

Italian and Albanian energy market: two countries compared. The new REC model in energy transition.

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Abstract

The transition to renewable energy is mandatory if we want to reduce the effects of climate change in the world. The transition from an energy mix centered on fossil fuels to one with zero carbon emissions is the founding principle of the energy transition. Among the potential emerging markets for renewables in Europe, Albania represents a good choice. Today the Albanian territory depends greatly on hydroelectricity and fossil fuels. The potential of wind and photovoltaic energy should be exploited. In this sense, Italy can contribute to decarbonisation and the growth of renewable energy beyond the Adriatic, offering its expertise in the field of regulation, and this would represent a valid opportunity for Italian energy companies in Albania. Attention is focused on the topic of “energy communities”, discussing their benefits and advantages in the production and consumption system of the Italian energy supply chain. Analysis tools are suggested for Italian companies interested in investing in Albania, starting from the recent submarine power line built by Terna between Italy and Montenegro. The infrastructure represents the first “electric bridge” between Europe and the Balkans, thus creating the first interconnection between the Old Continent and the Balkan area.

Keywords: Sustainability, Renewable Energy Communities, Energy transition, Environment, Climate Change.

1. INTRODUCTION

The data on pollution levels that affect the health of our planet confirm a dramatic global picture. Climate change and environmental degradation are a huge threat to Europe and the world, and there are many triggering factors (Mendizabal et al, 2018). The Italian Government has currently confirmed among its main objectives the task of supporting the “green economy” with the aim of “decarbonizing” Italy, promoting the circular economy through actions aimed at increasing energy efficiency in all sectors and production from renewable sources, and providing national planning that strengthens measures for energy saving and efficiency (Apeneste, 2022). In this sense, over the last year the sector has seen the Government approve support for the production of energy from offshore wind sources by introducing incentive tariffs with established objectives. To overcome these challenges, the European “Green Deal” will transform the EU into a modern, resource-efficient and competitive economy, ensuring that no more greenhouse gas emissions are generated in 2050 (Tagliapietra, 2019), and furthermore economic growth is dissociated from the use of resources. Among the 17 sustainability objectives contained in the “Agenda 2030”, imposed by the UN countries, we also find the commitment (Goal n.13) to “undertake urgent actions to combat climate change and its impacts” (United Nations, 2015). To meet the present and future demand for energy, without producing pollution, we need to move from an economy based on fossil fuels to one based on renewable energy sources with zero carbon emissions (Tucci et al, 2023). It is a decisive moment for the global response to emergencies that threaten the climate and biodiversity of our planet and ours is the last generation that can intervene in time. Only with immediate actions to reduce greenhouse gas emissions and lower temperatures will it be possible to combat the climate catastrophe. Investing in renewable energy infrastructure can reduce greenhouse gas emissions and promote energy diversity and resilience (Liu et al, 2022), in the knowledge that global emissions of pollutants have reached the threshold of 421 ppm of carbon - the 50 percent more than in the pre-industrial period (Tucci et al, 2023).

The European Community, a priority of the Climate Agenda and of European energy policy and of the Member States, requires us to move from an energy system that uses fossil fuel to one in which the use of renewable sources is exclusively and absolutely preferred (De Vidovich et al, 2023). This step is commonly defined in the European countries as the mechanism of the energy transition. There is unanimity on the final objective of the energy transition but there are different points of view and ways to achieve it (Crali, Federico, 2020). This decade is crucial if we are to meet the commitments made under the Paris Agreement, in the interests of everyone’s health, well-being and prosperity. The objectives imposed by the European Community require member states to make the European economy sustainable by 2030 and to be the first continent in the world with zero emissions by 2050, therefore a condition of climate neutrality. The understanding of the need for a decisive acceleration of emission reduction policies has led to the definition of relatively ambitious short-term objectives (such as the European cut of 55% by 2030 compared to 1990) and very ambitious in the long term, 110 countries aim to carbon neutrality between 2050 and 2070 (Silvestrini, 2023). Climate neutrality

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represents the point at which greenhouse gas emissions do not exceed the earth's ability to absorb them. To achieve climate neutrality, we must measure our emissions and reduce them accordingly. Despite the possible efforts undertaken, it is not possible to avoid any type of emissions resulting from daily activities or industrial processes. There is growing interest around the world in implementing policies that are more effective in promoting environmental sustainability and mitigating pollution. In the electricity sector, in pursuing the objective of decarbonisation, Italy has followed the path of the energy exchange policy with the Balkans, thanks to which it is possible to import energy produced from renewable sources in Italy. The following paragraph contains a description of the Italian and Albanian energy markets, highlighting the advantages and benefits of the two markets. The connection structures between Italy and the Balkans that allow the exchange of clean energy are also described. Seizing the opportunities offered by new technologies, citizens around the world are already coming together to regain relevance in the energy sector, through direct and participatory actions that aim to build a more equitable and sustainable society. This trend is growing. Another good practice in addition to the two Italy-Balkan bridges is represented by the establishment of the renewable energy communities described below. With a view to reducing carbon emissions in the electricity sector by 2050, it is estimated that 264 million European Union citizens will join the energy market as prosumers, generating up to 45% of the country's total renewable electricity. system. Those citizens who instead limit themselves to energy consumption alone will position themselves in the chain as simple "consumers". A new scenario is thus envisaged that enhances what are today defined as "Renewable Energy Communities" (Aura, 2022). They are dynamics in which the inhabitants of a community participate, interpret, co-plan, are involved in the identification of local resources and take on an active role as protagonists in the definition and management of the transition process of their territories towards a perspective of self-sustainability (Bolognesi, Magnaghi, 2020). In fact, the contribution that these realities will be able to make to the decarbonisation process is fundamental (Eroe, 2023). Strengthening self-consumption brings benefits for the network; guarantees economic returns for the territory with a view to reducing emissions and consumption, money spent but also the elimination of forms of energy poverty, allowing citizens belonging to the community to participate in the economic benefits of the system. Using renewable energy-based energy production systems creates a cleaner and more sustainable energy system that mitigates climate change and promotes a healthier environment for current and future generations (Liu et al, 2020).

For the energy management of the future, flexibility will be needed. In particular, in recent months the ecological transition and the energy transition have been discussed (Aura, 2022; Poliseno, 2023); these are two topics of great participation in every sector, and in particular they are debated with great involvement on political, academic and corporate tables. The situation facing the energy market is worrying, as we are still behind what is required by the European Community in terms of decarbonisation, and the transition from fossil fuels to renewables is certainly not a given, nor can it be easily implemented. This article discusses the difference between the Italian and Albanian energy markets, highlighting the mechanism of "energy communities" as an innovative example of the development of a better and advantageous system for the user, the environment and for companies working in the supply chain. of the same market. Operating in the energy production sector using renewable resources means doing good for the environment, promoting energy diversification and sustainability. Two connecting bridges for energy exchange between Italy and the Balkans are described. Considering the total costs, a new renewable energy generation structure is often more competitive in terms of costs than a conventional energy structure: this is why it is always better to focus on renewables

2. THE ITALIAN AND ALBANIAN ENERGY MARKET

The Balkan region has a strategic importance for Italy from an economic, geo-political and security perspective, aspects that are extremely connected to each other. The strategic position of proximity to the European Union markets, the Balkan area and the strong economic integration, in addition to the geographical proximity, make Italy and Albania perfect economic partners. The interconnection between Italy and the Balkans presents itself as a basket of opportunities for Italian companies, offering a framework of promising opportunities especially in the technology sectors, such as infrastructure, digitalisation and start-ups, renewable energy, green transition, and agriculture. tech. Particularly when it comes to energy markets. This condition represents a strong point for the development of bilateral economic and trade relations. Reading the data from INSTAT (National Institute of Statistics) of Albania in the period between January and November 2022, Italy confirmed itself as Albania's first commercial partner, with 29.5% of the total Albanian trade with rest of the world, for a total amount of over 3.2 billion euros. Italy is Albania's main supplier country, accounting for approximately a quarter of imports into Albania (22%). In Italy but also in Albania, the energy crisis remains a risk factor to be monitored. There are many and varied questions pending. If we look at structural issues, for example, we realize that investments in renewable energy are too slow, while in recent years the capital for investments in fossil fuels has been reduced, especially as regards oil extraction. Imbalances arise between supply and demand in the short term. If it continues to be cold for a long time, these imbalances could persist even in the medium

term. The energy transition proves complex and difficult to implement in a short time. The demand for fossil energy, especially for natural gas that is less “dirty” than coal and oil, may grow, especially in countries other than those of the European circuit, such as those in Asia. Unfortunately, the transition towards more sustainable energy production cannot be resolved in the simple and sudden abandonment of fossil fuels, as in the mechanism of the energy transition the process must include a progressive, gradual elimination. According to Ponomarenko, et al, (2021) there is a need to develop new oil and gas fields as production in existing facilities is expected to decline. To manage this process we would need to find a way to guarantee system stability, resilience and efficiency of networks. In particular, trade between Italy and Albania based on the exchange of energy guarantees adequate levels of maintenance of the country system. Reading the data from Infomercatiesteri of the Economic Observatory of the Italian government, it appears that of the 2,675 companies with Italian and mixed capital active in Albania, 1,911 are those with entirely Italian capital and of these a good part of the medium-large sized companies established themselves in energy sector. This represented the most successful field for high-level Italian penetration into Albanian territory. There are various reasons and strengths (Table 1) that push Italian companies to push and invest in the Albanian territory. In 2022, Italy is Albania’s first commercial partner and first in terms of number of foreign companies.

Table 1: Strengths of the Albanian territory for businesses. Source: own elaboration

Strengths	Advantages
Strategic position in the center of the Mediterranean and proximity to the markets of the Balkan countries	<ul style="list-style-type: none"> • Cultural affinities • Ports of Durres and Vlora • Widespread Italian language
Low cost-of-life	<ul style="list-style-type: none"> • Good availability of qualified manpower
Good stability of the Albanian economy and compatibility with the Italian production system.	<ul style="list-style-type: none"> • Open functional market economy • Development of networks between political and economic institutions • Attraction of considerable external capital • Promotion and development of investments that promote internal growth.
Spread of the Italian language among the local population	<ul style="list-style-type: none"> • The Italian language, culture and lifestyle represent a strong added value for the territory and for national investors.
Favorable general taxation	<ul style="list-style-type: none"> • Simplification of procedures related to the start-up of economic and productive activities.

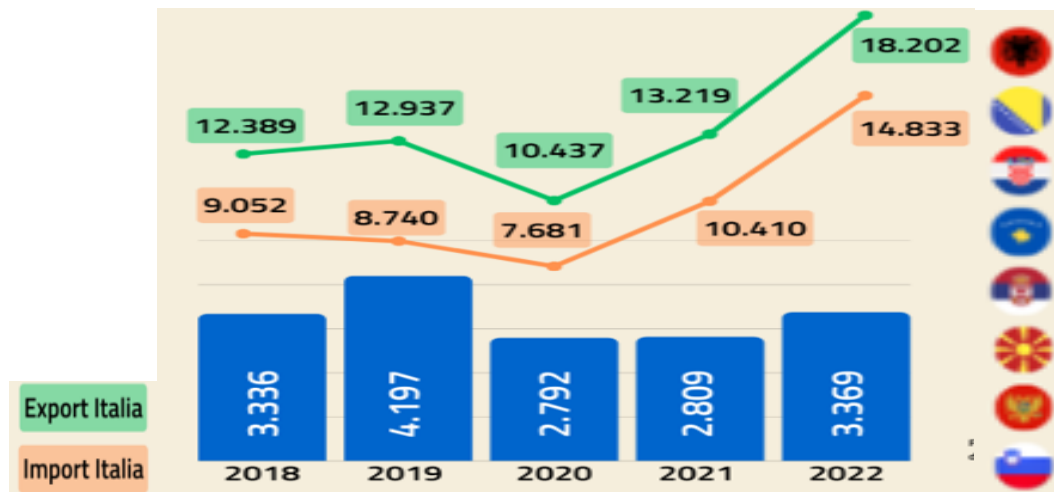
2.1 Albanian energy market

Analyzing the Albanian energy market and observing the market data, a fairly comforting picture emerges. Albania is the most eco-sustainable nation in Europe, at least as regards electricity production. The data on electricity production relating to the country of Tirana are remarkable despite the fact that it is often associated with problems such as poverty and corruption. Almost all of Albania’s energy production (95%) comes from state-owned hydroelectric plants. The Albanian energy market showed a positive trend until 2022: based on data from the Albanian Statistics Institute, in the second quarter of 2020 the gross export of electricity recorded an increase of 57.9%. If we look at the production data in the same period, we note that public hydroelectric plants recorded an increase in production of 18.2%, despite the fact that independent production from licensed energy producers is decreasing. Among the positive factors benefiting the country is first of all the promising potential in terms of wind and solar. There are many objectives that are urgent for the Albanian government: a) an increase in the use of renewable resources, b) better energy efficiency, c) the progressive reduction of CO2 emissions. The fact that the entire energy production system is based on hydroelectric power plants brings with it a risk, even a foreseeable one: that of exaggerating; plants were authorized without considering the environmental impacts deriving from the construction of these works. Furthermore, renewable sources linked to meteorological conditions (from hydroelectric to wind) have an intrinsic flaw linked to the unpredictability of atmospheric events and the possible appearance of extreme phenomena which risk dragging the entire production system into the abyss.

If we observe the energy exchange relationship between Albania and Italy, the January 2023 data from the Albanian Institute of Statistics (Instat) tell us that Italy has absorbed 55 percent of Albania’s exports, a period in which the estimated value of the goods shipped from Tirana stood at over 139 million euros. Specifically, the main products exported to Italy in the period considered were shoes and textile products. This is followed by products from the group “building materials and metals” and “machinery, equipment and spare parts”. In the

same period, exports of minerals, fuels and energy decreased tenfold, from over 17 million euros recorded in January 2022 to 1.9 million in January 2023.

Table 2: Italy-Balkan trade. (Albania, Bosnia Herzegovina, Croatia, Kosovo, Serbia, North Macedonia, Montenegro, Slovenia). Source: Export.gov



To implement actions and policies to combat climate change, the European Commission launched the Economic and Investment Plan for the Western Balkans in 2020. The Economic and Investment Plan for the Western Balkans aims to stimulate the region’s long-term recovery. In particular, it intends to promote a green and digital transition, developing regional economic cooperation, stimulating economic growth and supporting the reforms necessary to converge on the EU path. Many resources have been foreseen and allocated for the implementation of these objectives; specifically, it involves 9 billion euros of financing for the entire region in various sectors, including energy connectivity, green and digital transformation.

Also important in Albania is the Electricity Law, which regulates relations between private operators and the Electroenergy Corporation (KESH), of April 2015, which has the aim of guaranteeing the effective and competitive functioning of the sector, through the plans of the Transmission System Operator (OST) and Distribution System Operator (OSHEE). These two plans provide for the updating and expansion of the transmission and distribution network to guarantee all users (families, businesses, intermediaries) a continuous, safe and quality service (infomercatiesteri, 2023).

Of great novelty and relevance to guarantee the economic, environmental and social sustainability of the country is the 2018-2030 national strategy (Resolution no. 480 of 07.31.2018). Specifically, the strategy aims to guarantee a sustainable electro-energy system. This objective can be achieved by using the concession mechanism for the production and exploitation of electricity; for example, sources can be diversified by relying on renewables; losses on the distribution network can be reduced and smart meters installed. Finally, thanks to the national strategy, the national system can be integrated into the regional and European systems. The Ministry of Energy and Industry, given the strong gap in this area, is attempting to align national legislation on the efficiency and energy performance of buildings, favoring a more attentive approach to environmental sustainability, with the aim of also creating new jobs, thanks also to the support of technologies. In fact, today the transformations in the energy system, together with technological changes, have revealed the existence of an “organizational field” (Powell, DiMaggio, 1991) in which new business models can be developed, where technical innovations and social change they feed each other (Carrosio, Scoli, 2019). Since there are many structural deficiencies from the point of view of technologies and materials, Italian companies could find fertile ground, and therefore seize the opportunity.

Currently, Albania, with a population of around 2.8 million, depends entirely on hydroelectric plants for its electricity supply. In fact, it has good hydroelectric potential. A large part of the electricity is produced in Albania by hydroelectric plants, with a minimal contribution from thermoelectric power, while the exploitation of renewable resources is only in its infancy. This is clean energy which, however, in addition to having a strong impact on the environment, is greatly affected by climate change and rainfall variability. Of the total electricity production, two thirds are provided by publicly owned hydroelectric plants and the remaining third by independent concessionaires. In the hydroelectric sector, there are 178 active concession contracts throughout the national territory, of which 101 in production, 20 in the construction phase of hydroelectric power plants and

57 in the preliminary phase (National Agency of Natural Resources). Due to this, Tirana was forced to import the electricity it needed from neighboring countries. However, as the city is the main oil producer in the Balkans (872 thousand tons in 2016), it increased the percentage of renewable energy to 38% of total electricity production in 2020. Therefore, in an attempt to promote traditional zero-emission alternative sources, Tirana has given greater impetus and attention to the production of energy generated by wind and sun, which create clean electricity, hoping to be able to cover at least 30% of its needs thanks to systems that exploit these sources. In fact, 88.5% of the total energy sources in Albania are made up of electricity, almost exclusively of hydroelectric origin. Other renewable energy sources (photovoltaic, wind, thermodynamic) have recorded growth margins. This means that Albania has made significant progress in the renewable energy and gas sectors, as well as on interconnection lines.

In order to achieve these objectives and achieve a valid energy transition in compliance with the European “Green deal”, the government itself is showing itself to be very sensitive to this issue and among its strategies, in order of priority, there is the promotion and development of a economic system based on a balanced and sustainable use of resources;

To increase the use of renewable energy in the energy market in Albania, the government works through incentives for promoting the production of electricity from renewable sources (solar panels, wind, plants, etc.) and increasing the consumption of natural gas. There are numerous projects of a transnational nature which affect all the countries in the area and in which the theme of regional connectivity plays a central role, with the infrastructural development projects connected to it - in particular in the railway sector - and that of the energy transition and ecological. Among the objectives that the Albanian government could achieve in the coming years, taking advantage of the Faro initiatives, i.e. all those initiatives that the EC adopts to support member states in achieving the Europe 2020 objectives on climate change, the efficient use of resources and energy, health and demographic change, we find:

- support for greater use of renewable energy sources;
- the completion of the restoration of the Fierza hydroelectric power plant;
- the construction of the Skavica hydroelectric power plant, in order to increase the potential for the country and the consequent increase in the export of electricity from clean energy.

These initiatives offer good investment prospects for local companies, which deal with renewable energy and operate by installing systems for the generation of wind energy or photovoltaic systems. Among the various initiatives, the WBIF Plan specifically provides for substantial economic financing for the period 2021-2027. This financing is structured into financeable interventions of approximately 30 billion euros structured in loans, donations and guarantees for projects grouped into ten flagship initiatives, identified in consultation with local governments. Initiatives targeting important sectors such as transport and energy will favor the ecological and digital transition, promoting intra-regional economic integration initiatives and with the EU, as well as private sector involvement (export.gov 2023).

In fact, at present the conditions for investing in Albania continue to be better than in other countries in the European area, despite the crisis and the effects of a contraction of the GDP of 10.2% compared to the second quarter of 2019, caused by the COVID-19; in September 2020, exports grew by 1.2% compared to 2019. Among the most promising Albanian sectors, in compliance with the country’s accession process to the EU, in which Italian companies can seize valid and profitable investment opportunities, we find that of renewable energy and the environment. These together with other priority sectors have been identified by the Economic and Investment Plan for the Western Balkans. Currently, especially in the form of a cooperative society, many companies support, supporting businesses in the internationalization processes in Albania, perhaps by aggregating them in the form of business networks.

In addition to significant financing to the Albanian region, the EU will also provide direct contributions to reduce the cost of financing for both public and private investments and to reduce risk for investors through the new Western Balkans Guarantee Facility, which has the potential to mobilize up to 20 billion euros of investments over the next decade. Therefore, the need to start a transition towards more sustainable methods of electricity production, increasing investments in renewable energy, is also necessary for these countries.

2.2 Italian energy market

In Italy, following a series of liberalizations that began in 1999 with the famous “Bersani Decree” (Legislative Decree 16 March 1999, n. 79), any operator can be able to produce electricity and resell it. In previous years it was not possible because there was no legislation on the matter and Enel had the monopoly. The Utilities, in fact, found themselves operating in a context of recovery of economic activities which led to the increase in energy consumption at a global level and consequently the unstoppable growth in the prices of both electricity and gas. Liberalizations, company mergers, loss of monopolistic positions, the need to compete with complex and flexible offers: the energy and public utilities market has undergone profound changes in recent years and is subjected to increasingly strong competitive pressure. Thus was born the electricity market and the development of the wholesale and retail electricity markets. A real liberalization of the electricity sector is

therefore taking place. Things changed considerably after the approval of the Decree, both from the point of view of the producer and the seller, and for the consumer, who from that moment on found himself able to choose which manager to rely on, taking advantage of the law of the free market. The Italian electricity market is managed by the Gestore dei Mercati Energetici (GME), a company controlled by the GSE, on the basis of a specific regulation that establishes the rules for the functioning of the market and the participation of operators. This regulation and the related updates are prepared by GME and approved by the Ministry of Economic Development after consulting the Authority for Electricity, Gas and the Water System. The Italian electricity market is divided, on a temporal basis, into the "Spot market" (MPE) and the "Forward market" (MTE). One of the most innovative forms that are developing every day as energy generation and consumption models, and in the future could play an increasingly greater role in accelerating the energy transition process, is represented by Energy Communities from renewable sources and self-consumption collective. These are real experiments in the decentralization of energy production, in which individuals, companies and institutions collaborate for a future of reduced and optimized consumption (and emissions), thanks to the development and installation of technologies that not only guarantee energy autonomy local, but contribute to the energy transition. (10)

3. RENEWABLE ENERGY COMMUNITIES

3.1 The scenery

The transition from fossil to renewable, a key point in the fight against climate change, represents a paradigm shift, since the level of emissions has become crucial, and has reached an unsustainable level for future generations. Promoting the energy transition is not always easy, especially after the problems caused by the Russian-Ukrainian conflict which has put Europe in check, making it vulnerable in terms of energy supplies. "The government is heading directly towards the total elimination of dependence on Russian gas and oil; however this could lead to a slowdown in the decarbonisation process, confirmed by a passage of the new RePowerEU package which, in addition to providing a strong push for energy efficiency and renewable sources (and this is good news), opens up the possibility of financing with Next Generation Eu funds (read Pnrr, for Italy) regasifiers and infrastructure for gas and oil" (FM Butera, 2022). To prevent dependence on foreign countries for high levels of energy imports from forcing European countries into slavery, Europe has developed programs to facilitate the creation of energy communities. From a completely programmable energy generation model, we are moving towards a scenario in which the intrinsic characteristic is non-programmability. What comes to our aid is the flexibility of the system. A path, therefore, which poses technical and infrastructure challenges, also because we cannot afford to destabilize the networks, nor cause blackouts or service interruptions. Thus, energy communities are born, a new systemic paradigm, innovative in the realization of the energy transition which involves economic, social, technical and political aspects. There are many examples of energy communities present in the world and in Italy. In many of these cases, what we are witnessing is a transition from a traditional economic model, based on the provision of services, to a more open and shared one. REC and self-consumption groups, in fact, open the doors to what is called the collaborative economy, or sharing economy. In several European countries, energy communities are a promising and developing reality for some time, as demonstrated also by the numerous initiatives supported within the various European Commission funding programs. Energy communities or Energy Communities are groups of self-consumers of renewable sources who come together to produce clean electricity, share it and consume it directly on site, representing an innovative form of production, distribution and consumption of energy therefore produced from renewable energy sources. Their role becomes central for the realization of an energy transition that is based on the principles of efficiency and equity and greater diffusion and support of this organizational innovation which is undoubtedly necessary.

3.2 The role of energy communities in the transition: legislation and definition

The use of energy from renewable sources constitutes a tool of central importance for reducing greenhouse gas emissions, as well as for respecting the related commitments undertaken within the framework of the Paris Agreement, has led the European Union towards a decisive position on the energy market report, potentially capable of overturning the current structure of the modern energy industry, still largely irremediably and stubbornly linked to the supply of fossil fuels (Giarmanà E., 2020). The framework of community regulations approved between 2018 and 2019 as part of the Clean Energy Package has paved the way and designed an innovative model that is distinct from traditional companies in the energy sector. «Renewable energy communities currently occupy a secondary role in the European energy system, but are increasingly considered a fundamental tool for involving citizens and facilitating the energy transition» (Rossetto N., 2021). Many in the literature discuss this new model (Holstenkamp and Kahla, 2016, Bilardo et al., 2020; Rahmani et al., 2020; Tricarico, 2021). One of the most innovative forms that is developing every day as a model of energy generation and consumption, and which in the future could play an increasingly greater role in accelerating the energy transition and decarbonization process, is represented by energy communities from renewable sources (Rec) and collective self-consumption. «Energy communities are becoming a key theme in the decarbonization

process as they can simultaneously guarantee economic, environmental and social benefits» (Casalicchio V., Manzolini G., Prina MG, Moser D., 2022). These are real experiments in the decentralization of energy production, in which individuals, companies and institutions collaborate for a future of reduced and optimized consumption (and emissions), thanks to the development and installation of technologies that not only guarantee energy autonomy local, but contribute to the energy transition. By collective self-consumption we mean a group of citizens or inhabitants of the same condominium who consume, store and produce renewable energy, thus saving on the bill. According to data from the GSE (Energy Services Manager), “the more energy you self-consume, the more the costs of the variable components of the bill are reduced” (energy quota, network charges and related taxes such as excise duties and VAT). Energy communities, as representatives of this new model of energy production in an organised, participatory and optimized manner based on local needs, also play a key and very decisive role in the decarbonisation process. Following a first transitional phase at the end of 2019, the community regulations regarding them were fully implemented into our legal system, namely in December 2021. “Recently in Italy several regulatory actions have been launched which define the implementation of the community’s renewable energy. Beyond the regulatory aspects of the legislation, the definition of economic incentives has opened up the possibility for the evaluation of the business models of the Renewable Energy Community initiative” (Cielo A., Margiaria P., Lazzeroni P., Mariuzzo I., Repetto M., 2021). Called “smart community” or “digital energy community”, they are the heart of innovation in the energy sector, as well as the physiological evolution for a country like Italy, which has proven proactive in energy development with zero CO2 emissions. Energy communities can be created by both public bodies and citizens, with significant social and economic advantages by promoting national independence from an energy point of view, an issue much discussed in recent months, put to the test by geopolitical instability and tensions between Russia and Ukraine which made things worse. According to Arera data (February 2022), «Italy produces 60 percent of electricity using gas, half of which comes from Russia. We must increase energy independence from fossil fuel imports: it is a question of national security, but also environmental. Electricity produced with gas will have to increase from 60 to 30 percent by 2030 to reduce CO2 emissions. The diffusion of Renewable Energy Sources (RES) can, in fact, change the paradigm of energy dependence. The issue of energy supplies and independence from Russia has become central in the agendas of the Italian and European authorities and every front must be opened or strengthened or renewed, depending on the case, in the shortest possible time to deal with the energy crisis on which it weighs the Ukraine-Russia war. Energy communities are essential levers for promoting the energy transition, understanding it as the construction of a new model of social organization based on the production and consumption of energy from renewable sources. They represent a new and urgent model that requires cultural, material and immaterial changes that ensure energy saving and consumption efficiency. The activation of these new forms of collective action and collaborative economies (in which production and consumption give rise to new exchange systems), combined with the opportunities offered by new digital technologies, constitute the cornerstones of the energy transition and the digital transition, as well as representing an opportunity for the creation of new green economy models (GECO Project). In addition to guaranteeing greater energy autonomy than now, they would allow the creation of many jobs in the energy sector. Unfortunately, both due to issues related to the delay caused by excessive bureaucratic slowness, and due to immaturity on the part of governments on issues of environmental protection and safeguard, today energy communities in Italy represent “white flies”, a real market niche. However, despite these issues, the theoretical potential of this new model of production and consumption is encouraging and promising; furthermore, renewable energy communities can represent an opportunity for economic and technological rebirth and improvement of social cohesion in historic villages and more isolated locations in the near future, in line with the spirit of community legislation. A “0 km sustainable energy production” could well be combined with historic villages that want to energize the local economy and have already focused on promoting local production in other sectors (crafts, agri-food). Each user could derive different benefits also in terms of savings; the savings would be linked first of all to the energy independence that would be acquired. Being able to independently manage how much energy to make available and how much to produce, without going through third parties is a significant advantage. The gain that the environment would have from using renewable and non-fossil energy must then be taken into consideration. Even the large contribution that it could make to the achievement of decarbonisation objectives, through the consumption of renewable energy by 2030, becomes a reason for their development. The role of energy communities could also be particularly important in a not unlikely scenario in which investments in large-scale plants face strong local opposition. It is necessary to change the paradigm by moving from fossil to renewable. From a completely programmable energy generation model, we are moving towards a scenario in which the intrinsic characteristic is non-programmability. The system therefore needs flexibility. This new concept is therefore born which changes and revolutionizes the entire structure of the energy market. Demand Response (DR) plays a key role in this new energy concept, promoting the circular economy and transition. «The Demand Response service allows commercial and industrial customers to reduce or increase their energy consumption with the aim of responding to peaks in demand or supply in the electricity market, enabling greater network flexibility and

stability and more efficient use infrastructure and energy resources. In exchange for this availability, the customer receives remuneration. Additionally, DR is a technique that microgrid operators use to balance sudden spikes or drops in consumers' energy consumption. «In the context of the transition towards cleaner and more sustainable energy production, microgrids have become an effective way to address the problems of environmental pollution and energy crisis» (Li Y., Li K., Yang Z., Yu Y., Xue R., Yang M., 2022).

Based on the European vision, communities can be distinguished (figure 1) between Citizens' Energy Community (CEC) and Renewable Energy Community (REC) as expressions of collective self-consumption and energy communities based on renewable sources (figure 1):

- Citizens' Energy Community (CEC): manages exclusively electricity produced from renewable and non-renewable sources; it does not provide for the principles of autonomy or geographical limitation for production and consumption.
- Renewable Energy Community (REC): manages energy in various forms - electricity, heat, gas - but necessarily from renewable sources; members enjoy the principle of autonomy and consumption must take place near the generation plants; can be considered a subset of CECs.

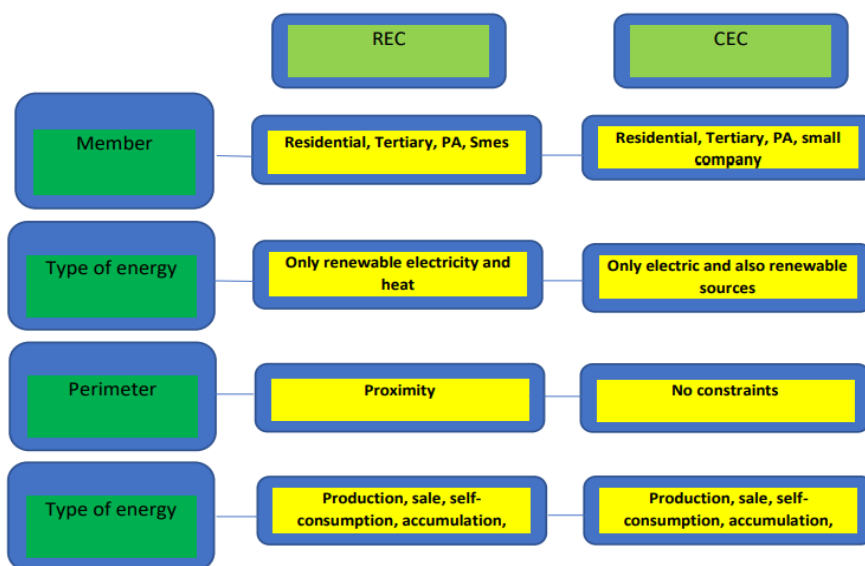


Figure 1: Cec and Rec comparison. Source: our own processing

To give a definition on the basis of European regulations, the energy community is a new legal entity, based on the voluntary participation of companies, individuals or municipal administrations, which aims to create environmental, economic or social benefits at community level through the production of collective energy – which in the case of renewable energy communities must come from renewable sources. The regulatory framework on energy communities, at community level, starts with the Clean Energy Package (CEP) approved in November 2016, which talks about the energy community as a new player in the energy sector. In fact, the true role of energy communities was established with two subsequent European Directives:

1. RED II or the Renewable Energy Directive 2018/2001, published in December 2018, which introduced the concept of “Renewable Energy Community” or REC, Renewable Energy Community;
2. the IEM or the Directive on common standards for the internal electricity market 2019/944, published in June 2019, which introduces the definition of CEC - Citizen Energy Community or energy community of citizens.

To create an energy community, no particular technological investments are needed or those compatible with collective self-consumption. Investments may concern the installation of new energy production systems (such as photovoltaic systems), energy storage, electric vehicle charging systems or other hardware and software devices. In fact, one of the key elements for the management and control of any aggregation model of this type could be the use of energy management and consumption monitoring software. Thanks to digitalisation and tools of the digital world we can achieve the active participation of citizens in the production, exchange and consumption of energy. In fact, IoT systems connect to nodes, peer to peer. This marks the transition from a centralized physical network, with one-to-many transmissions (the electricity provider that supplies energy to homes), to a decentralized digital network, with one-to-one and many-to-many connections. This network is intelligent to the extent that it incorporates, in addition to the necessary measurement sensors, the complex algorithms of artificial intelligence, allowing the active participation of even the individual citizen.

The challenge is precisely to give citizens the opportunity to become recognized figures in the market, as consumers and producers, to integrate within the distribution network alongside companies in the energy sector. Local businesses and commercial activities should also participate in self-consumption and sharing of energy, with a view to collaboration with the local community; on the other hand, suppliers and large companies in the sector are excluded, so as to guarantee the non-profit nature of the established group, and in which the members participate in an open and voluntary manner without profit, other than the achievement of environmental, economic and social benefits for those who make it part.

Through the Smart Grid, every user can become part of an energy community (figure 2 and figure 3): whoever owns a photovoltaic system connected to the network (and is therefore a prosumer) can share his excess energy with other consumers. Anyone can be part of these communities by sharing clean energy, reducing energy waste, bills and their carbon footprint.

We can cite some of the most representative examples of energy communities in Italy such as: GECO (Green Energy Community) neighborhood energy community in the southern area of Bologna, Energy City Hall Energy Community in the municipality of Magliano Alpi, Pinerolese community in the Province of Turin, Society Elettrica Cooperativa dell'Alto Ma (SECAB) is the first company in Friuli, PAN (Puglia Active Network), Energia Agricola a km 0 the agricultural energy community of Veneto.

To be able to become part of an energy community and take on the characteristics of a prosumer, it will be necessary to equip yourself with a photovoltaic system with storage, both for condominiums and for individual homes, or on the contrary you can choose to be simple consumers.

The term prosumer is borrowed from English, and is used to refer to the user who is not limited to the passive role of consumer (consumer), but actively participates in the different phases of the production process (producer). In practice, the prosumer is someone who owns his own energy production plant, of which he consumes part. The remaining amount of energy can be fed into the grid, exchanged with consumers physically close to the prosumer or even accumulated in a special system and therefore returned to the consumption units at the most appropriate time. Therefore, the prosumer is an active protagonist in the management of energy flows, and can enjoy not only relative autonomy but also economic benefits.

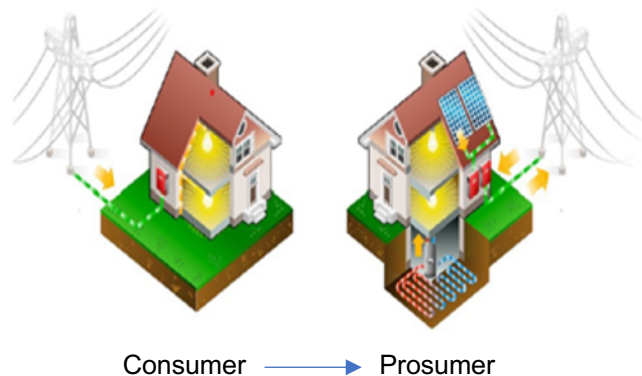


Figure 2: Prosumer vs Consumer Source: The Energy Communities in Italy. A guide to orient citizens in the new energy market.



Figure 3: Example of renewable Energy Communities. Source: The Energy Communities in Italy. A guide to orient citizens in the new energy market

Energy Communities become a driving force for stimulating the production and consumption of renewable energy; consolidated examples are already present in other European countries such as the United Kingdom, Spain, Greece, France and Germany. The relevant provision to energy communities that the participating entities expect to produce energy for their own consumption with systems powered by renewable sources with a total power of no more than 200 kW. To share the energy produced, users can use existing distribution networks and use forms of virtual self-consumption. The constant development of renewable electricity generation, especially photovoltaic, wind and biomass, is the premise for the creation of local energy systems for the production and consumption of electricity.

As illustrated in Table 3, there are many benefits that can be obtained from the creation of an energy community. In its original conception, the formation of renewable energy communities had the objective of leading to greater efficiency, which had to arise from innovative forms of use and sharing of renewable energy. However, in both European and Italian legislation, it is well outlined that these new models must not aim for profit, speculating on the installation of a photovoltaic system, or to earn on energy production. Their existence has more significant purposes and effects. In the milleproroghe decree, law decree 30 December 2019, n. 162 clarifies its main objective better: "The purpose of the association is to provide environmental, economic or social benefits at community level to its shareholders or members or to the local areas in which the community operates, rather than financial profits". From this definition it is understood that economic, social and environmental advantages can arise from the establishment of a Rec.

Table 3: Advantages of Rec. Source: own elaboration

Economic advantages	<ul style="list-style-type: none"> • Savings on your bill. • Energy independence. • Energy valorisation. • Tax breaks.
Social benefits	<ul style="list-style-type: none"> • Interaction between networks of individuals. • Help for vulnerable people. • Reduction of energy poverty. • Impact on the territory with positive repercussions on the quality of life in a certain area and on the levels of energy independence of a territory. • Creation of new jobs. • Development of energy culture among citizens and PA. • Stability of the electrical system. • Reduction of network losses.
Environmental benefits	<ul style="list-style-type: none"> • Clean energy production. • Use of renewable source. • Reduction of CO2 emissions into the environment.

The benefits obtained from the creation of an energy community, such as the ability to reduce energy costs and share it with an increasingly large number of people, together with the gains in economic terms, can be an excellent incentive to spread their acceptance among the population. Sharing local energy production determines an increase in its economic and social value: it reduces bill costs, combats energy poverty, develops the local economy while maintaining profits in the area, stimulates the awareness and energy culture of citizens and public authorities Local Administrations. The development of these production systems also creates new jobs, further stimulating the local market.

From an energy point of view, the widespread production of energy from local renewable sources and its simultaneous consumption contribute to the stability of the national electricity system by reducing network losses and allowing us to overcome the use of fossil fuels.

According to the study by Wierling et al (2023), on the presence of energy communities in 29 countries of which only 26 are EU member states, there are 9252 energy communities (Figure 4). The authors note that more than half of these communities are located in Germany, (4848 energy communities). Followed by the other European Union states such as Bulgaria, Malta, Romania and Hungary which just have one. Italy is lagging behind other countries in the development of energy communities.

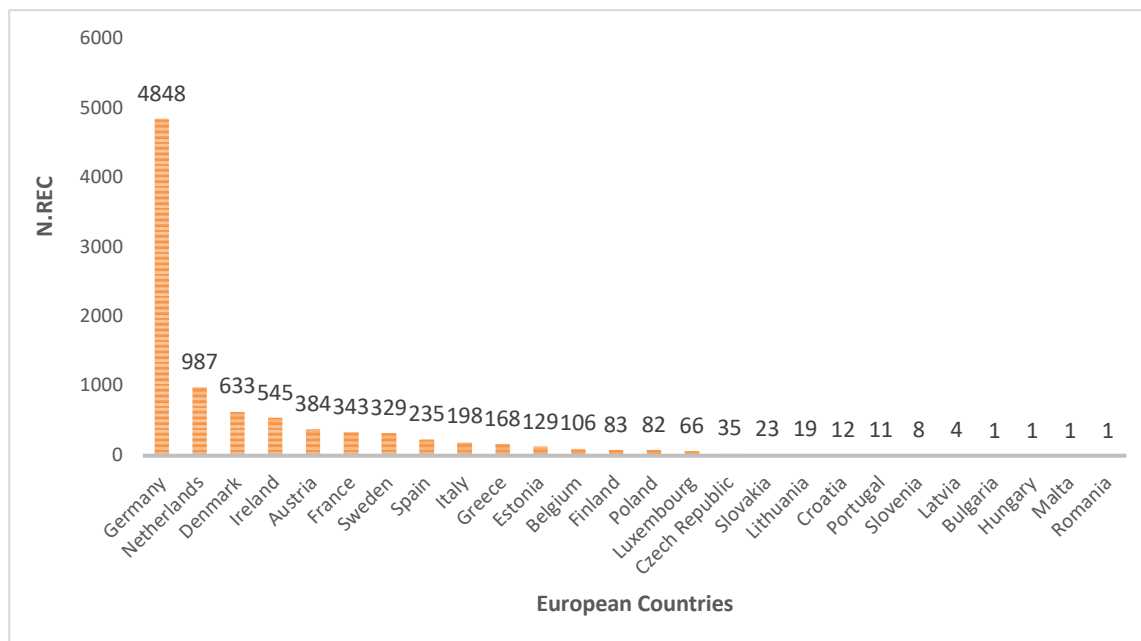


Figure 4: Renewable communities in Europe 2022. Source: our own elaboration

For Italy, this delay could be attributed to the participation of public entities and local authorities, which, being equipped with specific accounting control rules, suffer from the lack of contractual models that can guide and simplify the establishment of energy communities or collective self-consumption. Legambiente (2022) also notes that NGOs and Third Sector Bodies remain totally excluded from the laws regarding the energy community, as they are not provided for by the European directive, but that like all other subjects they must have the same rights as prosumers of citizens, businesses and local authorities.

4. NEW STRATEGIC ALLIANCES ITALY ALBANIA

4.1 Pescara-Montenegro Bridge

In a geopolitical scenario where the trade balance is largely in favor of our country, there are two strategic alliances between Italy and the Balkans. These are record-breaking infrastructures for technology and strategic innovation for the security of the two electricity systems and for the integration of renewable sources. In particular:

- a power line from Pescara to Montenegro of 445 kilometers, which works in both directions but for the most part it is Italy that buys; already functioning and at full capacity it interconnects Italy and the Balkans, to date it represents the longest bridge ever built by Terna.
- a maxi-aqueduct under the Adriatic to supply the Apulian one, the largest in Europe, with the water resources of Albania. A 1-billion-euro investment that would bring Albanian waters to Southern Italy in four years.

Some "hidden" infrastructures, such as networks, cables and gas pipelines, are exponentially acquiring a significant status in the geopolitics of the mare nostrum. A sort of new diplomatic lever that can be activated between the Mediterranean and the Balkans: the cable between Italy and Montenegro (figure 4 and figure 5), the submarine cable between Libya and Greece to have more internet power and the Euro-Africa interconnector on the Cairo - Nicosia axis -Athens are three examples that amply demonstrate this and which also pave the way for future projects, such as water networks. In essence they represent the indicator of a new strategic awareness: network diplomacy is the key to new alliances (including Italy's). In particular, in a historical moment characterized by the need to start a bridge in the Tech sector between Europe and the USA, Italy has moved forward. Between the two shores of the Adriatic (where China has considerable pressure) there is a submarine interconnection, the Italy-Montenegro one created by Terna, between the electrical stations of Cepagatti, in the province of Pescara and Lastva, in the municipality of Kotor, in Montenegro. The Italy-Montenegro submarine cable inaugurated on 15 November 2019 by the President of the Republic Sergio Mattarella and the President of Montenegro Milo Đukanović today represents the first interconnection between the Old Continent and the Balkan area, which therefore allows the integration of energy markets, guaranteeing high standards of safety, efficiency and sustainability of the Italian, Montenegrin and European electricity system.

Italy carries out its intervention in the Balkan coast by exporting technology and innovation, where Rome can, better than other players, speak directly with all the countries in question, by virtue of its ability to relate

without triggering vetoes of a historical, linguistic or religious. In this sense, Italy can contribute to decarbonisation and the growth of renewable energy beyond the Adriatic, offering its expertise in the field of regulation, and this would represent a valid opportunity for Italian energy companies in Albania. Montenegro, thanks to its geographical positioning and a transmission network well connected to Bosnia Herzegovina, Serbia, Kosovo, Albania and, indirectly, Bulgaria and Romania, is in a strategic position to play the role of electricity exchange platform between Italy and the region Balkan. Other hypotheses, such as a connection to Croatia, presented problems of congestion on local lines. The bridge allows the two countries to exchange electricity bidirectionally: initially for a power of 600 MW, which will become 1,200 MW when the second cable is also built, expected in the next few years. The total amount of the project is estimated at approximately 1.1 billion euros.

The connection also makes it possible to use more efficient resources, including production from renewable sources, available both in Italy and in the Balkan area. A completely invisible interconnection, because it is underwater and underground (for the terrestrial part). Specifically, a 445-kilometer work, the longest ever carried out by Terna, between the electrical stations of Cepagatti, in the province of Pescara and Lastva, in the municipality of Kotor, in Montenegro, of which 423 kilometers are laid at 1,200 meters below the Adriatic waters, while the remaining 22 kilometers are represented by terrestrial cable, of which 6 in Montenegro and 16 in Italy (Qualenergia.it, 2019). Europe and the Balkans are connected via an infrastructure that represents the first “electric bridge” between Europe and the Balkans and which Brussels considers of great strategic importance to the point of having been included among the projects of common interest (PIC) by the Commission European Union which co-financed the feasibility studies within the framework of the “Trans European Network” (Ten) program to support priority electricity infrastructures. A fundamental hub that will allow Italy to strengthen its role as a European and Mediterranean “Hub” in electricity transmission. A record-breaking infrastructure for technology and innovation, strategic for the security of the two electricity systems and for the integration of renewable sources. The benefits of the Italy-Montenegro bridge as shown in table 5 are many: for Italy the work means greater safety of the electricity system and contribution to the objectives of reducing CO2 emissions. In particular, it will contribute to the integration of the Italian market with that of the Balkans and will increase the flexibility of operating renewable sources, through the export of energy to that area. This will reduce the risks of excess generation in the increasingly frequent moments in which the Italian system is in conditions of reduced demand and high production from renewable sources. Table 4 illustrates some of the advantages of the Italy-Montenegro bridge.

Table 4: Bridge Italy-Montenegro advantages. Source: own elaboration

Italy-Montenegro Bridge	<ul style="list-style-type: none"> • Greater safety of the electrical system. • Reduction of CO2 emissions. • Integration of the Italian and Balkan markets. • Greater flexibility of renewable sources. • Reduction of risks of excess generation.
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While respecting the environment, Terna has worked on this work to make it less invasive, progressively reducing the use of land, and obtaining a very low environmental impact. Increasingly green stations and power lines, the high share of sustainable investments and attention to the environmental context make Terna one of the main drivers of the energy transition today.

The Puglia Albania submarine aqueduct connects the Italian and Albanian territories, with 85 kilometers of pipelines at the bottom of the Adriatic, 120 on the mainland, in Girokaster in the Land of Eagles and in Galugnano, in the province of Lecce. This 1 billion investment project, has the structure of an aqueduct between Puglia and Albania, very rich in water sources, returns to the institutional tables.

4.2 The Puglia Balkan bridge

The maxi aqueduct under the Adriatic that connects Puglia with the Balkans takes on the characteristics of the largest bridge in Europe. It will supply 150 million cubic meters of water per year. Useful bridge that compensates for the problems of water shortage in the Apulian territory. It is well known that the Apulian territory has been suffering for a long time due to water shortages due both to the obsolescence of the systems, which waste a lot of water given their dilapidated structure, and to the continuous phenomenon of drought. The maxi aqueduct is an advantageous opportunity for the territory of southern Italy because it allows the importation of drinking water, and underlines the importance of blue gold in times of climate change (la regione.eu, 2023).

Specifically, the bridge is structured by connecting the Puglia region of Southern Italy to the Albanian territory, through an underwater infrastructure between the two shores of the Adriatic with its mouth at the city of Otranto. The connection involves 200 kilometers of pipes; approximately 30 kilometers of these pipes are

located in Italian territory, 85 in Albanian territory and the remaining 85 kilometers are present in the underwater seabed.

This connection, together with the one already described, represents a fundamental hub that allows Italy to strengthen its role as a European hub in the Mediterranean in the transfer of electricity from renewable sources. Thanks to direct current transmission, the two countries will be able to exchange the electricity they need with each other bidirectionally via two high-performance parallel cables; approximately 600 Mw, which when intense in both directions count for a total of 1,200 Mw.

5. CONCLUSION

The types of connections between countries for the exchange of renewable electricity, seen as a whole, represent a development potential that ensures the health and well-being of the ecosystem and the inhabitants involved, also guaranteeing good conditions from an economic point of view. They represent a fundamental dimension for attracting investments, making the country more resilient to inevitable climate changes, protecting nature and biodiversity, and guaranteeing the safety and efficiency of the water system (Aura, 2022). Renewable energies are increasingly present in Italy and there are numerous projects in the area whose main aim is to make the country independent from an energy point of view. The article discussed the alliances between Italy and the Balkans as a potential means of cohesion and development for energy exchange. Thanks to these connection bridges it is possible to benefit from continuous electricity transmission and it is possible to obtain clean energy from renewable sources. The article discussed the model of energy communities from renewable sources as a potential paradigm for the production and sharing of energy between users of the same community, which contribute to reducing CO2 emissions into the environment while also bringing social and economic benefits to the territory where they are located. Energy communities that are still underdeveloped will help safeguard the environment and reduce energy waste. Finally, everyone will be able to have access to and share the benefits of this clean and sustainable form of energy generation, which is photovoltaic.

The possibility for pure electricity consumers to join forces with producers of renewable energy in the form of an Energy Community represents a milestone in the history of the development of renewable energy in Italy. Having reached this point in the article we can conclude that, unfortunately, Italy is still lagging behind other European countries that produce renewable energy through energy communities. Although European experiences of local communities and energy cooperatives are still few, they demonstrate how energy democracy, through energy communities, represents the key to combating climate change. The Italian electricity system and that of the Balkan area are today quite different in terms of characteristics and structures, but despite everything they manage to create synergies, exchanging energy through the connections described previously: the submarine bridge and the aqueduct. Albania and Montenegro have the highest use of renewable energy in the region. The Republic of Albania has one of the highest shares of renewable energy in south-eastern Europe; It is also home to eight major river systems and relies on hydroelectric power plants, which can become unreliable during periods of drought, to provide power for the country's 2.8 million residents. It therefore becomes a driving force of the economy for both internal and external investors. Based on its characteristics, it could therefore today more than ever achieve that carbon free and zero CO2 emissions energy transition, becoming a nation that diversifies its electricity supply, which is too unbalanced on hydroelectric, using new renewable sources.

In Italy the situation is very different; Energy prices remain very high, with oil remaining above 80 dollars a barrel and the cost of gas held hostage, as observed by some analysts, in the "tug of war" between Moscow and Brussels. The only practicable solution could be to accelerate renewables. In order to achieve the famous objectives, set by the EC and reduce emissions by 55% by 2030 by achieving a good energy transition, according to experts, in the next ten years, install 70 thousand megawatts of renewable energy, mainly wind and solar, which means 7000 megawatts per year. Given that in recent years we have seen a rate of less than 1000 megawatts per year, it will be difficult to reach these goals in 2030. It is hypothesized, according to these data, that they will even be achieved in 2070 or 2080. The only way forward could be an acceleration in the system of rules that allows authorization of a wind farm in one year, rather than in 5/6 years that are necessary today. Some European countries even fall back on the possibility of implementing nuclear power for the energy transition, given that it is a technology that actually does not emit CO2. Unfortunately, in order to activate nuclear power, a good technological maturity is needed which, to this day, many countries still do not possess. Renewable energy communities were discussed as a possible solution, even if in Italy we are lagging behind. There are 3,493 Municipalities which are already 100% electric, those where electricity production from renewables exceeds the needs of resident families, and 40 Municipalities which are 100% renewable where the mix of renewable sources is able to cover both the electrical and thermal needs of the resident families. Here these subjects are protagonists in the management of the entire system, from production to distribution in a local and distributed system, capable of bringing bill savings of up to 40% compared to normal energy tariffs. Thus, 13 GW of fossil fuel power plants were closed. But large plants are not taking off: in 2020 it

installed only 112 MW more than in 2019, for a total installed power of just above 1 GW. At this rate, the decarbonisation objectives are unattainable in 2030 and 2040. According to a study by the Polytechnic of Milan, by 2025 around twenty thousand energy communities could be created in Italy for around one million domestic users and 300 thousand non-domestic users. At the moment, energy communities in Italy are few, but growing, and have been regulated at a regional level by Piedmont, Puglia, Marche and recently also by Veneto. These models of energy production and consumption represent a profound innovation for the Italian energy system and will set in motion a real paradigm shift in the way of looking at networks; unfortunately they are held back many times by the lack of more favorable and explicit legislation, but in any case, from an environmental point of view the most important aspect is that we can move towards zero-emission rental, where for all uses we can ignore from fossil sources. Their full development throughout the national territory can benefit the environment, the economy, employment and can above all favor the decarbonisation process in the thermal and transport sectors. It would therefore also represent an example to imitate for countries such as Albania and the entire Balkan area.

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