# Energy Communities: a socio-political analysis

AWARE

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TABLE OF CONTENTS

## EXECUTIVE SUMMARY

The following paper addresses the topic of Energy Communities, a new systemic approach to implementing the energy transition that involves economic, social, technical and political aspects. The content of the paper has been linked to two of the 17 Sustainable Development Goals: Goal 11 "Make cities and human settlements inclusive, safe, resilient and sustainable" and Goal 7 "Ensure access to affordable, reliable, sustainable and modern energy systems for all". The Energy Communities, in their composition, organisation and function, produce effects that fall directly on the two goals discussed in the analysis. At the same time, objectives 7 and 11 represent a framework within which the Energy Communities will have to develop in order to be able to implement the content of the 2030 Agenda. This two-way relationship has been considered in the paper in order to better frame and understand its dynamics.

Within the analysis, in relation to Goal 11, the role of Energy Communities in the context of so-called "sustainable cities" is investigated with a particular focus on Net Zero cities. In addition, this section explores the importance of Energy Communities in achieving an effective energy transition. In relation to Objective 7, the paper dwells on the social impact of Energy Communities, especially with regard to the role of consumers as prosumers and the critical issue of energy poverty.

Finally, in addition to considerations on Energy Communities in relation to the two Sustainable Development Goals, the paper focuses on policy and regulatory aspects. In particular, the European and Italian regulatory context is analysed, with the latter strongly dependent on the former. Furthermore, concerning the most recent regulations, the economic instruments included in them are analysed, specifically: Green Certificates and Feed-In-Tariffs  This section ends with a focus on future developments in the sector and recommendations to legislators.

## INTRODUCTION

In recent decades, the energy transition has become increasingly necessary. Today, international bodies and civil society are calling for an acceleration of this transition. These include international agreements such as the Agenda 2030 and the Paris Agreements, as well as the climate demonstrations of recent years that have prompted the European Union to present the Green Deal. This is because of the serious problems presented by the energy sector, including the production of 90% of the greenhouse gas emissions that are leading to an increase in global temperatures. At the same time, however, energy is crucial to a nation's economic and social development. Yet this development has now proven to be unsustainable for future generations, so the implementation of the energy transition is vital. This has led to the creation of new paradigms and innovative systems, including Energy Communities.

Energy Communities are an innovative way of producing, distributing and consuming energy produced specifically from renewable energy sources. Therefore, their role is central to the realisation of an energy transition that is based on the principles of efficiency and equity, and greater dissemination and support of this organisational innovation is undoubtedly necessary.
In view of this, the content of the paper will try to answer the following questions in the following pages:
- What function do Energy Communities play in achieving an effective energy transition and how do they fit in with the Goal of Agenda 2030 number 11, namely, "Make cities and human settlements inclusive, safe, resilient and sustainable"?
- What is the role of Energy Communities given the social issues related to the energy sector and how can they "ensure access to affordable, reliable, sustainable and modern energy systems for all" (Goal 7)?
- Given the importance of an efficient economic-regulatory system for the proper development of Energy Communities, what are European and Italian legislators doing and what are the main critical issues related to the current rules?

After the consideration of the role of Energy Communities in the energy transition and decarbonisation of cities, with particular attention to Goal 11 (Section 1), the social aspects related to them will be considered with regard to the new figure of the prosumer and energy poverty, taking into account Goal 7 (Section 2). Finally, the economic-regulatory aspects related to Energy Communities will be analysed and some recommendations to policy makers will be proposed (Section 3).

# 1. THE ROLE OF ENERGY COMMUNITIES IN THE ENERGY TRANSITION AND THE DEVELOPMENT OF SUSTAINABLE CITIES

## 1.1 Energy communities in the context of energy transition

The year 2015 has been characterized by a change in the approach towards sustainability and a major evolution of the multilateral and governance system for sustainable development. In fact, in that year, fundamental milestones have been achieved, such as the adoption of the United Nations 2030 Agenda for Sustainable Development and the Paris Agreement on climate change.

CO2 emissions are the main type of anthropogenic greenhouse gas emissions and most of them come from the energy sector and, in particular, from coal-fired power plants. The energy transition is identified with the progressive shift from energy from fossil fuels to energy based on renewable sources. Therefore, the energy transition is crucial to achieve the goals set at the 21st session of the Conference Of Parties (COP21) in Paris in 2015.

The COP21 defined the objective of limiting the increase in global temperature to less than 2 degrees Celsius above pre-industrial levels. This goal could only be achieved through the collective efforts of all stakeholders, not only the governments of all states, but especially businesses, civil society, local governments and citizens. In particular, the mitigation of climate change can only be achieved through energy transition, understood as a systemic approach that enables a comprehensive paradigm shift. In particular, the de-carbonization of energy production is the starting point for energy transition. In this respect, the closure of coal-fired power and clean energy production are accelerating, also thanks to the progressive reduction of renewable technologies costs over the last decade. Furthermore, the electrification of consumption, essential to reduce air pollution, is necessary. According to the fourth edition of the report "Global Energy and Climate Outlook" of the Joint Research European Commission's Joint Research Centre, electrification plays a key role in the energy transition, and its rate is increasing in all sectors[1].

Measures that facilitate the electrification of energy-intensive sectors, such as transport, are are needed to encourage the continuation and acceleration of the positive electrification trend. In this context, energy communities represent an important tool to directly involve citizens and communities in the pursuit of the common goal of energy transition, thus in the fight against climate change. Energy communities are defined as coalitions of users who, through voluntary adherence to a contract, work together with the aim of producing, consuming and managing energy through one or more local energy facilities.[2]

Energy communities' primary goals are economic savings and energy efficiency improvement, in a self-consumption and cooperation logic. Indeed, through the decentralization and the localization of production, consumption and exchange of energy from renewable sources, citizens and businesses can directly contribute to the energy transition and, consequently, to the sustainable development of the territory.

[1] Joint Research Center, European Commission. Global Energy and Climate Outlook: Electrification for the low-carbon transition.

[2] Green Economy Community. 2020. Le comunità energetiche in Italia: Una guida per orientare i cittadini nel nuovo mercato dell'energia.

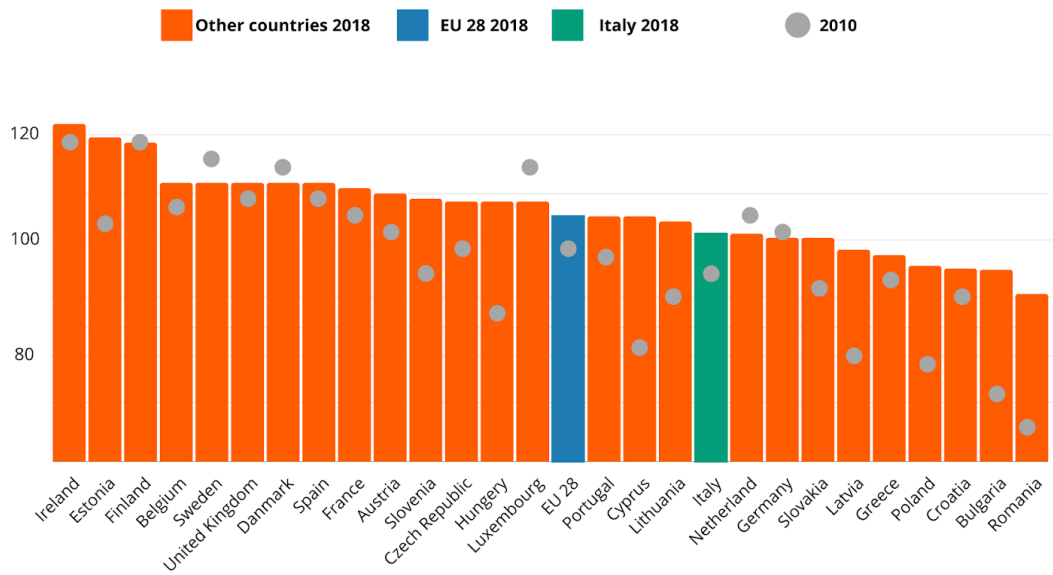
## 1.2 Sustainable cities and energy communities: Sustainable Development Goal 11

The United Nations 2030 Agenda is defined as "a plan of action for people, planet and prosperity", which integrates the three pillars of sustainability: environmental, economic and social. The 17 Sustainable Development Goals (SDGs) are further broken down into 169 targets and 244 indicators., which translate the current global challenges into specific and measurable goals. The targets are interconnected and some of them are preparatory to the achievement of others. The interconnectedness and complexity of the current global challenges encompassed in the SDGs are the starting points to understand the increasingly evident and pressing need for an integrated and multi-stakeholder approach to achieve the global goals.[3]

In particular, the SDG 11 'Make cities and human settlements inclusive, safe, resilient and sustainable' comprises several targets, including the reduction of the negative environmental impact of cities per capita and the improvement of cities' air quality.

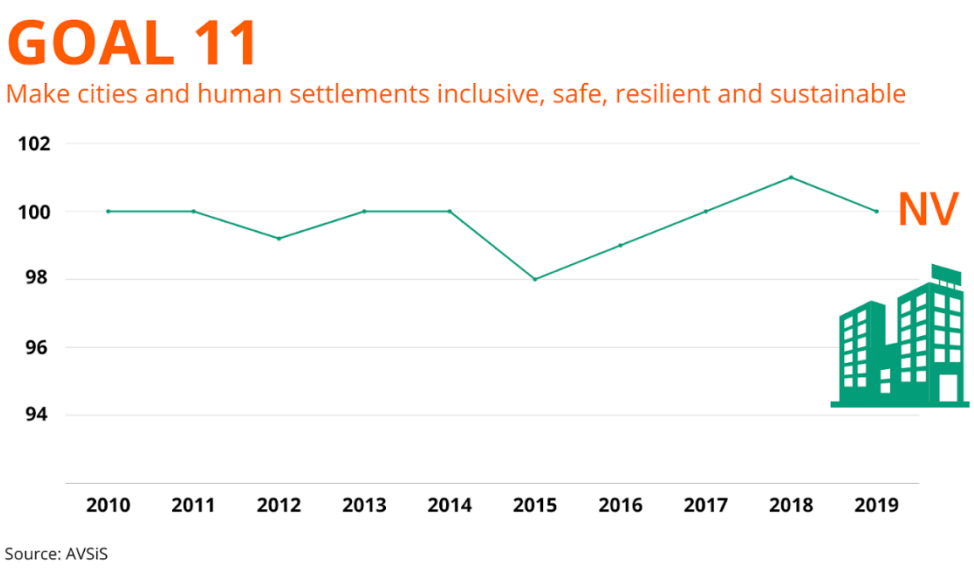
As regards the progress towards Goal 11, Italy still lags behind the European average, as depicted in Figures 1 and 2. This despite an improvement between 2010 and 2018. Among the main causes, the Italian Alliance for Sustainable Development (ASViS) highlights the rate of housing overcrowding.

*Figure 1 - Europe's trend of the Sustainable Development Goal 11*




[3] Salis G. 2018. The Agenda 2030 for Sustainable Development: A driving force for multilateralism and corporate strategies. In Tesi Luiss.

*Figure 2 - Italy's trend of the Sustainable Development Goal 11*




In order to reduce cities' environmental impact, ASViS promotes upgrades in buildings' energy efficiency, the replacement of fossil fuel-based heating systems and the installation of renewable energy systems. Progress towards the development of sustainable cities is necessary for the achievement of the climate goals of the Paris Agreement. Indeed, cities generate around 70% of global CO2 emissions[4] and, therefore, represent key players in achieving the goal of keeping global warming below 2 degrees Celsius.

According to the System Value Framework developed by the World Economic Forum in collaboration with Accenture, the de-carbonization of cities through energy efficiency initiatives, digitalization, the electrification of transports, the de-carbonization of the heating sector and the optimization of energy demand would generate significant climate benefits. In particular, at European Union level, decarbonizing cities would reduce CO2 emissions by 263 Mt, create 680,000 new jobs in sectors such as electric mobility, generate $36 billion in potential health benefits from improved air quality, and reduce the water footprint of 87 billion litres.[5]

The key pillars for reducing city emissions are: switching to renewable energy sources, electrification of the transport and heating sectors, and, in general, a widespread shift to modes of production and consumption based on energy efficiency. Therefore, the development of renewable energy communities at the city level can constitute an important enabling factor for the development of Net Zero Carbon Cities, gradually enabling the electrification of streets and neighborhoods and promoting energy efficiency. According to the recent study carried out by Elemens for Legambiente, the development of energy communities in Italy would contribute to reduce national emissions by 47.1 million tonnes of CO2 equivalent by 2030 (428 million tonnes of CO2 equivalent are Italy's total emissions for the year 2020). Specifically, energy communities, in addition to increasing the energy

[4] World Bank 12/2020.

[5] World Economic Forum in collaboration and Accenture. 2020. System value framework.

production from renewable sources, would contribute to the de-carbonization of the heating and transport sector, which are crucial to reduce cities' emissions.

Moreover, given the lower cost of the self-consumed energy compared to grid-derived energy, members of energy communities would be economically encouraged. As regards the transport sector, charging stations for electric vehicles could be powered by energy produced by energy communities. Enabling the maximization of shared energy, energy communities would enhance energy efficiency, accelerating progress and the de-carbonization of cities. In this context, digitalization could play a major role in steering energy consumption towards efficiency and sustainability and in making the exchange grids of energy communities 'smart'.

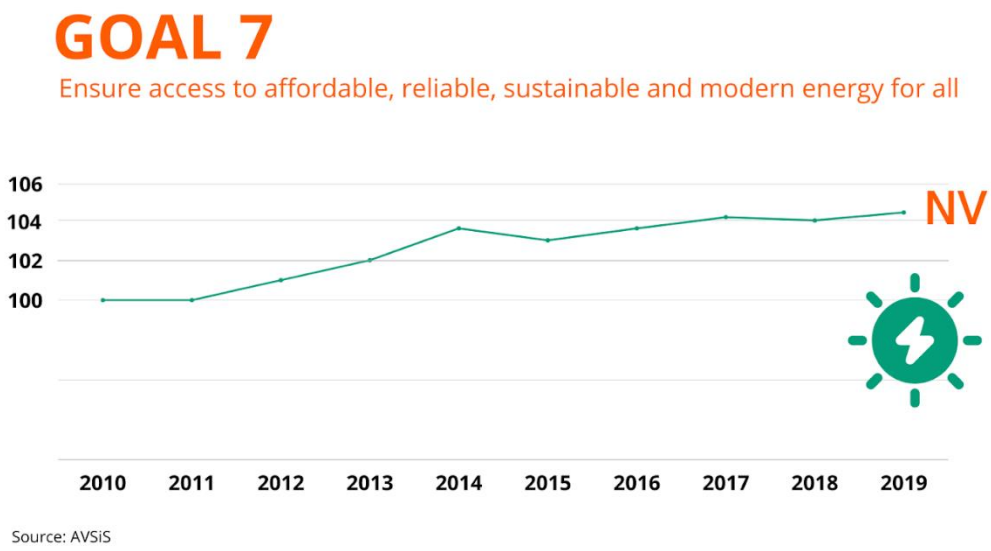
## 2. THE SOCIAL IMPACT OF ENERGY COMMUNITIES

### 2.1 Sustainable Development Goal 7 and social sustainability

The 7th Sustainable Development Goal (SDG) defined by the United Nations with the aim of achieving a better and more sustainable future for all, states that we need to: "*ensure access to affordable, reliable, sustainable and modern energy systems for all* ".[6]

In Italy, the trend of the indicators related to Goal 7 follows a stable positive trend, as shown in Figure 3.
However, if we look at current data and forecasts made on the basis of the regulatory instruments in use included in the National Integrated Energy and Climate Plan (NIPEC), it is clear that the Country is in a backward position and not on track for achieving the goals by 2030.[7]

*Figure 3 - Italy's trend of Sustainable Development Goal 7*




The aim of SDG 7 is to increase the total share of energy production and consumption from renewable sources, making the availability of the service affordable, reliable, and modern. But in addition to these fundamental aspects, the text emphasises that it must be guaranteed for everyone.

The development of Energy Communities (ECs), as outlined in Section 1, would enable significant levels of energy efficiency to be achieved, thus facilitating the energy transition without forgetting the important role played by the social sphere. For effective and lasting change, the new elements that enable the necessary development must be positively perceived and accepted by the society in

[6] Sustainable Development Goals, 7th Objective, United Nations.
[7] Rapporto 2020, *L'Italia e gli Obiettivi di sviluppo Sostenibile*. Asvis.

which they are embedded, but also bring a tangible benefit to the area in which they are located, bringing social, environmental and energetic sustainability together.
Social sustainability combines the attention to the social world with one to the physical structures that shape the interactions within it. Its ultimate goal is the creation of sustainable and successful environments by focusing on personal well-being through an understanding of people's requirements as regards the places where they live and work.[8] This aspect is integrated with the environmental and economic spheres to ensure a comprehensive approach to sustainability.
In this respect, energy supply is an essential element for the functioning of a community, and this need is made even more evident by the challenges introduced by the current pandemic. Although progress is being made to ensure increasing access to energy sources in different parts of the world, for nearly 800 million people this cannot be guaranteed.
All these critical elements see an opportunity for improvement in the EC.

## 2.2 Promoting social acceptance through Energy Communities

The increase in production of energy from renewable sources reflects broad political consensus and strong private support for the introduction of more sustainable policies.
At the same time, however, not all types of sustainable energy infrastructures are equally accepted by the population. As a result, resistance to certain projects, such as wind farms or hydropower plants, has proven to be a major problem for further developments in the field.

The strong opposition to the presence of such facilities on the territory and the delay in the implementation of policies that are ambitious enough to achieve the Sustainable Development Goals by 2030 reflects two well-known phenomena: Not In My Backyard (NIMBY) and Not In My Terms Of Office (NIMTO). The former indicates opposition to the construction of public works on the nearby territory by the local community. This refusal, in our example referring to the different sources of renewable energy, is not a disagreement with the forms of production themselves, but only if they are carried out in one's own backyard, i.e. in a place physically linked to our daily life. The second 'syndrome', NIMTO, refers to the political tendency to postpone potentially unpopular decisions in order not to lose electoral consensus, regardless of the actual need to take certain measures, as in the case of sustainable development.
The social acceptance of renewable energy sources, i.e. the perception of climate change as an issue and the role that the current energy systems play in it, is indeed a key factor for the success of the transition, as the reluctance by the population could hinder the achievement of the SDGs. This dimension has an influence on choices and attitudes at the collective level, but also at the individual one.
Among the most relevant factors influencing this variable, in addition to the two phenomena just mentioned, we find a number of key players, such as social interest groups and energy-related realities.
While awareness of environmental issues is directly linked to the level of education, the individual territorial conditions inherent in the issues have a strong impact on local perception.[9]

[8] Woodcraft, S. *et al.* (2011) *Design for Social Sustainability*. Social Life.
[9] Corrias, P., Felici, B., (2019) *Accettazione sociale delle tecnologie energetiche: il territorio tra vocazioni, sviluppo locale e obiettivi di decarbonizzazione*. ENEA.

It is precisely in this latter context, the local one, where the key influence of Energy Communities has been stressed. Although there is no ultimate solution for improving the social acceptance of renewable energy, the European Commission has recognised the benefits that the introduction of ECs can bring: "The participation of local citizens in renewable energy projects through ECs has led to a substantial added value in terms of local acceptance of renewable energy [...]".[10]
The same point was underlined by Azarova et. al. Their study on the impact of participation in ECs on the use of various forms of renewable energy sources underlines how the use of renewable technologies by local energy communities significantly increases the likelihood of acceptance and support for the energy transition, especially with regard to the use of photovoltaic panels and power-to-gas systems.[11] This greater readiness to accept renewables does not originate from climatic and environmental assessments exclusively, but is also influenced by the positive economic impact that the very presence of the EC can guarantee, as mentioned in the third paragraph.

With regard to the reluctance of the population to include renewable energy production systems and the lack of attention from the government system, the NIMBY and NIMTO factors may not occur in an EC, given the direct benefits that Community members have from the installation of renewable energy production systems. The same benefits would provide a rationale for action by EC governance leaders to favour renewable systems at the local policy and regulatory level.

## 2.3 The implications of the EC on the social sphere

### 2.3.1 The actors involved and the role of consumers: from consumer to prosumer

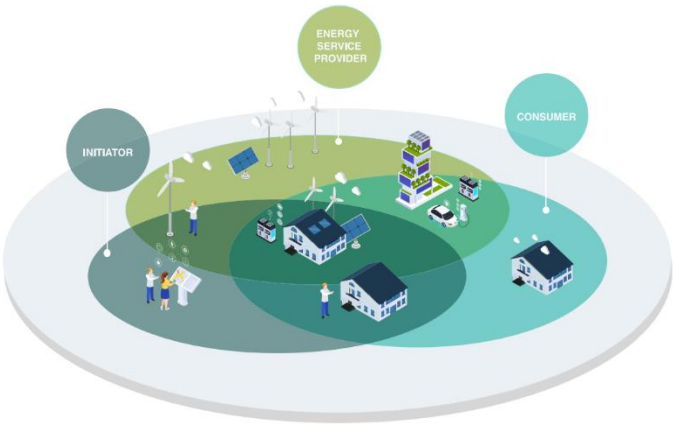
The idea that collaboration is a favourable condition, which can result in optimal outcomes, is well established. We have traces of it since the first communities developed with the aim of collective survival, and those have subsequently developed into the notion of the social contract aimed at organising interactions in an increasingly complex world. Currently, the energy sector is facing a profound transformation, the transition, as a reaction to the major challenges posed by climate change. This innovation is having a strong impact on energy production systems, and consequently on the actors that interact within them. It is in this context of change that energy communities emerge as a model for the management of the new types of interaction between the different actors and the new arising needs for collaboration.

The most evident element of change that emerges from this transition is the new role of consumers, who move from being passive beneficiaries of energy services, completely detached from energy governance processes, to a situation of active evaluation of their consumption choices. This is done both by reducing demand and by personally participating in the generation and storage of energy, so that the 'new' consumers become more relevant in the energy sector. Participation in the various stages of the energy production process has given individual users (who may be citizens, but also various entities such as associations or businesses) the name of prosumer, i.e. those who own their own energy production plant, of which they consume a part.[12] These self-production and self-

[10] European Commission, 2018.
[11] Azarova, V., Cohen, J., Friedl, C. Reichl, J., (2019) *Designing local renewable energy communities to increase social acceptance: Evidence from a choice experiment in Austria, Germany, Italy, and Switzerland*. Energy Institute, Johannes Kepler University Linz.
[12] Barrocco, F. *et al.* (2020) *Le comunità energetiche in Italia.* Green Energy Community. a

consumption become collective from the moment the actors become part of the Energy Community, where users collaborate among themselves, but also with other figures such as the energy service provider and the initiators (figure 4), to produce, consume and manage energy through local energy installations.[13]

*Figure 4 - The role of actors in an Energy Community; an actor may play one or more roles in the community: as a consumer, service provider or initiator.*




Source: Gjorgievski, V.Z. *et al.* (2021) *Social arrangements, technical designs and impacts of energy communities*

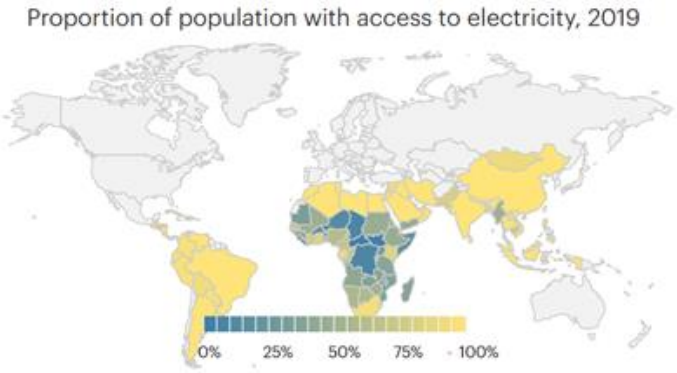
ECs may differ from each other in the nature of the actors involved, in the production systems, in their extent and in the presence of a number of enabling factors, which will be discussed in Section 3 of the paper. Nevertheless, they share a common goal: to provide affordable renewable energy to all members of the community[14], which is exactly what was called for by the United Nations through Goal No. 7, and in doing so contributing not only to a fairer transition, but also to the creation of a decentralised and democratic energy system that encourages greater social involvement in the energy market.

### 2.3.2 ECs and their benefits: a solution to energy poverty?

As previously stated in Section 2.1, energy is not only central to the economic system, but is also part of the underlying structure of our society, as recognised by Art. 36 of the Treaty of Amsterdam[15]. Its ever-increasing importance has made the energy system a primary object of social justice, causing new tensions to emerge between the market, rights and solidarity,[16] and resulting in a further factor of inequality both within individual communities and globally.
Hence the emergence of a new form of poverty: energy poverty, which manifests itself differently depending on the development level of the area in question.
In developing countries, especially those in the African continent, energy poverty refers to the lack of access to electricity sources (Fig. 5). In recent years, the number of people without access to energy sources has gradually declined to an all-time low of 770 million. However, this downward

[13] Gjorgievski, V.Z. *et al.* (2021) *Social arrangements, technical designs and impacts of energy communities, A review.* Elsevier Ltd.
[14] Barrocco, F. *et al.* (2020) *Le comunità energetiche in Italia*. Green Energy Community. b
[15] Treaty of Amsterdam amending the Treaty on the European Union, OJ C 340, 10.11.1997, Art. 36.
[16] Heldeweg, M.A., Saintier, S., (2020) *Renewable energy communities as 'socio-legal institutions': A normative frame for energy decentralization?* Elsevier Ltd.

trend was reversed with the arrival of the pandemic.[17] Moreover, for 2.6 billion people, the only option for meeting essential energy needs is exclusive reliance on fuels such as coal, kerosene or biomass.




Source: International Energy Agency

In Europe, however, energy poverty has a different connotation, but it is still a relevant phenomenon that some EU policies, such as the 2019 Clean Energy for all Europeans Package, the Energy Package 2030 and the Energy Poverty Recommendation 2020/1563, are trying to remedy. The European Commission's EU Energy Poverty Observatory monitors the evolution of energy poverty in Europe on the basis of multiple indicators. Generally defined as the excessive diversion of income resources to energy bills, with the consequent inability of part of the population to purchase essential energy services, the Observatory estimated that in 2018, 80 million Europeans (of which 4 million in Italy) were unable to purchase the most basic energy goods.[18]

ECs, part of the scenario of collective and sustainable self-production and self-consumption of energy, are an important tool to mitigate energy poverty. In taking part in ECs all citizens, including the most vulnerable and those with low income, are able to obtain the benefits derived from participation in it.
The benefits can be identified in the following macro areas:

- High level of security and quality of energy supply for its members;
- Possibility to ensure access to energy sources also for more remote geographical areas where the costs of supply through autonomous systems would be considerably higher, as it happens in the energy communities of South Tyrol;[19]
- Economic benefits deriving from the exploitation of economies of scale, from the lower and more stable cost of energy compared to standard tariffs thanks to the regulation of alternative costs (such as installation, maintenance and insurance) with long-term contracts and thanks to a lower level of dependence on market-price variability that characterise fossil sources.
- Development of a collaborative economy model, based on the sharing of goods and services;
- Greater social cohesion and solidarity among members;
- Possibility of reinvestment within the community of profits generated by the sale of excess energy, depending on the interests of the different members and the specific needs of the community, or distribution of profits.

[17] SDG7: Data and Projections, Flagship report (2020) International Energy Agency
[18] European Commission, EU Energy Poverty Observatory Report (2018)
[19] AltoAdigeInnovazione *Comunità energetiche in Alto Adige - Results* (2020)

The advantages listed above maximise the benefits brought to the community, both economically and socially, favouring the overcoming of traditional energy sources in favour of a more efficient and innovative system, which is crucial to bridging the evident global gap in the possibility of access to "reliable, sustainable and modern" energy resources.

# 3. CE IN THE REGULATORY ENVIRONMENT AND THE POLITICAL AND ECONOMIC INSTRUMENTS FOR THEIR IMPLEMENTATION

## 3.1 The European and Italian legal framework

In the next section, the analysis will focus on the legal context defining the different categories of self-consumption and Energy Community. Dealing with the European directives, especially the IEM and RED II directives, the member states must start from the key points highlighted into the directives for the implementation of the legislation. Later, the Italian legislation will be discussed, outlining the EC models already present in the legal system and their peculiarities

### 3.1.1 The RED II and IEM directives and the CE typologies

In order to illustrate the EC regulatory environment, it is necessary to introduce two important directives included in the Clean Energy Package. This legislative package defines the European's energy sector regulation, aiming to harmonize the member states' legislation. It contains two directives IEM[20] and RED II[21], that trace the path for the introduction and diffusion of the Energy Community in the European Union. It is better to start from the fundamental attributes to define an EC: persons who may be members of an EC, the maximum extension of the perimeter and the typology of energy plant allowed. The directives use these elements to define three models of EC. As it is possible to see in Tab 1, the Self-Consumption (SC) comprehends private citizens located in the same condominium that self-consume energy produced through a renewable energy plant. Same rules for the plant used in a Renewable Energy community (REC), in this case, also small and medium enterprises (SMEs) could participate. The perimeter is extended as well, throughout the concept of physical proximity. The Citizens' Energy Community (CEC) model reduces the dimension of the enterprises who may take part in the EC, although it could use any kind of energy plant and there are no rules related to the EC perimeter. The two directives carry out their job properly, presenting the key elements to introduce EC into the member states' legislations. They include subjects, perimeter and typology of energy plant, allowing member states to freely define the details. For instance, the physical proximity concept is wide and ambivalent; it leaves to each country the possibility to interpret it and to introduce it into their own legal framework.

[20] Internal energy market directive (IEM) (Directive UE 2019/944)

[21] Renewable Energy Directive (Directive UE 2018/2001)

*Table 1 - European EC models and their attributes*

| Attributes | Models | AC | REC | CEC |
|---|---|---|---|---|
| Subjects | | Individuals | Individual and SMEs (<250 employees, <50 mln turnover, <43 mln SP) | Individuals and SEs (<50 employees, <10mln turnover |
| Maximum perimeter | | Same condo | Physical proximity | No constrains |
| Energy source | | Renewable | Renewable | Any |

### 3.1.2 The "Milleproroghe" decree and the direct incentives

Even if the deadline to adopt the two directives is June 2021, Italy, through the "Milleproroghe" law[22], has launched an experimental phase aimed at gathering information on the EC. Two forms to produce and share the electric energy are provided, Autoconsumo Collettivo (ACC) and the Energy Community, as it is possible to see in Tab 2, there are similarities and differences by comparison with the directive IEM and RED II. More subjects may participate, even shops and offices located in the building can join the ACC, while in the EC public authorities may join too. Talking about the perimeter, for the ACC it is still the condominium, while for the EC, it is restrained to the secondary cabin, the electrical facilities that transform the medium tension electric energy into low tension. The cabin is usually managed by the distributor, a technical figure of the energy market responsible for the proper functioning of the grid, not of the customers' services. The decree foresees that the professionals of the energy sector (suppliers and ESCo) may provide supplying and infrastructural services, without participating in the EC. The normative does not present sufficient elements to rule the relation between CE and distributors, causing confusion regarding the subjects' responsibilities and rights.

[22] Article 42 bis of the Decree law 162/2019, converted in Law by L 8/2019

*Table 2 - EC models in the Italian legal system*

| Models/Attributes | Subjects | Perimeter | Energy source |
|---|---|---|---|
| ACC | Individuals, shops and offices | Same condo | >= 1 RE plant(s) (power <200Kw for each plant |
| EC | Individuals, SMEs and Public authorities | Secondary cabin (low tension) | >= 1 RE plant(s) (power <200Kw for each plant |

Finally, the power constraint related to the plant stands out. From a certain viewpoint, this limit highlights the role the EC has for the Italian legislation, related to self-consumption, possibly overshadowing their productive potential in the Italian energy market. In the "Milleproroghe" direct incentives are planned, in the form of tax reductions, for the energy sharing activity (self-consumption) amounting to 100€/MWh for the ACC and 110€/MWh for the EC, together with bill savings derived from lower costs of transmission, consisting in the energy transfer from the grid to the house, equal to 50€/MWh. However, there are no incentives for the mere production of energy, depriving the EC of a very important remuneration for its economic feasibility. Another possible reason for the power constraint could be the indirect attempt to favour the photovoltaic plant to the detriment for instance of the wind power plants, which usually have a higher power. In this sense, the content of the Decreto Rilancio[23] is very interesting. It provides a 110% tax deduction for expenses related to increasing energy efficiency and seismic retrofitting of a building. In addition to such primary investments, the decree provides the same deduction for citizens who decide to install photovoltaic panels, energy storage systems (batteries) and charging columns for electric vehicles. This focus on just one typology of renewable sources could strongly limit where the EC could rise and diminish their potential. The Italian legislation takes a first step away from fossil energy sources through many direct help to build renewable energy plants. Even though the incentives success among citizens was relevant, there were several problems related to accessibility, due to the externalisation of demands among different actors (bank, ESCo etc) determining in the best scenario work delays, in the worst the renunciation of the investments. These instruments produce positive effects that unfortunately will lose effectiveness in the long term; some other incentives are needed to sustain the energy production.

## 3.2 Renewable Energy and Energy Community

The next paragraphs introduce the Italian story of renewable energy incentives. They analyse the different politics and economic strategies adopted in the last thirty years, in particular the two main

[23] Decree law 19 May 2020 n. 34 converted in Law by L. 17 July 2020 n. 77

tools employed, not only in our country but also at the European level, showing their pros and cons. A presentation of the tradable certificates and Feed-In tariff will make it possible to comprehend the importance of the renewable energy incentives to completely develop the energy sector.

### 3.2.1 The tradable certificate system

In Italy, the tradable certificate system starts with the Legislative Decree 16 March 1999, with the name of Certificati Verdi (CV) (Green Certificate). Any energy producer and distributor that every year put into the grid more than 100 GWh, was obliged to cover a percentage with renewable energy sources. To show the fulfilment, these subjects had to present the amount of CVs equal to the percentage. It is possible to obtain CVs in three ways: producing directly renewable energy (1 CV for 1 MWh), buying renewable energy from other producers or purchasing certificates in a stock exchange market, not related anymore to the energy production.[24] This system has a hybrid nature: it aims to control the amount of renewable energy produced (through the mandatory percentage), but it is completely based on the certificate prices. The price is at the heart of the system, because when the supply is higher than the demand, the price could dramatically decrease. If the certificate price is too low there is no incentive to produce renewable energy. This risk implies a continuous focus on the price level. In Italy the government tried to solve the problem through the Financial Law 2008, establishing the possibility to bank the CVs for more years and forcing producers/distributors to buy exceeding certificates on the market with a fixed price. In this way the renewable energy producers could put the CV on the market only when the price was favourable, when the demand was rising. The results were not so positive. Italy had the highest price for certificates in Europe, 180€/MWh, granting one of the highest supports to the investors (only second to Luxembourg), anyway the efficacy of the system was very low. Defining efficacy as the percentage increase of renewable energy production, 1.5%. The CVs could not sustain the renewable energy production in the decade of utilisation. For that reason, and for the success related to the Feed-in tariff of other countries, the system changed and the government decided to adopt this other strategy.[25]

### 3.2.2 The Feed-In Tariff

The Feed-In Tariff arises from an agreement between renewable energy producers and suppliers/distributors (depending on the energy market organisation). The producers cede the entire production for a very long period, more than 10 years, to the producers at a fixed price for each MWh. Therefore, it is possible to make a clear plan of the investment, as an approximation of the total revenue coming from the energy sales is feasible. In this case the government intervention is not so relevant, it could fix a minimum price for the energy and it could part the quota with the supplier/distributor. The instrument is more flexible compared to the CV because the quota paid by the government could be increased in case of lack of demand or vice versa reduced in consequence of technological innovation or a higher price of electricity. To clarify this last sentence it is better to introduce the two types of Feed-in Tariff: fixed or premium. The traditional version, the fixed one, is based on a fixed remuneration not related to the market energy price, the price for each MWh is stipulated at the beginning of the contract between the energy producer and the supplier. In the Feed-In premium the quota is divided in two parts: the variable part is linked to the market energy price and the fixed part (the premium) is summed to the variable part. The traditional version is less

[24] Haasa, R., et Al., (2011). A historical review of promotion strategies for electricity from renewable energy sources in EU countries. *Renewable and Sustainable Energy Reviews, 15*, 1003-1034.
[25] Legislative Decree 3 March 2011 n. 28 and the DM 6 July 2012

risky, it allows to predict the flows of cost and revenues for a very long time, the only risk is the bankruptcy of the supplier, a very remote one. The second version is more risky because it is associated with the variability of the market price of electric energy. Although, if the price is rising the producer could cover the investment faster and obtain bigger revenues. Furthermore, the Feed-In Premium allows to remunerate the renewable energy producer for the lower environmental impact, if the premium price is fixed on a value that represent the difference between the environmental costs of renewable and not renewable sources.[26] The difference is extremely difficult to find, but newer and more precise softwares could help find it. In Italy, the adoption of the Feed-In tariff started in 1992 with the CIP6. Unfortunately, following an equalisation between the renewable energy and assimilated sources (waste to energy plants), the politics failed. Indeed, the latter needed bigger investments and they drained the funds rapidly; therefore, there was a structural delay in the renewable energy in Italy. In 2012, following the decree mentioned in 3.2.1, there was a hybrid situation in which some plants built before 2012 benefited from incentives based on the CV system while the newer plants, built after 2012 followed the FIT system. A transition moment that overcomplicated the legal framework diminishing the attractiveness of the renewable energy market for the investors. In 2019, following the emanation of the FER1[27] ,based on the FIT system, the government opened calls to cover part of the Italian renewable energy requirement. The results of the three different auctions for 5.8 billion of euro in 2020 were unsatisfying. Part of these requirements are still uncovered and many highlight the lack of clarity of the calls and the excessive bureaucracy. A requirement that EC could potentially fulfil with an effective aid.

### 3.3 Towards full development of the EC

To develop completely the Energy Communities and their renewable energy production potential it is necessary to offer the adequate tools and the FIT are the most efficient. They are easy to implement and as a consequence of innovation and renewable energy plant cost reduction they can be easily modified. They have lower administrative costs compared to the tradable certification system and they have the chance to get into the European energy market without massive revolution of the national market. Enlarging the analysis to other European countries, it is possible to find three interesting case studies.[28] They prove the higher efficiency of the FIT, highlighting pros and cons of their implementation.

In Denmark, the results are almost astonishing; the country aims to cover the entire energy requirement with renewable sources by 2035, while European target is 32% within 2030. Nowadays, policies are changed, in favour of the construction of offshore plants, although in 2005 already 20% of the energy requirement was covered by renewable energy thanks to on-shore wind power. Thanks to a large political consensus in the 90s, a robust legal framework was created, enhancing favourable circumstances for the investments. At first, the incentives supported cooperatives, especially the ones formed by neighbours, with fiscal discounts and cost reduction for the plant. In 2004, municipalities were charged with finding places to build new renewable energy plants in their territory, many farmers accepted to build them inside their properties. It gave another important push to the amount of renewable energy produced.

[26] Haasa, R., et Al., (2011). A historical review of promotion strategies for electricity from renewable energy sources in EU countries. *Renewable and Sustainable Energy Reviews, 15*, 1003-103

[27] D.M. of 4 July 2019

[28] Haasa, R., et Al., (2011). A historical review of promotion strategies for electricity from renewable energy sources in EU countries. *Renewable and Sustainable Energy Reviews, 15*, 1003-1034.

In Germany, in 2000 everything changed after the "Renewable Energy Act". The law made a distinction based on the localization, plant typology and on the technology used. The best locations and technologies benefited from bigger incentives, with a progressive temporal diminishment that considered the learning curve of the producers, i.e. the increasing amount of competences acquired over time and consequently the growing production. The law allowed a 7% increase from 1997 to 2004. Unfortunately, the incentives have created regional inequalities between the northern part of the country, where there is the highest concentration of plants, and the southern part with less renewable energy production. Thanks to the Feed-In the Renewable energy facilities have become a solid investment, even small and medium entrepreneurs decide to create their own plant and, as energy producers, they free themselves from the big energy companies favouring a democratization of the energy market.

Spain presents the best results achieved through the utilisation of the FIT. The country reached important goals in renewable energy production, with modest government intervention and in a short time span. In 1998, the government predicted two possibilities, a fixed Feed-In and a Premium Feed-in, the producers could make the choice after the first year of production. The great success convinced the government to integrate the single producers in the energy market, with incentives to the direct sales on the market in an auction system. The high price of electricity led to the great success of the strategy, increasing the renewable energy production to 30TWh in 2006, with 80% of it related to wind power.

These three cases highlight many key points to think about, even if they are based on very different countries and situations. The FIT system is very effective to achieve renewable energy production increase in a short period, because they grant the total cover of the initial investment and encourage producers to improve their productions to achieve bigger revenues. It is clear as well, that the government intervention is necessary to start the energy transition.

### 3.3.1 Open questions for 2021

The main difference between the three cases and the Italian situation relies on the failure to create a clear and efficient legal framework to grant the renewable energy investments a period long enough to cover the initial capital. In the European countries the 90s policies propitiated a favourable situation for the investments triggering a progressive increase of renewable energy production. On the other hand in Italy, the CIP6 was a complete failure. Later, especially in Spain and Denmark, the governments recalibrated the support to renewable producers to rectify the inconveniences, i.e. the lack of integration of producers in Spain or the utilisation of agricultural land to increase production in Denmark. While in Italy, the switch between the tradable certificate system and FIT has further complicated the legislation and, therefore, reduced the investors' trust on the market. This situation is far from resolution, as observed in the disappointing results of the FER1.[29] A unitary legislative package could solve many of these problems. What better time than the presentation of the *Piano Nazionale di Ripresa e Resilienza* (PNRR) that ensures access to the Next Generation EU funds. One of the PNRR challenges is the green transition and the European objectives are clear and ambitious, i.e. zero emission within 2050 and 50% cut within 2030, Italy still has to make steps forward to achieve these results. The allocation of part of the funds to complete renewable energy and EC development could speed up the total abandonment of fossil fuels. Following the forecasts[30], the implementation of the two European directives could contribute with

[29] https://www.gse.it/servizi-per-te/fonti-rinnovabili/fer-elettriche/graduatorie
[30] Elemens (Energy Boutique Consulting). (2020). Il contributo delle Comunità Energetiche alla Decarbonizzazione. Legambiente.

17GW of electric energy in the national grid each year, favouring a complete decarbonisation of the heating systems for households and companies. Furthermore, the electrification of the mobility sector could benefit from this development as well, increasing the number of charging columns for electric vehicles and translate part of the mobility fossil fuel consumption to renewable electricity. Within 2030, the EC would avoid 47.1 million tons of CO2. Should not be underestimated the occupational benefits of EC, with 19.000 new employees between 2021-2030, related to a tax income equal to 1.1 billion of euro coming from IRES/IRAP payments from companies linked to construction and maintenance of the facilities and VAT on the energy production.[31]

### 3.3.2 Some recommendation to the policymaker

Following the clarification provided in 3.1 it is possible to state that the EC concept relies on three key concepts: the EC perimeter, the facilities used and the involved actors.
Nowadays, the maximum extension of the perimeter is limited to the secondary cabin, because of a restrictive interpretation of the RED II concept of physical proximity, therefore, it leads to the exclusion of farmers and enterprises connected to the medium tension. To loosen this constraint means to increase the number of shapes an EC could assume. Entire neighbourhoods or little municipalities could establish new EC. It could be useful to remember the Denmark case and the growing production triggered by farmers, or German entrepreneurs and their role in the energy democratization process. The EC perimeter should change based on the population needs, in order to include as many people as possible, considering also the morphologic and climate variability of Italy. The best solution is the one that can adapt to the peculiar characteristic of a region in order to favour a harmonic and integrated development in every part of the country.
The choice of the plant should follow the same model as before. The 200 KW constraint could be too strict in some cases or useless in others. The European legislation does not have any limits in this sense; consequently, it could be avoided or, better, linked to objective criteria, for instance the EC energy requirement or the localization of the plant, following the German example of the "Renewable Energy Act".
The creation of more inclusive EC requires the union of diverse subjects with different interests and necessities. The provision of new types of companies able to defend the interests of all of the subjects involved could be a solution, facilitating the relationship with energy distributors and suppliers. A solution is the Consumer Stock Ownership Plan (CSOP)[32], easy to introduce in the Italian framework. The CSOP, was born in the US in the 60s to bring together small farmers and share the business risk. Nowadays they could bring together the EC members to share the risk of the implementation of a renewable energy facility, joining capitals in order to gain access to a unique source of funding.
The role of the new legislation cannot stop at the EC definition but it should also clarify the context in which they operate. The policymaker must highlight their role in the energy market, granting access to the national grid through the definition of the responsible subjects of this important step. For instance, in the Italian market, consumers rely on the energy suppliers for the complete management of the service, while local distributors should only provide the proper functionality of the connection. As is widely reported in section 2, ECs have a different role compared to consumers; indeed, they need a different service. The competencies and rules definition become fundamental,

[31] Elemens (Energy Boutique Consulting). (2020). Il contributo delle Comunità Energetiche alla Decarbonizzazione. Legambiente.
[32] Lowitzsch, J. (2020). Consumer Stock Ownership Plans (CSOPs) - The prototype business model for renewable energy communities. *Energies*, 1-24.

especially considering the problems of the new EC in the last months. For instance, in the US, there are contracts called Power Purchase Agreements (PPA), from which the policymaker could start, and it has already started in the FER1.

The ultimate goal of the legislation should be the clear definition of the investment. In this sense, the introduction of the FIT system, with its ability to outline the revenues for a long period (10-15 years), reveals extremely important, allowing the EC to become economically independent. Furthermore, the government, through the FIT, could consider the technological development and the learning curve of the EC, reducing the incentive necessity and, therefore a public expense excess.

## CONCLUSION

Thanks to the decentralisation and localised production, consumption and exchange of renewable energy, the ECs are an important instrument to bring together citizens and community in the pursuit of energy efficiency, one of the pillars of the system transition. According to the paper, the ECs can increase the renewable energy production together with the contribution to the decarbonisation of the heating and mobility sectors, favouring the development of sustainable cities and the pursuit of the Sustainable Development Goal number 11.

The energy transition requires attention not only to environmental issues, but to social as well. Indeed, the ECs represent a useful instrument to realize a social transition. If the progress made in the last years related to the Sustainable Development Goal number 7 was not sufficient, the diffusion of ECs would make the 2030 objectives more feasible, taking into account the positive effects of EC to "grant everybody access to affordable, reliable and sustainable energy system". However, the different organisational structures and the active roles of the members inside an EC are crucial to reach an increasing social acceptance of the renewable resources and facilities. Furthermore, in the European Union context, the ECs represent a concrete help to the 80 million of citizens in serious difficulties, who cannot buy the essential energy services, a fundamental element of our society.

AWARE believes that the introduction of a unitary legislative package which disciplines exhaustively the renewable energy and EC issues is what is missing to introduce a solid base to reach the previous objective. Unfortunately, the past interventions were incomplete and, therefore insufficient to sustain the sector, which only in the last period has shown its significance. Considering the European directives IEM and RED II, their implementation should focus on the clear definition of the three key points that constitutes the EC's essence: the perimeter, the typology of the plants and the subjects that may participate. The policymaker, given the EC importance and their centrality into the sustainable energy transition, should favour the inclusivity of the organisation to allow the greatest possible number of people to join the EC. Moreover, they should consider the morphological, climate and social differences of each region in order to grant flexibility to the organisation and to optimise the overall results. Finally, the legislation must highlight the EC's productive roles and enable their economic feasibility in the long term. The analysis brings out the urgency of these measures, highlighting the potential of the Energy Community, hoping to bravely face the sustainable energy transition and successfully achieve it.

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