. In addition, it studies how much, historically, people have been prone to participate in environmental activism, to infer the attitude towards new energy technologies and solutions in the different MSs.

The creation of Renewable Energy Communities produces different benefits compared to relying on national or international suppliers: the participants in the community have direct control of the production and consumption of energy, they can dispose of excess production as they wish, and they are not dependent on any contractor. In addition, since the production facilities are built close to the shareholders, it can further cut the financial and environmental costs of energy transportation. Lastly, it can considerably reduce the amount of CO2 and Green House Gasses produced.

1.1. What is an Energy Community

Figure 1 below is useful to understand how an Energy community is organized from a practical standpoint. There are five roles to describe and all players are connected to the same grid.

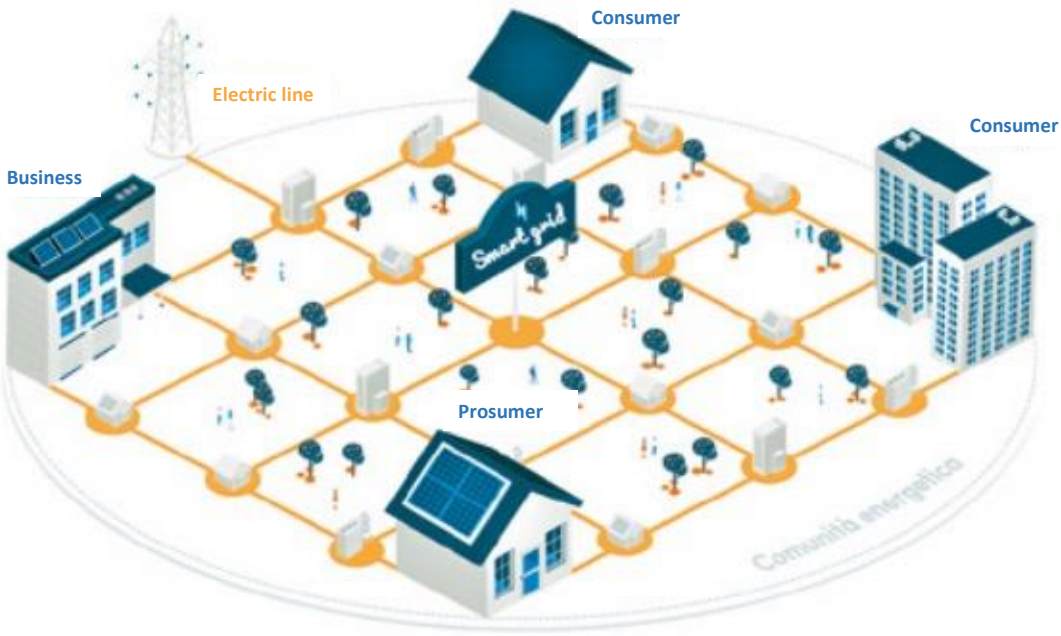

Figure 1. *Energy Community representation. Source: EMEA*

The Business is the player that most probably can offer larger financial resources and knowledge, the only limitation posed by the directive is that its main activity is not in the energy market. Prosumers are all those participants that produce and consume energy. In this picture, the private and the business have installed solar panels which use for self-consumption and sharing. Consumers are those participants to the community that are only connected to the grid to consume the energy produced in the community. The link with the national electric system (Figure 1, in yellow) is fundamental for two reasons: it allows the community to get energy in case of shortages, and to share eventual surpluses with the national grid, gaining revenues and financial rewards through the incentive package. In addition, the picture shows the grid connecting all the participants living in the proximities of the production facility (in this case, it coincides with prosumers, but in the case, for example, of a wind farm it would not).

There are two main definitions for Energy Communities provided in the Clean Energy Package (REScoop, 2019).[4] The first one is contained in Directive (EU) 2019/944 defining the main characteristics of "Citizen Energy Communities", or CECs. These are legal entities of various natures, such as SMEs, partnerships, cooperatives, and non-profit organizations. Their scope is to provide environmental, economic, and social community benefits to its participants. Financial profits are not one of the main goals. The community can enterprise in activities of generation - including renewables and not excluding fossil sources-, distribution, supply, consumption, aggregation, energy storage, energy efficiency services and charging of electric vehicles[5].

Is worth noting that this definition allows also the production of energy through non-renewable sources of energy, which is one of the main differences with the one provided by the Renewable Energy Directive (RED II).

The second definition is provided in The Revised Renewable Energy Directive 2018/2001/EU which outlines the traits for forming Renewable Energy Communities. As we can already note from the name given, the focus has moved from citizens to renewable energy. This definition shares some common aspects with that of Citizen energy communities, but also some differences that are worth noting: they both provide no limit to the form of the legal entity, and they specify that the main objective is not to make profits but to provide benefits on different levels, as stated above. In addition, they spotlight on the openness and voluntary nature of participation of the communities. Lastly, they both mention the fact that the ownership should be limited to participants: private citizens, local authorities, and SMEs. The main contribution of the REC definition comes from specifying that compliance can only occur if sources of energy are renewable, while CEC does not put any limitations of this kind. What's more, RED II puts a geographic limitation stating that participants should live nearby the plant and, in the case of participation of an SME, its primary business should not be in the energetic sector. It then limits in some way the use of the energy produced from the community to generation, consumption, storage sharing but also including sale, unlike in the CEC definition (De et al., 2022).

1.2. The Regulation

The definitions described above come from two EU Directives, meaning that each Member State has then the freedom to translate them according to its legal, economic, and social traditions as mentioned by De Santi et al. (2022). In addition, the EU does not mandate the formation of a REC, thus, participants can apply to this form only if they decide to and of course if they find it convenient. They may also decide to form a legal entity that

[4] https://www.rescoop.eu/uploads/rescoop/downloads/QA-What-are-citizens-energy-communities-renewable-energy-communities-in-the-CEP.pdf

[5] DIRECTIVE (EU) 2019/944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU

does not meet all the requirements of the framework. (Hoicka et al., 2021). The RED II after describing the governance model (Lowitzsch et al., 2020) speaks of an enabling framework, leaving the freedom of outlining it to national regulators.

Since this study is focused on the Italian situation, and provides insights into the specific case, the details of the Italian regulation will be provided below. However, for the sake of comparison and to give an example, the national regulatory framework of some of the principal European MSs will be described as from the study of De et al., 2022.

- In Germany, the definition of a "Citizen Energy Company" has been given in the 2017 revision of the Renewable energy Act. Along with the RED II scheme these legal entities must be built with more than ten participants, thus no one can hold more than ten percent of voting rights. At least 51% of voting rights must be held by natural persons living around the site of production of energy. In addition, it imposes a limit to a total production capacity of 18 MW. In addition, German law offers a technology-specific package of norms to incentivize wind-based Communities. It is worth noting that, in spite of the similarities, the Energy Act has been written independently from the RED II.
- France began its transition with the Ordinance N° 2021-236 of 3 March 2021. It provides a framework for the facilitation of both RECs and CECs. The definition given for RECs is exactly the same as the one from the RED II.
- Law N° 4513/2018 passed by the Greek Parliament in 2018 puts the Energy Communities at the center of the environmental transition, counting on the initiatives from private and local actors towards the production and consumption of clean energy. In this context, it provides a definition for RECs that deviate from the RED II and the IEMD: the Law distinguishes between for-profit and not-for-profit communities with respect to how they can dispose of surplus. For the formers, the surplus can be distributed among participants, provided that they are more than 15 and more than half are physical persons. The latter form allows the use of surpluses only internally for the achievement of other objectives.
- In Portugal, the "Comunidade de Energia Renovàvel" from the 2018 Decree-Law N°162/2019, has been passed to facilitate the formation of renewable energy communities and cut legal hurdles. Following the Greek example, the Law provides for both profit and non-profit oriented communities. In addition, the later Dispatch N° 6453/2020 offers a full exemption from Costs of General Economic Interest.

What emerges from the analysis of this regulatory frameworks is that MSs are still working to incentivize and facilitate the building of plants and community owned resources. However, none of them is yet stable and developed enough to enhance efficiency or regulate in detail the functioning.

Italy follows pretty much the same steps. The main documents are:

- Law N° 8/2020, as a result of the Decree "Milleproroghe", provides an experimental framework for the starting of new communities, while waiting for a better-defined framework from the RED II. The Italian framework retrieves the proximity concept of participants, and limits the productivity of plants installed after March 1st, 2020, to 200 kW
- The Resolution Document 318/2020/R/EEL of August 4th, 2020, published by ARERA the regulatory institution for energy grids and environment, outlines a tentative framework, to limit the impact on the existing infrastructure. The document also states that participants to the community should be connected to the same Medium/low voltage grid (secondary)[6]. According to the framework, if the energy produced by the community does not satisfy the energetic need of its participants, they will tap into the usual retailer infrastructure. The benefits coming from the energy shared among participants do not immediately covers the cost of power taken from the outside, but they will be redistributed yearly from the GSE (Gestore dei Servizi Energetici). In addition, in 2020 the Ministry for the Economic Development, has developed an incentive scheme. As described above the GSE incentive plan is of primary importance to the well-functioning of the Italian framework, for this reason, it has been chosen as one of the factors to analyze in the research that will be later introduced. Thus, it is worth describing in detail its functioning and its main provisions.

  First of all, the GSE allows for two configurations to participate in the incentive plan: a group of prosumers acting collectively, and Renewable Energy Communities. As stated above the distinction is done because collective action may not meet all the requirements of an REC.

  The economic contributions due to the permitted configurations are recognized for each production plant whose electricity is relevant for the configuration, for the duration of 20 years from the commercial start date of the production plant or from the first date for which the energy of that plant is relevant for the determination of the shared electricity.

  For each kWh of energy shared, the GSE provides:

- A Unit Compensation, sum of the transmission tariff for low-voltage consumers, and the highest value of the variable distribution component for low-voltage consumers for other utilities. The two components are tariffs for compensating costs of transportation of electricity on the national line.
- A premium of 110 €/MWh for Communities and 100 €/MWh for groups of prosumers.

  At the end of the 20 years the unit compensation can be extended yearly and tacitly[7].

[6] https://www.gse.it/servizi-per-te/autoconsumo/gruppi-di-autoconsumatori-e-comunita-di-energia-rinnovabile/requisiti-di-accesso
[7] Gruppi di auto-consumatori di energia rinnovabile che agiscono collettivamente e Comunità di energia rinnovabile: Regole tecniche per l'accesso al servizio di valorizzazione e incentivazione dell'energia elettrica condivisa, April 4th 2022, GSE

1.3. Benefits and barriers for participants

Before starting to describe opportunities and barriers it is worth mentioning that according to the activities performed by the participants to the community, it is possible to identify different categories of prosumers. This model is taken from Chaudhry et al., 2022 in which a simulation of a community in a German neighbourhood has been performed to study what are the main economic, social, financial, and environmental barriers and benefits for the participants to a Community. The model is based on the activities described in RED II and states that Partial Prosumership occurs when the energy produced from the community is used for self-consumption, and any surplus is given out in the grid and compensated financially. Periods of energy shortage are satisfied through the grid. On the other hand, Full Prosumership offers more independence from the grid. As for the former case, the energy produced is used for self-consumption. Any surplus is redistributed to the community to meet the deficits and only if there is an additional surplus then it is fed into the grid.

1.3.1. Benefits

The benefits described in the paper from Chaudhry et al., 2022, are in some way related to the regulatory framework in force in Germany, thus some of the results may not hold in every country in the same way, however, since all MS regulations are grounded on the RED II they all share some traits as described before, thus, some of the upturns will be considered appliable on a generic ground.

Considering the Economic aspects, the cost of energy under Partial and Full Prosumership is reduced compared with the case of consumers connected to the grid with no Prosumership. This is true also for the Italian case thanks to the incentives offered from the GSE. The Italian Framework allows for some additional benefits, namely, tax deductions and special amortization formulas for the set-up and construction of the plant[8].

As embedded in the definition, RECs reduce dependence from the grid enhancing self-consumption and energy sharing. These results depend on the ability of the members to produce their own supply and, according to the form chosen, to share it with the community. This is of course a characteristic trait of Energy Communities, thus valid in all countries. The only impacting factor may be the availability of resources, but it can be overcome through the application of the right technology (Photovoltaic panels, Wind turbines, and Geothermic systems).

The environmental upturns come from both the production of green energy, thus reduced consumption of coil and fossil fuels, and from reduced need for transportation through wired systems: prosumers do not need to rely on the grid, and connections are smaller.

[8] https://www.enea.it/it/seguici/pubblicazioni/pdf-volumi/2020/guida_comunita-energetiche.pdf

1.3.2. Barriers

To the broad participation and creation of Energy Communities some barriers are opposed, that hinder the success of such projects. Some of these barriers are related to the use of Renewable sources of energy: the fear of market failures arising from high costs of Renewable Energy systems, and uncertainty regarding the energy market. In addition, As from S. Chaudhry et al. 2022, the investment for such systems is hard to compensate for in financial terms; NPVs stay negative for the usual 20 years forecasted.

There are informational barriers to consider too: first of all, knowledge on the matter of RE and RECs is scarce, in addition, data on systems efficiency, and data on natural resources are hard to retrieve, preventing people from enterprising in such projects for lack of knowledge (Sen & Ganguly, 2017).

Other barriers to consider are policy related: even though MSs are encouraging ECs through frameworks and regulations, there may be some external elements to consider, i.e., monopolies built from the industry. The energy market is a natural monopoly, meaning that it reaches its best efficiency when there is only one player. In addition, it is hard for private citizens to face large multinationals in their business. (Chaudhry et al., 2022). This happens of course due to a lack of financial resources, know-how, and experience.

As a last point to mention, at the beginning, the paper describes the main features of enabling frameworks around Europe: the lack of clear, defined guidance and long-term vision for people who want to start an EC is clearly a barrier to their initiatives.

In the specificity of the Italian case another regulatory barrier; the Points of Delivery of generators and consumers, must be connected to a single MV/LV grid, limiting the scope and capacity of the plant (Cielo et al., 2021).

1.3.3. Energy Community Business Model in Italy

First, it is interesting to have a look to the current Italian situation for what concerns the presence of ECs. Data are provided by the report from the most important Italian environmentalist association Legambiente[9] which monitors the development of initiatives regarding renewable energies in the country. In Italy there are currently 35 operative Energy Communities, 41 are in project and 24 are being developed. These are mainly distributed in the northern regions of Lombardia, Piemonte, Liguria and Emilia Romagna the Central regions of Lazio, Marche and Molise. In the South, Sicily is the region presenting higher emergence of ECs, while some others are dispersed in Puglia, Calabria and Campania.

[9] Comunità Rinnovabili 2022 Report
https://www.legambiente.it/wp-content/uploads/2022/05/Comunita-Rinnovabili-2022_Report.pdf?_gl=1*75xh3b*_up*MQ..*_ga*MjA1MzMyNTU5Ni4xNjgzMDQyOTc3*_ga_LX7CNT6SDN*MTY4MzA0Mjk3NC4xLjAuMTY4MzA0Mjk3NC4wLjAuMA

Since this research is mainly focused on Italian communities and their development, as setting ground, it is interesting to consider the model by Cielo et al., 2021, which describes three possible business models in the development of an EC. In order to compensate for the lack of knowledge and resources of potential participants to an EC, the paper proposes a collaboration between the REC and a so-called Developer, which is a third party capable of setting up the community's infrastructure. According to the activities performed by this entity the three models are set:

- the first configuration in which the REC covers all capital costs, operational expenditures, and management costs, and leaves the construction to the Developer.
- In the second model, the REC and the Developer share equally the CAPEX costs and revenues but the Community pays operational costs and management costs to the Developer.
- The third case may be considered a turnkey project as the developer is responsible for the construction and all related costs and will sell the complete service to the Community which, in addition, will get a 30% of the revenues of the plant.

The concept of a Developer is extremely important to this paper and will be explored further in the following chapter and It represents the conjunction between this chapter and the next one. Conceptually, since the scope of this thesis is to understand in what ways Enel can increase participation in ECs while at the same time building a profitable business model, the role of the Developer fits to the purpose. The role that Enel may take as Developer, can be declined in many ways, which will be studied to identify the actions that the company should take to maximize its own surplus and that of potential participants to a community. The research will then take the parts of Enel to analyse the market and possible opportunities.

Even though Energy Communities are at an early stage of their development and diffusion, their characteristics differ depending on where they are developed and for what reasons they are built. A clear framework is provided by (Musolino et al., 2023). Specifically, two main aspects affect the structure of an energy community: if they are Bottom-up or Top-down. Usually, the latter is set by municipalities or public organizations in order to create awareness towards the matter of sustainability, compensate for the problem of energy poverty and enhance and encourage the population to adopt more sustainable habits: charging stations for electric cars, electricity supply to surrounding buildings. In addition, Top-down initiatives more often partner with universities and researchers. Bottom-up initiatives are usually mediated by NGOs and are usually located in smaller municipalities.

The paper concludes that the creation of alliances between potential participants and larger organizations (NGOs, Municipalities, Research groups,) is key to the creation and distribution of ECs on the Italian territory.

In the next Chapter will be described in what ways Enel intends to enter the market of Energy communities. The business model proposed is beneficial both to the company, as it can generate positive revenues, as for communities, as Enel plays the role of Facilitator, both from a technological and organizational point of view.

2. Enel Business Model

This chapter is the result of the collaboration with Enel, which has provided internal information on the business model for Energy communities, the objective is to understand how the activity of a multinational aimed at producing profits, can actually benefit the whole EC sector.

Before starting it is useful to recall the concept of Developer described in Cielo et al., 2021. The Developer is an entity external to the community, which has the technical and financial resources to set up the infrastructure. According to the three models described in the paper, the Enel model falls in the third case: the company offers a turnkey project to the community, which will pay a periodic sum to Enel in exchange for the use of the production facility and other maintenance and ancillary services.

The following chapter has been drafted with the support of Eng. Filippo Gordani, Responsible of the Development and Execution of the EC unit in Enel Green Power, Eng. Giulia Carrara Project Developer of the team, and Antonio Morabito, Product Owner ECs – B2B marketing in Enel Energia. The next chapter is a deep dive into the Enel business model, to understand the choices of the company to build a profitable and virtuous exchange of resources for both the company and the Energy Communities.

The interest of Enel in Energy communities originates with the enforcement of Law Decree 199 of November 9th, 2021, which is the first result of the transposition of the RED II European directive (2018/2001/UE). Of particular interest is Art.31 of the Decree which introduces the possibility to build Renewable Energy Communities (RECs) on the Italian territory. Since then, through its branch focused on renewable energies i.e., Enel Green Power (EGP), the company has started to explore the opportunities offered in the countries affected by the directive in which it operates, in particular Italy and Spain. Further positive signals are offered by the growth forecasts of Energy communities, made by the Italian Ministry of Economic Development (MiSE), which predicts a consistent increase in the photovoltaic energy generated from 2020 to 2030. The estimations have also been confirmed by the Ministry of the Environment and Energetic Security (MASE).

Through this business model the company intends to increase customers' loyalty by the sale of services and products, tailored on their needs and based on the new systems generated by energy communities and self-consumption.

Enel acts as a facilitator for consumers interested in becoming part of a community and transitioning to self-consumption. The model follows the community in every step of its lifecycle from the first stages of its constitution, throughout its whole activity and duration. In order to satisfy all the needs of the community, the company has structured its strategy through two of its branches: Enel Green Power and Enel X. Enel Green Power is responsible for the technical aspects and financial investment. Enel X is the company of the Enel group focused on providing services and products to enhance the energy transition at the domestic level. In the

specificity of this project, its activity focuses on dealing with clients and following them in the bureaucratic duties and daily activity support. In this second step, Enel X is supported by Enel Energia in further activities which will be dealt with in detail in the next sections of the chapter, together with a detailed description of the strategy, its points of strengths, weaknesses, and opportunities. The analysis will be split in the description of the part of the strategy focused on the technical and financial part and then, of that focused on the plan related to consumers and services offered.

2.1. The financing and building steps

As shown in the previous chapter, one of the main barriers faced by consumers in enterprising in an energy community, is a lack of know-how in building and managing an energy production plant. In addition, depending on the entities part of the project, another obstacle is the financial investment required, which is mostly focused on the setup of the technology, the acquisition of the land in which to site it, and its ordinary and extraordinary maintenance.

In this regard, the plan proposes Enel Green Power as the technical and financial facilitator. The company offers its technical skills and takes charge of the financial investment, from the identification and purchase of the land to the building and functioning of the production facility.

Once the project has been accepted, the first step is to find the right site in which to build the production facility. In general, the site has to be industrial land, thus not destined to agriculture. However, following the updates of Law 12, Art. 56 commas 8 bis of November 11th 2020, to Law Decree 1/2012 Art.65[10], the entity building the plant, can benefit of an incentive plan if the production facility rises in site of former caves or industrial landfills.

However, these incentives are not specific for Energy communities. The national regulation plan about incentives on the matter of ECs apart from that of the GSE, is currently under development and will only be confirmed after the publication of related Decrees from the Ministry of the Environment and Energetic Security (MASE). As stated from the Ministry of MASE Gilberto Pichetto, the Decree foresees both incentives and funds, included in the PNRR plan, with no interests required for the formation and building of ECs and self-consumption systems[11].

Furthermore, the land has to fulfill some technical requirements: to realize a plant of size up to 1MW in capacity, the land has to be in the range of 1,2 and 3 hectares; the Slope cannot be higher than 15%; exempt

[10] https://www.gazzettaufficiale.it/eli/gu/2020/09/14/228/so/33/sg/pdf
[11] https://www.ansa.it/canale_ambiente/notizie/energia/2023/02/24/pichetto-fratinpuntiamo-a-15mila-comunita-energetiche_c1a23bcc-a6b0-4511-b4a0-6e634713e310.html

from environmental constraints, in particular archeological or landscape constraint. Moreover, according to the regulation on the formation of ECs, in order to allow the constitution of the community around the plant and reduce costs for connection to the national grid, the site must be close to primary grids or medium voltage lines, and, at the same time, close to a large enough catchment area.

Once the land has been identified, Enel Green Power will build the generation plant. It will face the burden of the whole investment, which is esteemed, for plants with a maximum capacity of 1MW, around € 1.5 million. Currently, the most used technology is the Photovoltaic one, due to characteristics that make easier its application on a larger scale, intended in the quantity of plants built rather than size: in particular, photovoltaic systems can be adapted also to small sizes and their cost is on average more convenient if compared to other technologies. However, other technologies are being explored like wind technology, which represents a viable choice especially on the islands and coastal areas. When choosing the technology, EGP engineers have identified four pillars to consider: i., ease of finding and availability of appropriate sites for the application of the given technology; ii., costs related to the technology; iii., ease in the installation process and bureaucratic authorization process; iv., how the production and consumption curves develop. This last point is related to a concept that will be further discussed later: in order to maximize the efficiency of the plant, and the rewards from the incentive plan, the community should be able to dispose of the largest quantity of energy produced, up to an optimal point in which the community consumes 100% of the energy produced. In this context, the wind power technology cited before presents three main criticalities with respect to the photovoltaic one: it is harder to find sites with sufficient windiness; more complex and expansive execution process; forecasts on the production of the plant are harder and less reliable.

In this context, the company intends to avail of the public institutions, in particular the municipalities of cities and regions where communities will be built. This will benefit the strategy since these are the principal actors involved in the authorization processes; moreover, they can be a commercial partner in the identification and acquisition of land on which to build the plant, not to mention, that they may be the first participants of ECs themselves. Specifically, the collaboration seems particularly beneficial, with those municipalities that have applied the authorization process through the S.U.A.P. (Sportello Unico per le Attività Produttive) procedure, which allows to integrate the process in a more efficient and immediate way, and facilitates the involvement of all the actors part of this process.

EGP will then follow the EC throughout the whole life of the plant, which is estimated at 20 years, providing yearly ordinary maintenance, being responsible of extraordinary works and involving all the actors required like firefighters, and local authorities. Furthermore, operators will monitor the plant's performance and provide concerning reports. Still, the company will provide stock materials and qualified workforce to operate necessary actions and will be responsible for checking all permits, authorizations, and warranties related to plant usage.

The remuneration system has not been defined in detail, however, the company will remain the owner of the plant and will offer all these services to the community in exchange for a percentage of the incentives obtained from the community for efficient use of the renewable energy produced and consumed.
In this context, some criticalities and improvement opportunities have been identified.
At the technical level, there are problems in managing a large number of small plants disseminated on the whole Italian territory. Projects mostly focus on the areas of center, south-center, south and islands of the country, due to higher radiation, a lower cost of land on average, and higher availability of sites with the right destination of use, compared to north and north-center Italy. In addition, the regulation has set a limit of capacity of the single plant, however no specifications have been set on the number of plants that can be put at disposal of a single community, thus there is the possibility to form a community exploiting more than one generation system.

2.2. The Consumers Management

This section will explain how the company intends its relationship with clients. As described before, there are two main companies of the group dealing with consumers: Enel X and Enel Energia. The two companies provide technical and economic management of the EC for the whole life of the community (expected as 20 years) starting from its formation. In addition, it will manage the whole process of promotion, diffusion of information, and affiliation of consumers in order to get the highest possible rate of efficiency. These are the activities set to achieve its scope:

- Initial identification of potential REC members to maximize energy sharing. Potential members are identified on the basis of their current consumption data, according to parameters that will be further analysed later, which guarantee an efficient operation of the community.
- Management of the entering and exiting processes of members, and all the criticalities that may occur. According to the legal framework, participants are stockholders of the community, and the addition or exit of a member may produce some imbalances, which the company will compensate by acting promptly by redistributing the rewards from incentives or finding new members.
- The company will also manage the liquid economic balance of the community, dealing with payments and redistribution of the incentives coming from the GSE.
- Instruments for monitoring energy consumption and feed in the primary grid will be provided to participants. In addition, all members will have private access to a cloud platform allowing them to monitor in real-time data on consumption and benefits generated up to that point, in terms of emission, and incentives.
- All relationships with the GSE will be managed by Enel X and Enel Energia.

- Last but not least, the company will activate the Advanced Commercial Service (ACS) whenever the percentage of energy shared decreases below the 90% of that produced for three consecutive months. The aim of this activity is to find members to guarantee the sharing of 100% of the energy feed in the grid by the production plant.

The requisites that consumers should have to be considered as eligible as members of a community are aimed at maximizing the sharing of energy, thus, they are also related to the technology in use. For communities based on photovoltaic technology, since energy flows continuously and is not stored, consumers should concentrate their energy consumption on the daily hours. For this aim, the best target has been identified in B2B clients. In addition, all members must be connected to the same primary grid that connects to the production plant. From this point the necessity of building the facility in an area close to a large catchment area.

This second aspect is currently presenting some criticalities due to difficulties to find members to associate to the production plant. For this reason, a process has been started to provide digital tools to facilitate the identification of conventional geographic areas.

However, notwithstanding these hurdles, the company has reported a positive approach from consumers, mainly due to environmental advantages, the speed-up of the decarbonisation process, and the energy transition. Another appealing element is the economic benefit coming from the reduction of energy bills for EC members. In addition, the community is attractive thanks to the social benefits produced, supporting the production processes of SMEs in the territory, and increasing the need for new, and additional qualified workforce.

The remuneration system of Enel X and Enel Energia is the same as that of EGP, the companies will get a percentage, which will be smaller than the first one, from the incentive obtained from the community.

2.2.1. The Marketing Plan

Once the potential participants have been identified, Enel X and Enel Energia have built a marketing strategy in order to contact them and attract them both in the B2B and B2C categories.

Before describing the strategy, it must be specified that for reasons of effectiveness, the target preferably addressed is represented by businesses. First of all, because, as said before their consumption curve is concentrated in the daily hours. In addition, Enel can manage to fill the capacity of the production plant using a lower number of participants. This facilitates the search process. Furthermore, Businesses may have more necessities for additional services that Enel can sell them. Another benefit comes from higher reliability: there are multiple factors that may drive a private to move out from the community, however, it is more unlikely that a company moves far from its area. Nevertheless, this focus does not limit participation, on the contrary, it can help to build a stable basis for a community to which other private consumers can join.

Activities are integrated along the whole marketing funnel: awareness, consideration, conversion, and loyalty. Considering this theoretical scheme, the objective of the company is focused on the last step of the funnel, however, activities must be integrated along all its levels. In particular, since consumers are supposed to radically change their consumption habits, challenges may arise also at the conversion level. For this reason, it is important to enact strong and effective actions at the awareness and consideration level. In order to attain this objective, the strategy is ramified in activities of outbound and inbound marketing. The former is mainly composed of advertisements on the principal communication channel, which are aimed at acknowledging consumers. Regarding the latter, the company creates content diffused on digital and traditional communication channels, which drive the consumer to build an interest in getting in contact with the company. On the official websites of companies of the Enel group articles have been published describing the characteristics of the ECs, how they are formed, and their main benefits. In addition, as described before, some tools have been enacted to facilitate consumers to understand if their area can become part of an energy community.

Once consumers become members of the community, they are offered ancillary services and products, aimed at enhancing the energetic transition, like heat pumps, electric vehicles and other products and services related to the commodity, that fall in the domain of Enel Energia.

As stated at the beginning of this chapter, the objective of Enel is to increase consumers' loyalty and their willingness to buy products and services from the company. Consequently, the company aims at achieving this goal by increasing consumers satisfaction to enhance cross selling of other products of the Enel group: building partnerships with famous brands for products offered, advertising positive experiences of consumers, customization of products and services according to the needs manifested by consumers, and collecting feedbacks, rewarding most virtuous participants through the redistribution of incentives from the GSE.

2.3. Conclusion

The business plan proposed by Enel has strong potential, even though some criticalities related to the technical application and in retrieving consumers. Moreover, considering the barriers encountered by consumers and the need for e facilitator described in the first chapter, the role of Enel may represent a turning point in the diffusion of ECs in Italy. As said before, Enel can overcome the financial burden of the company, in exchange of a periodic sum that can be easily sustained by prosumers. Furthermore, consumers' trust is increased by the know-how offered by the company in all aspects of the management of the EC. The fear of risky investment can be mitigated by the presence of a multinational entity that operates side-by-side with consumers.

The next chapter describes an empirical research on consumers to study their approach and perception and willingness to use Energy Communities and their perception of Multinational energy supplier.

3. Consumer Research

In the previous chapters, information on: the policy framework surrounding Energy Communities in Europe with a particular focus on Italy; the main factors driving consumers to participate or not; the Italian business model of ECs and how a corporate multinational like Enel may enter this market have been gathered to provide a solid theoretical background. In this chapter will be described how the survey has been developed to study some of the principal factors that influence the willingness to participate in a Renewable Energy community, in order to identify some managerial implications to help the company succeed in the market and to increase the participation of consumers to this enterprises.

The concept of trust is inspected in the survey since it represents a key driver for people to participate in an EC. Many of the elements identified in chapter one, which based on the literature review appears to influence people's choices – as for example, the lack of trust in RESs, or the perception that ECs are not developed or reliable enough - directly impact people's trust in ECs. In particular, considering that ECs in Italy are still an underdeveloped phenomenon, issues of lack of knowledge of policies, benefits, incentives, and functioning are all intended to impact on trust.

The gap that this research wants to fill is to understand the relationship between the willingness of consumers to participate in an energy community and the trust they have in Multinational suppliers. The literature described in chapter 1, inspects singularly the characteristics of ECs in Italy and what are benefits and barriers related to Communities themselves. However, since the phenomenon of ECs in Italy is not yet well developed, consumers may be biased in their decision from a lack of trust. In addition, considering the role that Enel may have in helping communities set ups and growth, it is interesting to see whether trust in Multinationals can hinder trust in ECs and the Willingness to use. Another aspect studied in this chapter is the effect of the attitude towards environmental issues of respondents, on their willingness to participate in an EC. Since one of the main benefits of the diffusion of ECs on the territory is the dramatic reduction of CO2 emissions, environmental attitude may be a key driver to increase participants' willingness to use. The logical expectation is that a positive attitude towards sustainability positively influences their willingness to try. However, it is interesting to study the extent of this impact, as it could be leveraged by Enel to convince people to participate in such enterprises.

3.1. Hypothesis

The main factors influencing people's choice to participate in an Energy Community have been studied and the various ways in which Enel may contribute to the expansion and development of new ECs have been analyzed. The empirical study described below, through a statistical analysis based on a linear regression model, a mediation and a correlation analysis of variables, aims at studying the relationship between willingness to participate in ECs,

trust of consumers in large multinational suppliers, in ECs, environmental attitudes and other factors, that will be described in the following sections. Specifically, according to theory consumers mainly choose to participate in an EC to get economic benefits with respect to a usual contract with a Multinational supplier, and for interest in environmental issues and sustainability (Chaudhry et al., 2022). Thus, three hypotheses have been formulated:

Hypothesis 1 (H1): *Willingness to Use ECs is negatively affected by the trust in multinational suppliers (H1a), and positively affected by the trust in Energy Communities (H1b)*

Hypothesis 2 (H2)*: Environmental attitude positively influences Willingness to use ECs*

Hypothesis 3 (H3): *Environmental attitude mediates the relationship between trust in ECs and willingness to use*

Figure 2 shows the basic theoretical framework of the hypothesis.

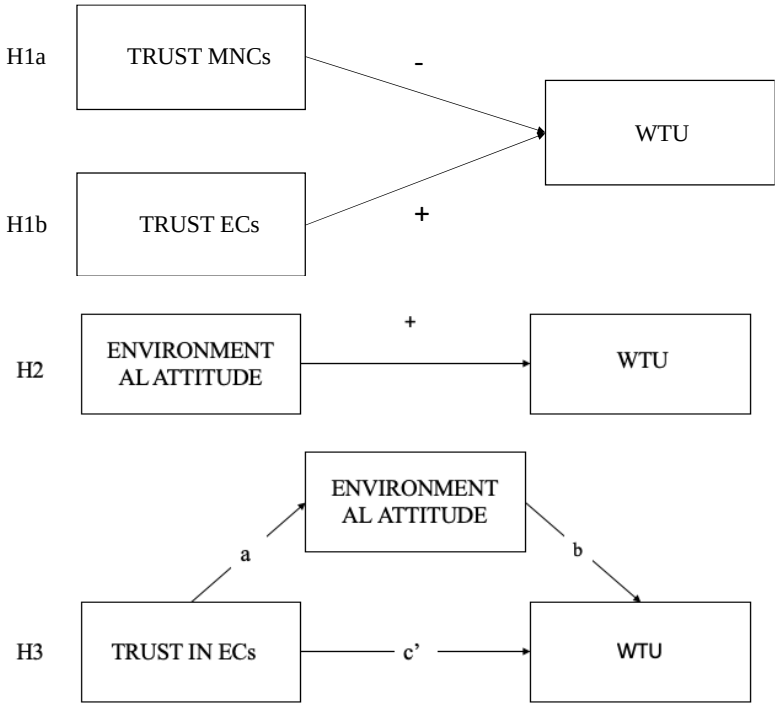

Figure 2. *Basic Theoretical Framework*

3.2. Description of the Questionnaire

The survey is structured with the objective of being distributed to a sample as random as possible, in order to get a clear perspective of a differentiated portion of the population of consumers of electricity supply services. The questionnaire has been distributed randomly to a sample of 283 respondents. No requirements have been asked for respondents to participate (aside being of legal age), however, being the questionnaire in Italian, it was administered to the Italian population, which perfectly fits the aim and scope of the research.

After collection, data have been cleaned from all incomplete, thus invalid, responses getting to a final pool of 216 responses.

The first section of the questionnaire is composed of a number of general questions to provide control variables on Age, Salary, Area in which respondents live, Gender, and Education. The salary range has been taken from the IRPEF [12] (the tax on natural person's salary) table for tax calculation and identifies four salary classes: low income, medium income, high income, and very high income with respect to the different options offered. This is important as people have different priorities and needs according to their economic conditions. An additional question has been included to inspect what kind of supply people use for their houses and offices: buying the service from a multinational company, self-consumption through personal RE systems, or if they are participating in a REC.

The second set of questions is based on the trust scale by Munuera-Aleman, Delgado-Ballester, and Yague-Guillen (2011) developed to study consumers' trust in brands. The questions have been adapted to study trust in a multinational company to deliver the supply of electricity.

In the same way, has been structured the fourth section in which the same trust scale has been adapted to Energy Communities. In addition, Energy communities are put in place of a real company, putting the two types of entities on the same level.

The scale measures trust in the form of the expectation of trustworthiness of the entity. Questions are structured as sentences describing common beliefs to which respondents will answer through a Likert scale, specifying their level of agreement with the statements. The fourth Item of the trust scale has a reversed score, since it presents a negative sentence. Namely, since the questions is asked as a negative sentence, respondent's will answer defining their level of agreement with opposite scores: 1 if they strongly agree, 5 if they strongly disagree.

A further set of questions is aimed at studying the attitude of respondents toward the matter of sustainability. The scale has been taken from Ceylan (2019) in his study on sustainability and ecological fashion. These questions will provide a wider perspective on how the attitude of people impacts their willingness to participate in an Energy Community. In the used scale the fifth and sixth items have reversed scores.

Then, a question has been developed based on the barriers described in Lanzdis, Mutule, & Zilostiba (2021). First respondents are asked if they would participate in a REC. This will represent our dependent variable, the Willingness to Use. Then if respondents answered negatively they are asked why, providing four reasons taken from literature and described in chapter 1: because they trust multinationals better, they don't find it economically attractive, they don't trust RES, they feel it is too underdeveloped to function properly, for lack of knowledge.

[12] https://www.agenziaentrate.gov.it/portale/imposta-sul-reddito-delle-persone-fisiche-irpef-/aliquote-e-calcolo-dell-irpef

These are some of the most important barriers identified in the paper to participation in RECs. The answers gathered will allow a better understanding of the perception of those customers who do not trust the service and are not willing to try it. The results of this question have been thus inspected as a descriptive variable.
Then a question is dedicated to the awareness of the GSE incentive plan which will be important in the implications since, according to responses, it may be an important instrument to use to leverage participation.

3.3. Variable Construction

In order to allow the statistical analysis, the options of the multiple-choice questions for the two trust scales and the Environmental attitude scale have been translated into scores. The options for the Likert scales go from 1 to 5 in the following way: " Strongly Disagree " = 1; " Disagree " = 2; " Do not Agree or Disagree " = 3; " Agree " = 4; " Strongly Agree " = 5. In case of questions with reversed scores, values are assigned in the opposite order, namely, e.g. "Strongly Agree" = 1. In order to get more reliable results, scores have been translated in z scores meaning that all variables have been translated in variables with mean = 0 and Standard deviation = 1.
Table 1 provides a list of all the options for the different questions. The values have been assigned from 1 to n according to the number of options.

Salary	0-28.000 €	28.000-55.000 €	55.000-75.000 €	Over 75.000 €	
Area	City Centre	Outskirts	Countryside		
Gender	Female	Male	Other		
Education	None	High School Diploma	Bachelor	Master	PhD or more
Supply	Supply contract with MNC supplier	Self-consumption	Energy Community		
Adoption	Completely uninterested	Moderately Uninterested	Neutral	Moderately interested	Completely Interested
Reasons	I trust more Large Multinationals	I don't think it is economically beneficial	I don't trust Renewable energy sources and the related policies	It is still too underdeveloped to work properly	I know too little on the matter to take such a decision

GSE Incentive plan knowledge	Yes	No			

Table 1. *Multiple Options.*

From the questionnaire the variables have been extracted in order to build the regression and study the sample. Concerning the categorical control variables, Dummy variables have been built

The control variables and their use are described below:

- Age: the control variable for age helps understanding how the perception of Energy communities and, more broadly, of environmental issues, changes according to the age of people. The field is open, meaning that each respondent could fill in its specific age, giving the possibility to study the variation and distribution of scores.
- Salary: the variable has been described before and can be used to cluster respondents and cross results from other variables to give a broader perspective of the social factors influencing the dependent variable. The different options have been scored from 1 to 4 as the Likert scale, namely "0-28.000 €" = 1, to "over 75.000 €" = 4
- Area: instead of asking about the region, or city, the survey inspects in what area respondents live. This helps in understanding whether there is a different perception of ECs and environmental issues according to the area where they live: whether they come from the city, the outskirts, or the countryside. Again this is due to the different needs of people according to their lifestyles and types of housing (Sen & Ganguly, 2017). Also in this case, options have been scored from 1 to three in the following way: "Countryside" = 1; "City Center" = 2; "Outskirts" = 3.
- Gender: the variable wants to study if the perception changes according to the gender. Options are scored as "Male" = 1 and "Female" and "Other" = 2. Due to the fact that respondents who answered Other were a very small number, the option has been incorporated in the Female gender, since considering it individually would not give meaningful insights on the population characteristics.
- Education: it is important to understand the context of the sample and see if the variable affects the dependent variable. Options have been scored as "None" = 1; "High School Diploma" = 2; "Bachelor" = 3; "Master's Degree" = 4; "PhD or more" = 5.

- The variables on trust in MNCs, in ECs, and the one on environmental attitudes have been obtained by computing the sum of the scores on each question of the section for each respondent, thus building continuous variables.
- The variable on the knowledge of the GSE incentive plan is used as a factor affecting the trust in ECs and is studied as a descriptive variable to understand the extent to which people have a complete awareness of the topic.

3.4. Results

Now the results of the empirical analysis will be described starting from the descriptive analysis. The results of the test of the three Hypothesis will be shown in order to draw the final conclusions and most meaningful insights.

3.4.1. Descriptive Statistics

In this section some the descriptive variables will be discussed and briefly analysed, and a graphical representation will be used to easily have a grasp of the sample.

Firstly, the ages expressed by respondents, in this section have been summarized in ranges, for the sake of clarity. From Figure 3 below it can be seen that there is a prevalence of respondents between 45 and 60 years old, 36% , Then the 32% of the sample is included in the Under 30 category and then an equivalent percentage of respondents, 16% is in the categories 45-60 and over 60.

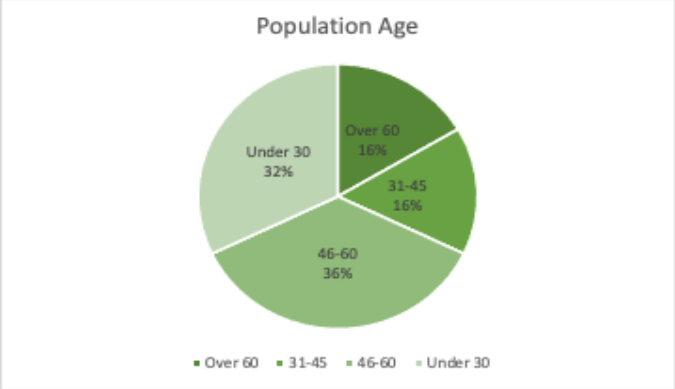

Figure 3. *Age Distribution.*

First, it is interesting to analyze the main features of the sample of respondents. The following chart in Figure 4 shows the Gender distribution of respondents.

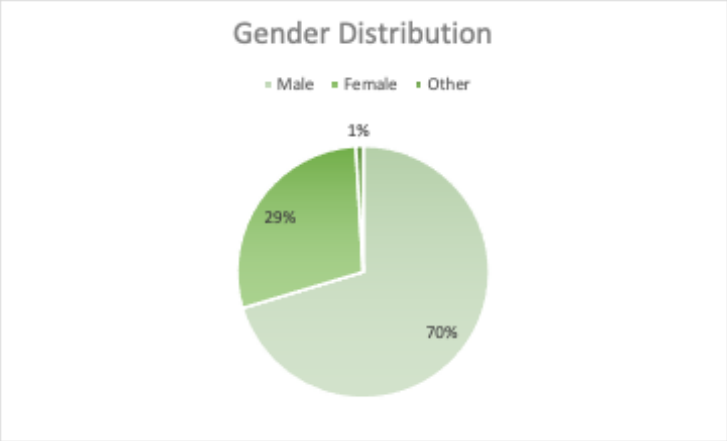

***Figure 4**. Gender Distribution.*

The sample is composed mainly of male respondents. In addition, the share of people responding Other is a non-considerable percentage, for this reason the following analysis will consider Female and Other as a single category.

As shown in Figure 5 the sample is mainly composed of respondents with low wages, this is, most probably, also related to the age of respondents which is characterized by a majority of young people.

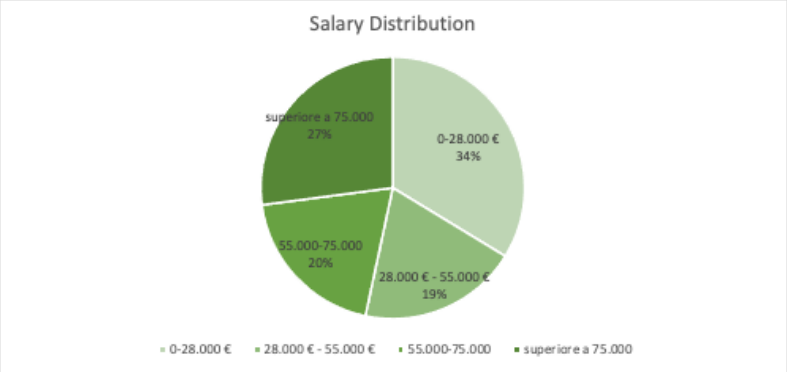

***Figure 5.** Salary Distribution*

The third Chart in Figure 6 shows the education level of surveyed people in order to understand if this element may impact on the choice of participation in ECs, or on Trust in MNCs and ECs or Environmental Attitudes. The pie chart shows a majority of respondents with a High School Diploma and people with a Master's Degree.

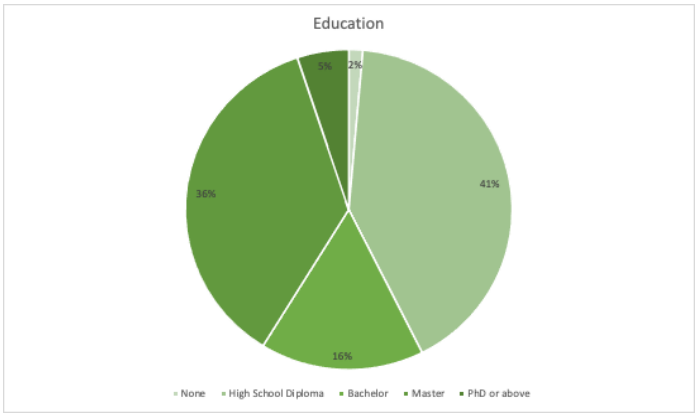

Figure 6. *Education Distribution.*

The next pie chart shown in Figure 7 describes the types of Areas in which respondents live. This is an interesting attribute considering that an EC can have different size according to where it is located, the outskirts of cities, for example, are generally closer to industrial areas. In the Countryside ECs may compensate for difficulties to be reached from the broad supply or bound to different kind of production like farming and agriculture. City centers are more related to residential areas. Overall respondents mostly live in the city center while the portions of respondents living in outskirts and countryside are more balanced with a prevalence of people from the periphery.

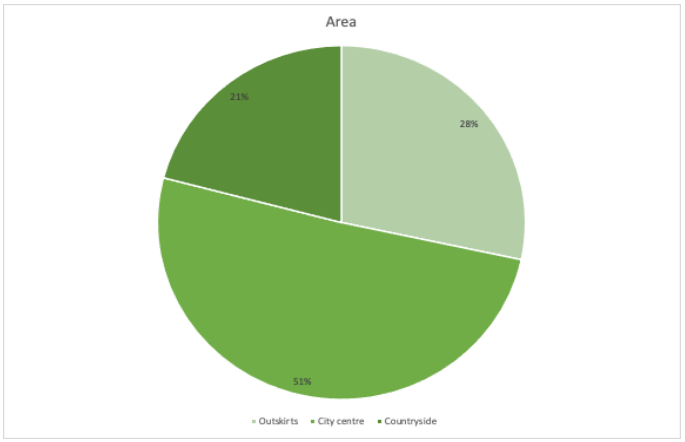

Figure 7*. Area Distribution.*

The last graph in Figure 8 is dedicated to the kind of supply that respondents are currently using.
As expected, it is possible to see that the majority of respondents currently gets its energy supply from an MNC. As for Gender variable, for similarity shared by respondents and characteristics of the service, in the next analysis, the Self-consumption and EC options will be considered as one.

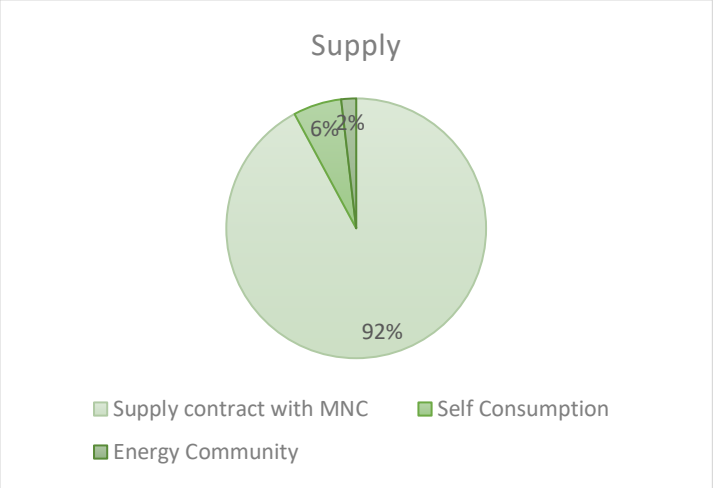

Figure 8. *Supply Distribution.*

Now that the sample has been represented the next step is to understand the main reasons driving respondents away from participating in an Energy Community.

The question gave the option to select more than one reason and was limited to those who answered that they are not interested in participating in an Energy Community. 47,06% of answers claimed a lack of knowledge of the matter to take the decision; 20,59% of responses are linked to the idea that the technology is not yet developed enough to be adopted; 17,56% answered that it is not economically convenient; 11,76% of answers say that people trust MNCs more than ECs and lastly the smallest percentage of 2,94% do not trust Renewable sources of energy. These results, overall, show a lack of trust and knowledge on the matter of Energy Communities, and this is already interesting as it fully agrees with previous literature. In addition, the data is enhanced by the fact that 78,24% of respondents are not aware of the incentive plan offered by GSE for ECs.

In Table 2 below, the number of items, mean and standard deviations of the variables are shown.

Considering the trust and attitude scales, overall, it can be said that trust is positive since on average people have mostly responded Agree to the questions, and even better is environmental attitude. However, the considerably high standard deviation says that answers differ and are not so close to the mean. The standard deviation is very high in age, as the sample is well distributed among respondents of different ages.

Descriptive Statistics

	N	Mean	Std. Deviation
AGE	216	43.36	15.758

WAGE	216	2.17	1.153
AREA	216	2.07	.698
EDU2	216	2.01	1.009
SUPP_MNC	216	.92	.270
AWARENESS	216	.22	.414
TRUST_MNC	216	23.72	5.168
TRUST_CE	216	27.67	3.928
ENV_ATT	216	35.66	4.479

***Table 2**. Descriptive Statistics.*

Now an explorative analysis of correlations will be shown to understand the relationship between different variables, results can be seen in Table 3 below. The correlations show that the control variables have not a significant correlation with our target variable WTU, willingness to use. Awareness have a positive correlation ($r = 0.139$, $p < 0.05$), meaning that people who are interested in the matter of ECs are more informed and aware of the benefits, in this specific case, of the incentive plan. The other meaningful correlation ($r = 0.501$, $p < 0.01$) is trust in ECs: as it could be expected, respondents showing more trust in Energy communities, are more willing to use the service. Lastly, the Environmental attitude is significantly correlated ($r = 0.359$, $p < 0.01$), showing that respondents with a more positive approach towards sustainability, in general, may be more prone to use the service of an EC.

Another interesting result is the positive and significant correlation between Age and Awareness, showing that as people grow older in the sample they have more knowledge of the incentive plan, proxy of knowledge of the EC matter. However, probably the most interesting result to consider, is the positive correlation ($r = 0.216$, $p < 0.05$) between trust in CEs and trust in MNCs. This tells that trust in multinational does not impact negatively trust in ECs, but, on the contrary, stronger trust in one increases trust in the other.

Correlations

		Age Distribution	WAGE	AREA_1	EDU2	SUPP_MNC	AWARENESS	Zscore (TRUST_MNC)	Zscore (TRUST_CE)	Zscore (ENV_ATT)	Zscore: WTU
Age Distribution	Pearson Correlation	--									
	N	216									
WAGE	Pearson Correlation	.608**	--								
	Sig. (2-tailed)	<.001									
	N	216	216								
AREA_1	Pearson Correlation	-.169*	-.148*	--							
	Sig. (2-tailed)	.013	.029								
	N	216	216	216							
EDU2	Pearson Correlation	-.094	.114	.018	--						
	Sig. (2-tailed)	.168	.095	.789							
	N	216	216	216	216						
SUPP_MNC	Pearson Correlation	.007	-.047	.204**	.055	--					
	Sig. (2-tailed)	.922	.489	.003	.419						
	N	216	216	216	216	216					
AWARENESS	Pearson Correlation	.207**	.245**	-.104	.004	-.179**	--				
	Sig. (2-tailed)	.002	<.001	.126	.955	.008					
	N	216	216	216	216	216	216				
Zscore(TRUST_MNC)	Pearson Correlation	-.049	-.019	.088	-.118	.181**	-.047	--			
	Sig. (2-tailed)	.472	.786	.196	.084	.008	.489				
	N	216	216	216	216	216	216	216			
Zscore(TRUST_CE)	Pearson Correlation	-.064	.013	.162*	.048	.168*	.025	.216**	--		
	Sig. (2-tailed)	.350	.845	.017	.482	.013	.717	.001			
	N	216	216	216	216	216	216	216	216		
Zscore(ENV_ATT)	Pearson Correlation	.112	.047	-.090	.035	.001	.108	.002	.273**	--	
	Sig. (2-tailed)	.100	.492	.187	.609	.989	.115	.976	<.001		
	N	216	216	216	216	216	216	216	216	216	
Zscore: WTU	Pearson Correlation	-.075	.079	.042	.060	-.006	.134*	.080	.501**	.359**	--
	Sig. (2-tailed)	.275	.247	.543	.379	.932	.049	.242	<.001	<.001	
	N	216	216	216	216	216	216	216	216	216	216

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3. *Correlations.*

3.4.2. Empirical Results

First, a linear regression has been carried out in order to see which variables had a significant impact on the dependent variable WTU. In this model, all the variables extracted from the survey have been inserted as independent variables. The results show an adjusted R square of 0.295, namely, the model with all the variables is able to explain 29.5% of the variance of the dependent variable. However, the only variables showing a statistically significant impact were Environmental attitude (ENV_ATT: $\beta = 0.286$, $t = 3.911$, $p < 0.001$) and trust in CEs (TRUST_CE: $\beta = 0.403$, $t = 5.451$, $p < 0.001$).

Based on these results, thus another linear regression has been run considering the same dependent variable WTU as shown in Figure 9. In this case, though, a stepwise procedure has been adopted. The stepwise model creates different models considering the variables that impact the most and allows to see to what extent an additional variable increases the R square value. In our regression a model considering only Trust in CEs as independent variable, produces an Adjusted R square of 0.222, while, the addition of a new variable, namely doubling the number of variables, Environmental attitude, to the model would increase the value to 0.291. The addition of a second variable is not justified by the increase of 6.9% in the description of the variance. The second model has the same R square as the exploratory model, which is direct consequence of the other variable not being significant.

Hence, based on these results H1, as while the positive effect of the variable Trust in CEs has been statistically confirmed (i.e., H1b), the negative effect of Trust in MNCs on the willingness to use CEs did not found statistical support (H1a). As for the second hypothesis (H2), the current results show support for the positive impact of the variable environmental attitude in increasing the willingness to adhere to CEs; however, the stepwise regression model, also suggests that this variable accounts only for a small amount of variance, hence, including it makes the model not parsimonious.

	Dependent variable **WTU**
Independent Variables	Coefficients
const	
TRUST_CE	**0.403** (<0.001)

Number of Observations	217
F	3.595
p-value (F)	<0.001
R-Squared	0.227
Adjusted R-Squared	0.222

Table 4. *Linear Regression Analysis Results.*

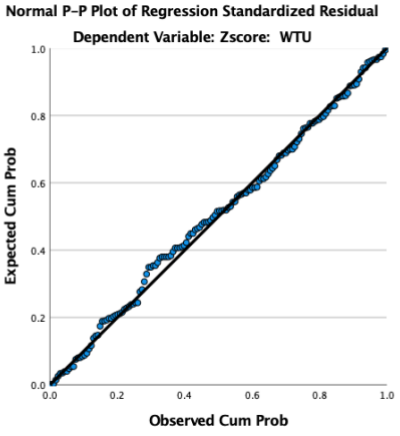

Figure 9. *Regression model.*

The last step of this empirical analysis aims at understanding whether the relationship between the dependent – i.e., willingness to use – and independent variable – i.e., trust in CEs - is mediated by another variable, namely people's environmental attitude. To do this a Mediation model has been run. The objective of this analysis is to better explain the relationship between a dependent and an independent variable by considering a third variable and the effects it has on the independent variable to give a more specific insight into the relationship between the variables of interest. The model also includes a series of control variables, included as covariates, namely: age, wage, area, education, supply, and awareness. Table 5 reports the main results of the model.

	B	SE	T	P	LLCI	ULCI
TRUST_CE	0.103	0.015	7.110	0.000	0.074	0.131
DIRECT EFFECT: ENV_ATT	0.052	0.013	4.113	0.000	0.027	0.076
AGE	-0.011	0.005	-2.514	0.013	-0.020	-0.002
WAGE	0.120	0.061	1.971	0.050	0.000	0.240
AREA	-0.031	0.073	-0.424	0.672	-0.174	0.112
EDU	0.003	0.055	0.062	0.951	-0.106	0.112
SUPPLY	-0.167	0.211	-0.792	0.430	-0.582	0.248
AWAR	0.206	0.136	1.511	0.132	-0.063	0.474
INDIRECT EFFECT: ENV_ATT	0.017	0.007	-	-	0.004	0.032

Table 5. *Mediation Model results.*

The model was overall significant ($R = 0.324$, $R\text{-sq} = 0.105$, $F = 3.489$, $p < 0.01$). Furthermore, some of the results of the regression model were replicated, in particular, the effect of trust in CEs was found significant ($\beta = 0.103$, $t = 7.110$, $p < 0.001$), along with the effect of the direct effect of environmental attitude ($\beta = 0.052$, $t = 4.113$, $p < 0.001$). More importantly, the indirect effect of the environmental attitude – namely, the effect of environmental attitude in mediating the relationship between trust in ECs and the willingness to use ECs – was also found significant ($\beta = 0.017$, $LLCI = 0.004$, $ULCI = 0.032$), hence providing support for hypothesis H3 (see Figure 10). Further, the covariates age ($\beta = -0.011$, $t = -2.514$, $p < 0.05$) and wage ($\beta = 0.120$, $t = 1.971$, $p < 0.05$) were also found significant; this indicates that willingness to use CEs is stronger for younger generations and compared to older ones, on the one hand, and that people with higher income are more willing to engage in a EC, as compared to those with lower income.

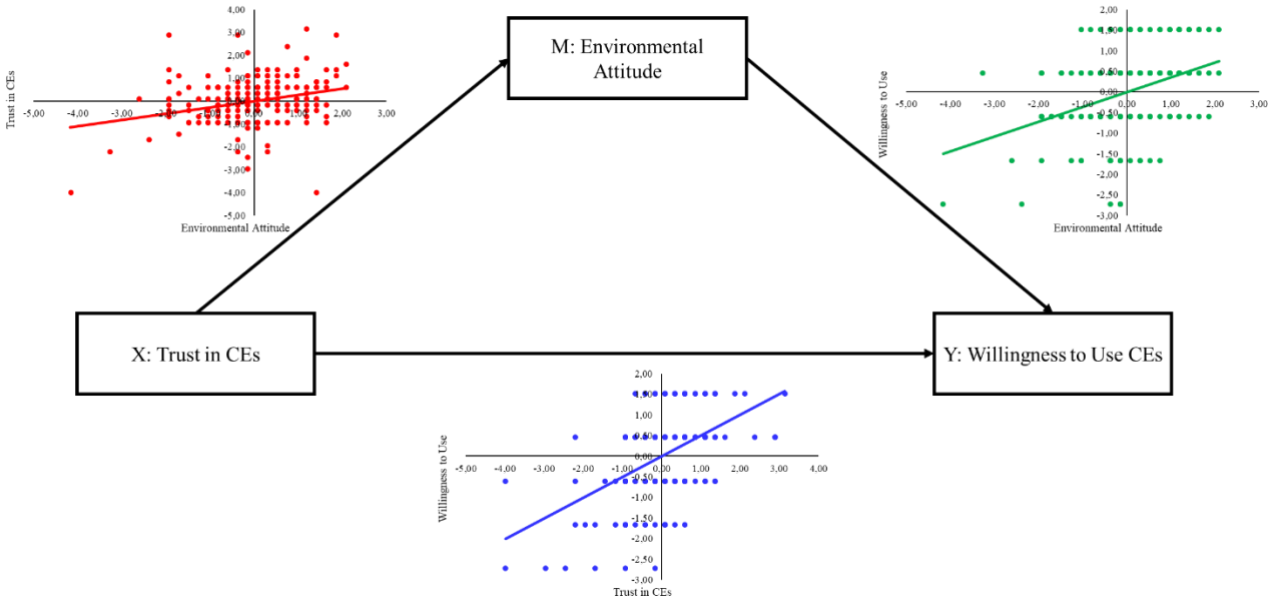

Figure 10. *Mediation effect.*

3.5. Discussion

Now that all the relevant data have been drawn from the analysis it is possible to study their implications. Following the order of the findings, the first result to focus on is related to the very high percentage of people manifesting lack of knowledge of the matter of ECs an awareness of the GSE incentive plan (47.06% and 78.24%, respectively). This is a sticking result as, from the literature, the lack of knowledge is one of the main factors preventing people from participating in ECs. In addition, since the GSE provides a very convenient economic opportunity for consumers with respect to the usual energy fee, acknowledging people of its existence may help considerably in convincing them and increasing trust. Further analysis has also shown the positive correlation between awareness and willingness to use. Furthermore, it is interesting to note that age and awareness are positively correlated, thus, meaning that probably older people have broader knowledge on this matter. This can be interpreted in many ways, since people getting older may get more interested in public policy, or, more simply, they get more opportunities of acknowledging them even by chance. This result may contrast with another data arising from the mediation model: willingness to use is negatively influenced by age, this tells that younger people are more prone to try such services. On the other hand, WTU is positively influenced by income, namely, an higher income is related to an higher willingness to use ECs. This may be related to the fact that people with lower incomes are less inclined to invest in new enterprises, and arising sectors, even if it offers economic benefits in the medium-long term

Another interesting factor arising from the analysis of correlations, is the positive relationship between the two types of trust analyzed, namely in MNCs and ECs. First, it is not an obvious result, since it means that growing trust of people in MNCs does not negatively affect trust in ECs. In simpler words, this two factors are not in contrast, and probably discredit one does not benefit the other.

Results arising from testing the hypothesis provide some meaningful insights: trust in ECs impacts positively willingness to use, thus working on increasing trust of consumers in sustainable resources and new ways of getting the daily energy supply may considerably increase their willingness to participate in ECs. On the other hand, it cannot be confirmed that trust in MNCs influence negatively willingness to use, thus further research may be needed.

Results from testing H2 confirm that environmental attitude influence positively consumers' willingness to use, thus campaigns of education and sensibilizations to issues of sustainability and protection of the environment, may increase willingness to use. However, as shown by the stepwise model, environmental attitude contributes very little in describing the variance of WTU, thus, probably it is not one of the key-driving factors.

However, it is interesting to note that environmental attitude has a mediating role in the positive relationship between trust in ECs and willingness to use, thus, it can be said that the effect of attitude is more consistent in increasing trust, which consequently increases WTU.

3.6. Limitations and Further Research

The limitations of the research proposed are related to the distribution of the questionnaire, due to limits to reach people of more varied nature: many of the respondents are people close to the researcher thus, of similar habits, many are young adults with low economic capabilities, thus there may be lack of experience in managing energy costs or choosing types of supply. For these reasons, some answers come from pure ideology. In addition, the dependent is built on responses to a single question. The use of a more complete scale would provide a more complete overview of the willingness to use of consumers. Regarding the scales used, a reliability test has not been worked out, meaning that there is a risk for lower consistency of results, even though the scales have been drawn from the literature. Finally, the scales used where initially thought for other topics, that, however, close to the items inspected in this thesis, have some differences. Building a scale dedicated to trust in MNCs and ECs, may help building a better picture of the sample on the topic.

Concerning further research on the topic, since, as emerges from the literature the economic aspect is key in the decision of consumers, both regarding a potential investment and energy costs, it would be interesting to integrate in this study an analysis of the economic factors of participating in ECs and the perception of consumers.

4. Conclusions

To conclude this dissertation, it is important to summarize the key elements that emerged during the analysis.

From the initial study of the European policy and its transposition in the national legal frameworks of MSs, it should be highlighted that all policies aim at facilitating the setup of new Energy Communities. Of course, being the directive very recent, the transposition process is still ongoing and only general guidelines have been drawn.

Still from the first chapter, in the analysis of the literature on benefits and barriers that consumers may encounter in approaching ECs, has been seen that participants may get important economic benefits from their participation, coming from stopping to get supplied by multinationals which require fees to be paid, and from the incentives offered. Specifically, in Italy the GSE incentive plan would provide an economic reward based on the ratio of energy produced and consumed by the community. In addition, there is a strong reduction in CO2 emissions, thanks to the deployment of renewable energy sources. The main barriers are issued by a lack of knowledge of the main features of ECs, a lack of trust in ECs and RESs and the burden of the economic investment to be sustained by the participants.

Lastly, closing the first chapter, the EC business models more diffused in Italy have been described. Two main points got the author's attention: first, communities are almost always started by large organizations, be it a municipality, as for top-down enterprises, or NGOs as in the case of bottom-up communities. These communities also entail the participation of other organizations like research centres and universities, however, it is not common to see an energy community set up by a group of citizens or small companies, which are actually the main participants identified in the EU Directive. The second element is the role of a Developer, claimed as necessary to facilitate the formation of ECs. The Developer is a larger entity that provides economic and technical support in the first stages of the creation of the community, and then shares with the participants costs and rewards coming from energy production and disposal.

In the second chapter, the focus has been placed in analysing how Enel intends to enter the Energy Communities market, how it can get profitable, and what benefits it can bring to the market itself and its participants. Enel's role is very close to the concept of Developer described above, in fact, they act as facilitators for the setup and maintenance of the communities. Two branches of the company work on two different fields: Enel Green Power offers the engineering technical support needed to set up the production plant and make the initial investment needed. This is, specifically, what the Developer is intended to do in the view of the literature. On the consumer's side, Enel X provides administrative support and is responsible for finding the right people to make up new communities, according to their energy consumption rates, in order to maximize the efficiency of the community, and the reward from the GSE incentive plan. In addition, they offer other, ancillary, services.

For the support provided, through an ad-hoc contract, companies of the Enel group get back a percentage of the incentives that the community gets from the GSE. The plant remains property of the company, which, in other words, grants use rights to the community. In this way, the company is able to directly impact the communities, and their development, by respecting the European directive, since it is not a participant stakeholder of the community. In order to maximise efficiency and effectiveness, Enel is currently focusing on finding corporate members, namely, SMEs and businesses that should compose the core of the Communities.

In the third and last chapter, through the empirical research developed, the factors influencing willingness to use have been studied, and some important results have emerged. First of all, the sample shows a broad lack of knowledge on ECs and on the GSE incentive plan.

Willingness to use is positively influenced by trust in ECs and by environmental attitude. In addition, it has been shown that environmental attitude positively mediates the relationship between trust in ECs and Willingness to use. In statistical terms, nothing can be said about the influence that trust in MNCs has on willingness to use, however, trust in ECs and MNCs are positively correlated, leading to the conclusion that probably they are not conflicting factors. In addition, from the mediation model, emerged that willingness to use has a positive relationship with salary and a negative one with age, meaning that it is higher for people younger people and with higher incomes.

So, the conclusion proposes an answer to the leading question of this work: what can Enel do to increase willingness to use of Energy communities provided that its main objective is to increase consumers' loyalty?

The company already facilitates the setup, however, it is important to increase trust of potential participants: people should always feel like the company is always ready to provide support, thus one way may be an immediate support system from Enel Green Power, be it an on-call service, or an operator assigned to each community, which is responsible for following the activities and reporting any arising issue. This action would increase both trust in the EC and in the company and loyalty of consumers. Trust can also be built from a peer-to-peer exchange of information. Thus, a public platform where EC members can review their experiences may help strengthen the perceived trust of other participants and also provide interested consumers with unbiased and sincere opinions. This would also give Enel a direct connection with consumers that would help implement the service.

Lastly, the company may provide an activity tracking system based on blockchain technology, in order to ensure a safe and reliable flow of data on consumption of energy. This would also help Enel X to better track the energy flow and production, as well as improving the precision of KPIs used to identify potential prosumers. A reward system may be built, based on this model, which allows prosumers to collect tokens, based on their performance

in the community, which can be used to purchase services and products from Enel. A similar model has been developed by KPMG[13]

Since another key element arisen is the role of environmental attitude, the company should invest in sensibilization and education of consumers: articles published on the websites, emails sent to clients, ad-hoc spots to publish, on the main means of communication used, in which some pills about the environmental crisis and sustainability issues are given. The same techniques should be used also to increase awareness on the incentive plan in order to highlight the economic benefits of participating in an EC. In addition, the initiative of building plants "recycling" old mining sites and dismissed caves, should be advertised. Some of these activities are already in place as part of the inbound marketing strategy, however in light of the findings of this thesis the scope of this communications should be widened to articles on broader environmental crisis. For this purpose, a periodic newsletter may be a good way to inform consumers.

Furthermore, as we have seen that willingness to use is higher for young people, thus, this is a target to pursue, one way may be to offer an incentive for participation, for example, Enel X, following the choice of looking for SMEs should look for companies with young owners or stockholders, and adapt to the kind of services they may require. Another way, may be offering appealing services targeted for younger people, like services of home automation, or a support system based on AI, and virtual reality, in which a digital operator shows the actions to operate, this also perfectly fit with the fidelization strategy of Enel X and Enel Energia aimed at tailoring products and services to the needs of consumers.

Lastly, when choosing who are the right consumers to involve in an Energy Community, the indicators used by Enel X should include elements not just related to energy consumption, but also on consumers attitudes. If Enel succeeds in making young people participate in ECs, the first time they have to deal with energy bills and supply, they would not be biased by previous experiences, thus more prone to participate and loyalty would increase.

Considering the technical hurdle of managing a large number of plants disseminated on the territory, EGP may try to build collaborations through non equity agreements and licenses, with local companies in the sector, which monitor and report issues to Enel. This, strategy may create problems of information flows since the managing structure may be more complex, however, delegating some activities may also give to the company the opportunity to focus on monitoring activities and have better control on its ECs.

Through the proposals made in this chapter the company can fasten its pace towards the objective of increasing consumers' loyalty, and, moreover, the whole Energy community sector would benefit from Enel's activity.

[13] https://kpmg.com/it/it/home/insights/2021/04/blockchain-autoconsumo-collettivo-comunita-energetiche.html

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APPENDIX A: ITEMS INCLUDED IN THE SURVEY

Trust in MNCs *(Strongly Disagree, Disagree, Do not Agree or Disagree, Agree, Strongly Agree)*

TRUST_1	With a Multinational Energy supplier I obtain what I look for in the Service
TRUST_2	A Multinational Energy Supplier always performs at my expectation level
TRUST_3	A Multinational Energy Supplier gives me confidence and certainty in the consumption of the service
TRUST_4	A Multinational Energy Supplier is not constant in satisfying my needs
TRUST_5	A Multinational Energy supplier would be honest and sincere in its explanation
TRUST_6	I could rely on a Multinational Energy Supplier
TRUST_7	A Multinational Energy supplier would be interested in my satisfaction
TRUST_8	A Multinational Energy supplier would repay me in some way for the problem with the service

Trust in ECs *(Strongly Disagree, Disagree, Do not Agree or Disagree, Agree, Strongly Agree)*

TRUST_1	With an EC supplier I obtain what I look for in the Service
TRUST_2	A EC always performs at my expectation level
TRUST_3	A EC gives me confidence and certainty in the consumption of the service
TRUST_4	A EC is not constant in satisfying my needs
TRUST_5	A EC would be honest and sincere in its explanation
TRUST_6	I could rely on a CE
TRUST_7	A EC would be interested in my satisfaction
TRUST_8	A EC would repay me in some way for the problem with the service

Environmental Attitude *(Strongly Disagree, Disagree, Do not Agree or Disagree, Agree, Strongly Agree)*

ENV_ATT 1	People must be in harmony with nature to survive.
ENV_ATT 2	People are recklessly destroying the nature.
ENV_ATT 3	I care about the environment.
ENV_ATT 4	The balance of nature is very sensitive and fragile.
ENV_ATT 5	People do not need to adapt to the natural environment, since they can change it
ENV_ATT 6	People have the right to change the natural environment according to their needs.
ENV_ATT 7	I am well aware of environmental issues.
ENV_ATT 8	Earth is like a spaceship with limited number of rooms and resources.
ENV_ATT 9	I see myself as an environmentalist.

Willingness to use *(Strongly Disagree, Disagree, Do not Agree or Disagree, Agree, Strongly)*

WTU	I would be willing to take part into a CSE

Control Variables

AGE	What is your age? *(Open Field)*
SALARY	What is your average yearly Salary? *(0-28.000 €; 28.000-55.000 €; 55.000-75000 €; Over 75.000€)*
AREA	In which area do you live? *(Countryside; City Center; Outskirts)*
GENDER	What's your gender? *(Male; Female; Other)*
EDUCATION	What is the highest level of educational qualification you have obtained? *(None; High School Diploma; Bachelor; Master Degree; PhD or Above)*

Descriptive Variables

KNOWLEDGE If you answered Disagree or Strongly Disagree please select one of the following *(I trust more Large Multinationals; I don't think it is economically beneficial; I don't trust Renewable energy sources and the related policies; It is still too underdeveloped to work properly; I know too little on the matter to take such a decision)*

ADOPTION Do you know about the incentives plan and regulation from the GSE for "self-consumption"? *(Yes;No)*

Summary

Introduction

The interest in this study emerges from the analysis of the literature related to the Energy Communities. The definition provided by Enel, the largest energy producer in Italy and one of the largest renewable energy producers in Europe[14], is the following: "*An Energy Community is an association that produces and shares renewable energy, generating and managing cost-effective green energy autonomously, reducing CO2 emissions and energy waste*"[15]. Energy Communities answer to several problems affecting society nowadays: the first one is for sure the matter of pollution and the climate change crisis. In fact, as stated in the definition, they are based on the production of clean energy, and may have a key role in contrasting CO2 emissions coming from production of electricity from non-renewable sources of energy, like coal, oil, natural gases employed in thermoelectric plants. Another problem is that of Energy poverty, which affects 8% of the European population[16]. This problem has been exacerbated by the critical increase in energy prices in 2021 due to the impact of COVID-19 and worsened by Russia's invasion of Ukraine in February 2022. Consequently, there are huge expectations on RECs; in fact, a study conducted by REScoop and EREF (European Renewable Energy Federation) prospects that about 83% of European citizens may become part of an energy community by 2050. Nevertheless, forming an Energy community is not an easy task, both from a bureaucratic perspective and a technical one since it involves the setup of a production plant of renewable energy.

The first European Directive trying to regulate ECs, states that multinationals cannot participate in this type of community; furthermore, the core business of SMEs that want to participate in ECs cannot belong to the energy production industry. For these reasons one of the major challenges that citizens and entities face, is that of economic viability and know-how in the setting and development of the production facilities.

Thus, the objective of this thesis generates from these considerations: can a large multinational energy provider compensate for this lack of resources while respecting the limits of the directives, in order to increase the participation and trust of consumers in Energy Communities?

To provide a complete overview of the case and analyze in depth all the main aspects, the thesis is structured into three chapters: the analysis of the current European and most significant national regulations, and an analysis of opportunities and barriers faced by consumers; the description of the Enel business model as a facilitator in the formation of new ECs; an empirical study aimed at understanding how to increase the willingness to use of

[14] https://www.bloomberg.com/graphics/2020-renewable-energy-supermajors/?leadSource=uverify%20wall

[15] https://www.enelgreenpower.com/countries/europe/Italy/renewable-energy-communities

[16] https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumer-rights/energy-poverty-eu_en

participants. At the end in the Conclusions will be discussed the results from a managerial point of view in order to provide some meaningful insights to improve the Enel business model or suggest some alternatives to increase participation.

Regulation, Barriers and Opportunities

The first chapter inspects the current situation of ECs drawing from existing scientific literature and official sources from the EU and Italian Organizations. The objects of the study are the regulatory framework and the transposition of the European Directive in the national legal framework. The Revised Renewable Energy Directive 2018/2001/EU outlines the traits for forming Renewable Energy Communities, namely, the legal nature of participants (participation is forbidden to MNCs in general and companies whose main business in in energy services), and the most important rights and duties of ECs and their participants. Being a Directive, European Member States have some freedom in transposing it into their national regulatory framework, thus some differences can be noted on the matters of the possibility of selling energy produced in excess, the nature of the plants and ownership rights. Five Member State's regulations have been analyzed to get a wide perspective of the transposition process, which is still going on, namely, Germany, France, Greece, Portugal and Italy. All of the frameworks developed are based on the Directive, but they differ on the freedom they give to prosumers to dispose of surpluses, for example, some frameworks allow the selling of surpluses while others not. Some regulations are stricter on the legal nature of participants to the community while others are not.

What emerges from this first analysis is that Energy Communities are still an underdeveloped phenomenon almost in all of Europe, also in pioneering northern countries. This is mostly due to the fact that before the European Directive RED II, energy communities were not properly regulated anywhere, and now all European countries are striving to build a solid regulatory framework based on the directive, to unify the laws.

A focus has been drawn on the Italian regulation, in particular, in addition to the directive transposition, which sets the rules for the formation of an Energy Community, the GSE incentive plan is of special interest. This incentive plan rewards the community for the clean energy they produce and share, representing a key turn-point in the battle against energy poverty.

Then, a study of the factors influencing people's choices of participating or not in an EC has been developed and the main barriers and benefits they encounter have been collected.

ECs are increasing in number and variety of business models in Italy, also thanks to the regulation put in place. There are different experiences, usually started by municipalities or NGOs. Nevertheless, it is worth pointing out the main opportunities and barriers that potential participants may encounter when participating in an EC. Starting from the bright side, participants have of course a financial reward, since energy would be self produces, and,

thanks to the incentive plan described above, they could also gain a financial benefit. It would be a way to reduce the CO2 emissions from the production of energy, and it could increase awareness of climate change. In addition, the creation of an EC brings a set of additional services, like charging stations for electric cars, which would improve even more the quality of life of participants. In addition, ECs allow more independence of consumers, from the central grid and thus, from the multinational suppliers, being less influenced by electricity cost increases and shortages of supply due to socio-economical events.

The barriers are mainly of practical and cognitive nature: first, the investment for the setup and maintenance of the production plant can be very burdensome for private citizens and SMEs, thus it may be required the help of other, larger entities. Those willing to enterprise in an EC may be stopped by the fear of market failures arising from high costs. Second, people have not yet developed consciousness on the matter, as they lack general knowledge on the topic which produces a lack of trust, not only in ECs but, more broadly, in sustainable sources of energy. This feeling is of course enhanced by the absence of a clear and well-set regulatory framework. A third element comes from the nature of the energy market: since it is a natural monopoly, the natural market flow may push out any initiative aimed at reducing the market share of the monopolist. In particular, people may not have enough resources to face large multinationals in their own business.

Currently, in Italy there are currently 35 operative Energy Communities, 41 are in project and 24 are being developed, distributed on the territory quite equivalently, with some small clusters in northern and southern Italy. The end of the chapter summarizes the principal business models adopted by Italian ECs: usually described as bottom-up when started by NGOs or private initiatives, and Top-down when started by municipalities. These two models denote some differences on the purpose of the initiative: usually, top-downs are aimed at building awareness on environmental matters and contrast energy poverty. In addition, they often involve research centers and universities. Bottom-up more often target small municipalities, in order to improve the communities' conditions. From the literature emerges that the current business models need a Developer, which is an entity that provides the know-how, technical skills, and financial resources to help the set-up of new plants. Three main business models are identified regarding the presence of a developer, in these different frameworks, the community and the developer share differently the financial burden of the initial investment and the capital expenses.

The Enel Business Model

In order to explore how an MNC can enter the business of ECs, the second Chapter have been developed in partnership with Enel, the largest Italian energy producer and Supplier, that has developed a strategy to act as a facilitator for the creation of Energy communities.

The second chapter is focused in the description of the business model of Enel, as a facilitator for citizens and small private entities, like companies and associations, in the formation of new communities. Enel has always been one of the pioneers in the production of renewable energy and has been investing in RESs since 2008 with the foundation of Enel Green Power.

Since the first transposition of the European directive RED II in the Italian regulatory framework, which introduced the possibility to constitute Energy communities in Italy, Enel has started the applicability of plan to enter this market.

In order to facilitate the transition toward more sustainable energy sources, many are the initiatives taken by the company: the building of plants for renewable energy production; the setup of online platforms to help existing communities to monitor; financial support to enhance the formation of new plants for ECs; partnerships with private and public organizations and universities to educate on the topic of energetic sustainability.

Through the business model developed the company offers support from both a technical perspective and administrative perspective. In fact, there are three branches of Enel that operate in the Energy communities' business: Enel Green Power and Enel X and Enel Energia. The first one, is the company responsible for making the initial investment for building the plant. In addition, they provide services for maintenance. As it is, the company builds the plant and remains the owner. However, they stipulate a contract with the Community, which allows it to use the plant for the consumption and selling of energy produced. Enel Green Power follows every step of the constitution of the community, from the identification of the right site in which to build the plant, which is chosen according to the characteristics of the land and its geographical location. They then build the plant and offer services for maintenance; they make sure that all the permits and authorization are valid. Enel Green Power gets its financial reward as a percentage of the incentives offered to the Community from the GSE incentive plan. Enel X with the collaboration of Enel Energia focuses on activities on the consumer side: they identify the right people according to include in the community, on the basis of their consumption habits, in order to maximize the benefits of the Community. In addition, they take care of all the administrative activities, i.e. legal representation, financial balances, and all bureaucratic duties, for legal and financial compliance. And act in case of new entries of exits of members of the community to compensate imbalances in distribution of resources and rewards from the incentives. The utmost objective of this Business Model is to increase customers' loyalty, and to attain the objective, Enel X and Enel Energia will offer tailored products to consumers participating in ECs, like electric heat pumps, electric vehicles and services to improve domestic energetic efficiency.

The company intend to operate with the local institutions responsible of the authorization processes, that may help in identifying the right sites in which to build plants and may be part themselves of the ECs. Some criticalities have been identified however, like the difficulty to manage a multitude of plants dislocated on the territory, and

some hurdles in identifying the right clients to contact. Answers to this and other issues is given in the final conclusions.

Thus, Enel operates as a facilitator, or, as from the literature, a developer, as their activities, allow consumers to form Communities without the barriers identified from the literature, that may prevent people from participating in such an enterprise.

An Empirical study to improve Willingness to Use

The last step of this thesis has been the development of an empirical study on the approach of consumers to ECs, and on the factors that drive their decision to participate in an EC. For this scope, a survey has been developed and distributed in order to obtain raw data on the sample. The variables extracted from the questionnaire are control variables on age, gender, salary, living area, level of education, type of energy supply currently in use, two descriptive variables to inspect the sample on the awareness of the GSE incentive plan and reasons why respondents would not participate in an EC (options where based on the literature). Then two scales have been applied to study the level of trust of respondents in Multinational Energy Suppliers and in Energy communities. The second scale studies the environmental attitude of respondents, namely, if respondents are more or less close to the topics related to environmentalism. From the literature inspected in chapter 1, three Hypothesis have been constructed. Based on the data gathered, a model has been built, through a regression analysis in order to test the three Hypothesis. The third hypothesis has been tested through a mediation model

The three hypotheses to test are:

Hypothesis 1 (H1): *Willingness to Use ECs is negatively affected by the trust in multinational suppliers (H1a), and positively affected by the trust in Energy Communities (H1b).*

Hypothesis 2 (H2)*: Environmental attitude positively influences Willingness to use ECs.*

Hypothesis 3 (H3): *Environmental attitude mediates the relationship between trust in ECs and willingness to use*.

The sample of respondents is characterized by a majority of under 30 y.o., respondents and between 31 and 45 y.o. The net majority of respondents where males. Coherently with the age distribution, the salary distribution shows a 37% of respondents within the lowest wage range and between the 28.000-55.000 € per year. Concerning the Education variable, the largest portion of respondents have a high school diploma or a master's degree.

Another variable inspected was the area distribution. This is an interesting attribute considering that an EC can have different size according to where it is located, the outskirts of cities, for example, are generally closer to industrial areas. Overall respondents mostly live in the city center while the portions of respondents living in outskirts and countryside are more balanced with a prevalence of people from the periphery.

Lastly it has been studied the how respondents get their energy supply, and it emerged that the vast majority is currently getting it from a multinational supplier.

Getting to the empirical analysis, after the analysis of correlations, an exploratory regression model has been run including all variables. However, the only variables showing a statistically significant impact were Environmental attitude and trust in CEs. Based on these results, thus another linear regression has been run considering the same dependent variable WTU. In this case, though, a stepwise procedure has been adopted. Based on these results H1 can be partially supported, as while the positive effect of the variable Trust in CEs has been statistically confirmed (i.e., H1b), the negative effect of Trust in MNCs on the willingness to use CEs did not find statistical support (H1a). As for the second hypothesis (H2), the current results show support for the positive impact of the variable environmental attitude in increasing the willingness to adhere to CEs; however, the stepwise regression model, also suggests that this variable accounts only for a small amount of variance. In order to test the third Hypothesis a mediation model has been built considering the mediating effect that Environmental attitude has on Trust in ECs positive effect on Willingness to Use. In addition, other descriptive variables have been used as covariates. The model resulted significant and positive.

In the discussion, the main results are analysed. the first result to focus on is related to the very high percentage of people manifesting lack of knowledge of the matter of ECs an awareness of the GSE incentive plan. This is a sticking result as, from the literature, the lack of knowledge is one of the main factors preventing people from participating in ECs. Furthermore, it is interesting to note that age and awareness are positively correlated, thus, meaning that probably older people have a broader knowledge on this matter. Another interesting factor arising from the analysis of correlations is the positive relationship between the two types of trust analyzed, namely in MNCs and ECs. First, it is not an obvious result since it means that growing trust of people in MNCs does not negatively affect trust in ECs.

From the hypothesis testing it can be said that trust in ECs positively influences willingness to use, in addition, the mediating effect of environmental attitude on trust in ECs has been confirmed, meaning that working on improving these two aspects, may help increase willingness to use.

Lastly, the negative influence of trust in MNCs has not been statistically confirmed, furthermore, there is a positive correlation between trust in ECs and in MNCs, which makes think that probably the hypothesis is not true.

Conclusions

According to the information gathered along this hole analysis some final conclusions have been drawn.

In order to get to the objective of increasing consumers' loyalty through its business model Enel should also consider the empirical factors affecting people's choice of participating in an EC.

In order to increase Willingness to use, seems necessary some work to improve trust in ECs, and environmental attitude. In addition, given the positive correlation of trust in MNCs and trust in ECs, actions aimed at increasing the former should not negatively affect the latter.

Thus, the suggestions are the following: in order to increase environmental attitude Enel should integrate in their inbound market strategy a newsletter which informs readers of the most important environmental issues.

In order to increase trust in both the EC and in the company, they should offer an immediate support in case of issues or malfunctioning that may help consumers feel safer in the adoption of a completely new service.

Moreover, in addition to the monitoring product and systems offered, the company should build a monitoring system for consumption and production based on blockchain technology; this would make the flow of information more precise and reliable, and may be used to build a reward system for more virtuous participants.

In addition, in order to increase loyalty, the company aims at offering products tailored for consumers' needs. Following this strategy, the suggestion is to offer products aimed at younger consumers, which, from the analysis have on average higher WTU scores.

Lastly, in order to manage the large quantity of plant distributed on the territory, the activities may be delegated to local companies, closer to the territory, through a license contract.