PLANNING AND ENGAGEMENT ARENAS FOR RENEWABLE ENERGYLANDSCAPES - PEARLS

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WP5 Report: Renewable Energy Communities in Portugal, Spain, Italy and Greece

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PEARLS Planning and Engagement Arenas for Renewable Energy Landscapes

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Introduction

Renewable energy communities are new actors in the energy systems in Europe (and elsewhere) whose main purpose is to democratise the production and access to renewable energy. They are prime examples of social innovation in the energy field and considered as key elements for the energy transition.[1]

The European Union defines two types of communities:

- 'renewable energy community', which means a legal entity:

  (a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;

  (b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities;

  (c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits; [2]

- 'citizen energy community' which means a legal entity that:

  (a) is based on voluntary and open participation and is effectively controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises;

  (b) has for its primary purpose to provide environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates rather than to generate financial profits; and

  (c) may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders;[3]

This report summarises the work carried out for WP5 of the PEARLS project concerning renewable energy communities (REC). During the secondments of this WP, researchers

[1] Dóci, G., Vasileiadou, E., & Petersen, A. C. (2015). Exploring the transition potential of renewable energy communities. Futures, 66, 85-95.
[2] Article 16, Directive (EU) 2018/2001 Of The European Parliament And Of The Council of 11 December 2018 on the promotion of the use of energy from renewable sources.
[3] Article 2, Directive (EU) 2019/944 Of The European Parliament And Of The Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU

carried out fieldwork in Portugal, Spain, Italy and Greece for compiling information on case studies, including document analysis and interviews with key actors (promoters of REC, local authorities, residents, representatives from regional government agencies, cooperatives and other civil society organisations).

Portugal

Policy Framework

Although EC Directives have been promoting renewable energy communities (REC) since 2016, it was only in 2019 that the first Portuguese legislation about them was published. The Decree-Law 162/2019 establishes the possibility of sharing renewable energy among neighbours under two formats: collective self-consumption and REC. The first requires an internal regulation defining rights and obligations; the second requires the establishment of a collective legal entity, such as a cooperative or an association that includes prosumers and other entities involved in prosumption. Energy communities can be formed by residents in a bloc of flats or group of houses, urban areas or neighbourhoods, business parks, agricultural units, industrial units, parishes, and municipalities. The law also determines that energy communities must be in the proximity of the generation site and that membership is free and voluntary. The energy can also be sold to the grid.

The same legislation states that REC are one of the ways of meeting the 2030 target for 47% energy (and 80% electricity) from renewable sources established in the National Energy and Climate Plan, while at the same time improving “social and territorial cohesion, contributing to the reduction of current inequalities, namely through the creation of jobs and the improvement of the competitiveness of companies”.

In January 2022 a new law regulating the National Electricity System was published (Decree-Law 15/2022). Here, besides REC, a new type of actor is acknowledged: citizen communities for energy. This type of community does not necessarily involve renewable energy sources and aims to provide environmental, economic or social benefits to its members or to the local areas, but their main objective cannot be to obtain financial profits. These communities can participate in production activities, distribution, marketing, consumption, aggregation, energy storage, provision of energy efficiency services, or charging services for electric vehicles or provide other energy services. This piece of legislation awards citizens the right to participate in energy communities (including low income and vulnerable families) and to leave them without costs. Information for creating or joining an energy community has to be accessible. REC projects have to be approved by two government agencies: DGEG and e-Redes.

The government has since published a manual for energy prosumption and renewable energy communities[4] and a blueprint for internal regulations of REC[5]. In 2022 the Plan for Resilience and Recovery opened a line of funding for collective prosumption and REC in residential, public administration and service buildings. The programme has 30 million euros to distribute and the maximum incentive is €500,000 per project.

[4] ADENE e DGEG Direção Geral de Energia e Geologia (2022) Autoconsumo e Comunidade de Energia Renovável: Manual Digital, https://www.adene.pt/wp-content/uploads/2022/11/Manual-Digital-Autoconsumo-e-Comunidade-de-Energia-Renovavel-Guia-Legislativo_vs2.pdf

[5] ADENE (2023), Regulamento Interno do Autoconsumo Coletivo, https://greenpower.pt/wp-content/uploads/2023/06/Regulamento_Interno_v-1.0.pdf

Energy communities

The first official energy community was created in 2021, in Miranda do Douro, but before that several projects were initiated, in some cases supported by European research funding (COMPILE, PROSEU, COMSOLVE). Coopernico, the only RE cooperative in the country, was a key partner in some of these early projects and published the Portuguese edition of the REC manual edited by Rescoop[6].

According to the Ministry of Environment and Climate Action, in February 2023 there were 4 REC in operation and 372 requests for licencing, 95 of which were already approved.[7] An internet and media search has allowed the identification of about 70 REC in Portugal, in different stages of development. The majority of REC identified are located in the Centre and North of the country.

Map 1 REC in Portugal (active and in planning)

Two main types of REC in Portugal can be identified: residential REC (where members are residents in a building, a neighbourhood, a gated community, a village) and industrial REC (where members are business companies). Some communities combine both kinds of members, as well as other organisations such as municipalities, industries, social

[6] Coopernico (2022), Comunidades de Energia: Um Guia Prático, https://coopernico.org/artigo/292

[7] Source: Público, 5 February 2023, https://www.publico.pt/2023/02/05/azul/noticia/portugal-nao-chegou-maocheia-comunidades-energia-renovavel-2036970

welfare organisations, football clubs, schools, parishes, business associations, voluntary fire departments. In some cases, the electricity generated is also shared with deprived families in the neighbourhood, addressing energy poverty. There is just one case of an agricultural REC whose members are the farmers from an irrigation association. In most cases, solar panels are installed in rooftops, but there are also instances of solar farms to supply the REC.

The majority of REC are supported by dedicated companies that have been created in recent years: Cleanwatt, Greenvolt, Elergone Energia, EnergyCon, Ecoinside. Electricity companies have also started to provide services for setting up RE communities, such as the Bairro Solar programme of EDP. These companies fund the installation of solar panels and provide management services.

It must be noted that the majority of these REC are in fact collective self-consumption entities and not formally energy communities, since they do not have the legal status of associations or cooperatives.

Case 1 Culatra, Faro

Culatra is a small island in the coast of Algarve inhabited by a fishing community of a few hundred people, which has always struggled with energy supply (that is provided by an underwater cable connected to the mainland). In 2019, the University of Algarve, interested in becoming involved in energy transition, presented an application to the Clean Energy for EU Islands programme, which provided technical support but no funding. Local residents, through their association, were consulted and involved from the beginning, with the assistance of a NGO (Make it Better) which performed a participatory diagnosis. The project now relies on a wide array of partnerships, including regional and municipal authorities, electricity companies, smaller companies, ENGO and civil society organisations; it has harnessed funding from several sources (INTERREG, foundations, EEA Grants, national government, crowdfunding).[8]

Due to its location within a natural park, the project has had to forego some of the planned infrastructures, such as wind energy turbines and a desalinisation plant. PV panels are already installed in collectively owned rooftops (fishing huts, school, community centre) and on top of the gangway close to the pier, but not in private dwellings nor in the local church. There is also an energy storage unit with lithium batteries in the island. Several training and awareness initiatives were organised, as well as cultural events and environmental festivals.

> *Our objective is to have a transformation, until 2030, in terms of behaviour and attitudes of residents and visitors to have a natural park more natural, cleaner, healthier, a planet cleaner, safer, healthier (…) the objective is to bet on clean energies, that families transition gradually, to adapt to new technologies (…) all ideas are good and I think we can make an effort to reach this 100% objective of energy transition, independence and sustainability* (interview with representative from the residents' association)

In December 2022 a local cooperative, C Coop Cooperativa para a Sustentabilidade da Ilha da Culatra, was established to govern the REC. Its first members were three local associations, but all residents are entitled to take part. This will pave the way for PV panels to be installed in private rooftops, but with the energy to be shared among the community, addressing also energy poverty. The national regulator (ERSE Entidade Reguladora dos Serviços Energéticos) approved the Culatra REC as pilot project in early 2023, citing the citizen involvement as exemplary. The cooperative was awarded a prize by a national magazine in 2023.

[8] https://www.youtube.com/@Culatra-uv6qy

Photo 1 Fishing community of Culatra

Case 2 São Luís, Odemira

São Luís is a small freguesia (parish) in the Odemira municipality. The implementation of RE production in São Luís was triggered by civic initiative, initially with no public funding and without any large Portuguese electricity operators involved. This energy project started out in 2012 from a civic initiative presented at the Odemira participatory budget meeting, where it was awarded 125,000 Euros. The proposal envisaged the installation of solar panels on the roofs of public buildings with the locality intended to progress towards energy self-sufficiency through decentralised and democratically managed low carbon emission RE.

To achieve these objectives, a study was made of the locality's energy needs in 2017 and the solar panels were subsequently purchased collectively. The collaboration of the Minga Cooperative in Montemor-o-Novo was secured for this as was that of the Coopernico RE cooperative in subsequent phases. Minga has a long track-record in clean energy production with the installation of solar panels on public and private company buildings. This first collective purchase resulted in the installation of solar panels on the roofs of São Luís' Recreational Music Society, the Parish Association office, the civic hall and local government facilities.

The fact that the first step was a collective purchase of solar panels by a group of townspeople and the support of São Luís' local government and the San Luizense Recreational Music Society reinforced the democratic and community nature of the energy initiative. The outcome was an almost four-month long horizontal deliberation process during which some members of the initial initiative withdrew. The fact that this was a self-organised initiative with a voluntary work-based horizontal management system enriched the social process and, at the same time, delayed any decision-making.

The entire participatory process was channelled through a social collective composed of residents and non-residents of São Luís called the Movimento Transição São Luís (the San Luis Transition Movement) and the Energia com Alegria (Joyful Energy) initiative. This São Luís social energy initiative subsequently came to be guided and supported by the Coopernico cooperative and a team from the Faculty of Sciences of the University of Lisbon under the PROSEU European H2020 project focused on the integration of RE prosumers into the European Energy Union.[9]

The initiative developed by the São Luís Transition Movement, therefore, seeks to position itself as an alternative to Portuguese regulations that favour EDP's control of the grid and so has, to date, only allowed individual self-consumption and not considered collective self-consumption or that any excess electricity produced should be sold directly to another community or to local residents.

[9] https://proseu.eu/

This energy initiative has also had cultural and educational implications with the development of artistic and musical activities involving the town as a whole,[10] the running of training workshops on the installation and development of renewable energies, and participatory sessions for REC design. All this means that the management and launch of the renewable energy collective can be considered to have become one of the cornerstones of São Luís' social and cultural life, making it a social and technical testing ground in light of the changes to regulations in the Portuguese electrical energy distribution and production markets. The initiative's horizontal civic nature and interest in generating local benefits from the energy point-of-view and also from the perspective of social cohesion around this model bring it close to the definition of REC, although technically-speaking no energy exchanges have been made between community members due to legal constraints.

In 2023 the status of the energy community is severely impaired. Firstly, COVID 19 dealt a severe blow to the evolution of the energy community, and a certain exhaustion of the activities of the main actors in its implementation is beginning to be observed. However, the cession of six thousand square metres by the municipality of Odemira for the installation of solar panels opened new expectations for the growth of the energy community in Sao Louis.

Unfortunately, the need to temporarily cede the space promised for the location of the local school due to the poor state of the current building has delayed the reactivation of the project until today.

It is clear that COVID-19, administrative difficulties and bad luck explain why the project has not progressed since 2019.

Photo 2 Solar panels in rooftops in São Luís

[10] https://montrassaoluis.wixsite.com/2019

Photo 3 Solar panels in a car park in São Luís

Photo 4 Poster of a workshop about energy communities in São Luís

Spain

Policy Framework

In Spain, European directives regarding prosumption and energy communities were also slowly transposed to the national legislation. In 2018, the newly elected socialist government finally repealed the so called “sun tax” (Real Decreto 15/2018), which was a severe obstacle to solar photovoltaic projects. The following year, the Real Decreto 244/2019 sets the administrative, technical and economic conditions of self-consumption of electricity, including collective presumption. The following year, the Real Decreto-ley 23/2020 contains several measures regarding energy due to the pandemic situation and is the first to include the definition of renewable energy communities (similar to the one in the EU Directive). This law determines that RE communities should benefit from specific conditions in order to compete for access to the remuneration framework on an equal level with other types of organisations.

The following year the Real Decreto 477/2021 defines the conditions for several incentive programs linked to prosumption and storage, with renewable energy sources, as well as the implementation of renewable thermal systems in the residential sector. RE communities are one of the potential beneficiaries of these incentives, together with citizen energy communities. However, the later are not yet recognised by law.

In April 2023 the government presented for public discussion a draft of a new law concerning RE communities and citizen energy communities that would finally regulate their operation. The lack of specific regulation is seen as an obstacle for the development of these organisations.

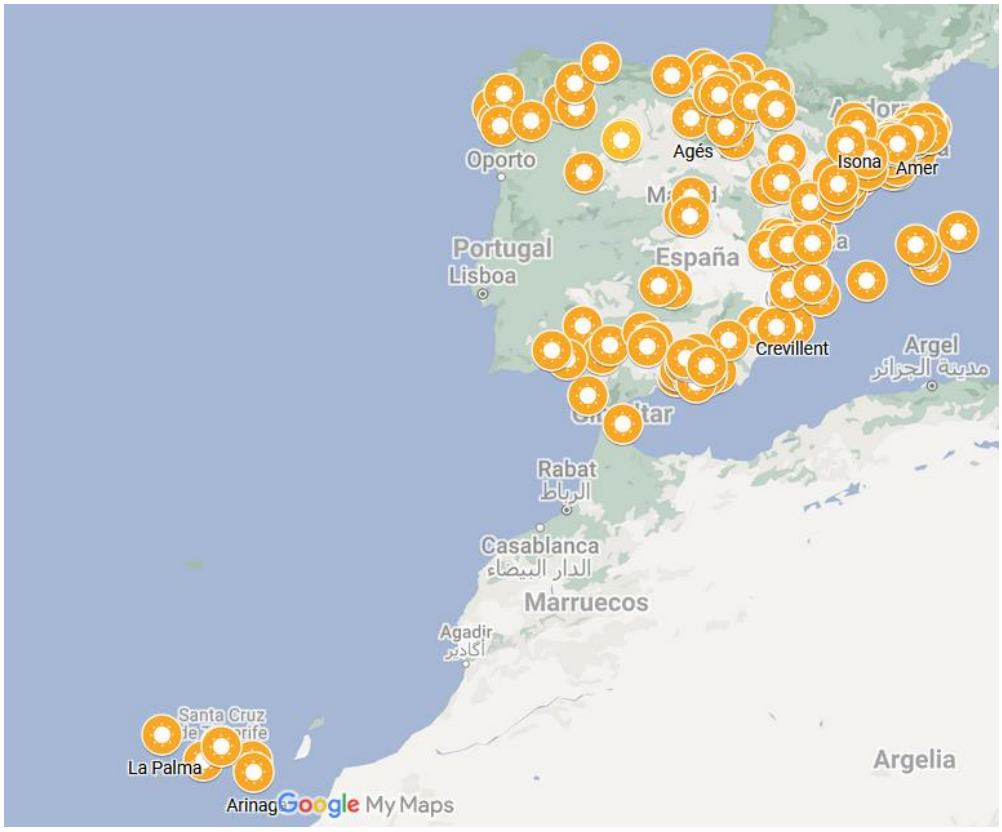
IDAE, the Spanish Institute for Energy Diversification and Saving, provides information regarding RE communities and has published a practical guide for setting up energy communities.[11] IDEA manages several support programmes (within the framework of the Recovery, Transformation and Resilience Plan): CE OFICINAS (Program to grant aid to Community Transformation Offices for the promotion and revitalization of energy communities), CE IMPLEMENTA (energy community pilot projects). So far, it has funded 73 RE communities and a database of projects is made available online.[12]

[11] https://www.idae.es/sites/default/files/documentos/publicaciones_idae/guia_para-desarrollo-instrumentos-fomento_comunidades_energeticas_locales_20032019_0.pdf
[12] https://informesweb.idae.es/visorccee/

Energy communities

According to a list compiled by Aliente Alianza Energía y Territorio (a network of over 200 NGOs that campaigns in favour of energy transition that respects biodiversity conservation) at the beginning of 2023, there were over 180 REC in Spain, many in the planning stages but some already in place, generating and sharing energy. The majority of REC are located in the region of Catalonia, followed by Valencian Community, Basque Country and Andalusia.

The dominant type of RE source is photovoltaic (often solar panels installed in the rooftops of public buildings, such as schools and sports facilities), but some REC also rely on hydraulic and biomass energy. Most have the status of REC, but some are also Citizen Energy Communities.



Map 2 : REC in Spain (active or in planning)

Source: ALIENTE, https://aliente.org/mapa-comunidades-energeticas-locales

Many are supported by energy cooperatives (e.g. Goiener, SomEnergia) and most rely on wide partnerships that involve regional and municipal authorities, SMEs, civil society organisations and residents. Some have public funding, other rely on their own

resources (crowdfunding) or funding opportunities from the private non-profit sector (e.g. Germinador social from SomEnergia). Many REC are built based on participatory processes

Like in Portugal, some companies already provide support to REC, such as Vagalume Energía. Repsol and other large energy companies are also trying to get involved. Some regions already have associations of REC, that aim to represent the interests of REC, help setup new REC, lower the costs of setting up REC, share information and provide training, and increase the local impact and social benefits of REC. Such is the case of AVACE in the Valencian Community[13] and ANCE[14] in Andalusia.

[13] https://www.avace.org/
[14] https://www.ancenergia.es/

Case 1 Alumbra, Arroyomolinos de Leon

The Alumbra energy community is located in Arroyomolinos de León, a small municipality in the rural interior of the province of Huelva that has seen its population decline since the 1970s (from 2,190 residents in 1960 to around 900 inhabitants in 2019). Energy communities in depopulated and vulnerable rural territories can be a catalyst for revitalizing the social and economic fabric of those regions, contributing to more sustainable rural development. They also play a relevant role in promoting the public participation of older populations, through the co-creation of learning and support communities in the consecration of residents' right to clean, affordable, and safe energy produced locally. Alumbra became an interesting case promoting a rural energy community to which we witnessed its creation.

On January 10th, the Arroyomolinos de León City Council and the MUTI Association convened the so-called "motor group" of ALUMBRA, the new Rural Energy Community of this municipality, at the Plenary Hall of the City Council (see photo 3).

One year later, in January 2021, the ALUMBRA office opened in that rural town, providing support and advice to local residents regarding energy consumption and promoting initiatives for collective self-consumption. Through a collaboration agreement between the MUTI Association and the Arroyomolinos de León City Council, ALUMBRA can be defined as a community of learning, support, and care that structures the rural territory through the right to energy of its inhabitants.

One of the iconic projects successfully implemented by Alumbra in 2022 was 'La Energía del Cole'. The objective of this project was to generate energy and combat energy poverty by setting up a large photovoltaic plant on the rooftops of a public school, specifically the "Colegio Virgen de los Remedios". The community bought the photovoltaic facility through crowdfunding demonstrating how committed and supportive were the residents. One resident even matched any contribution made (if someone donated €50, he would contribute another €50).

Thus, the installation of photovoltaic panels not only generated energy for the whole community of Arroyomolinos but also served as a model for a more democratic and sustainable approach to the natural and human environment of the region. The idea of using the electricity bill savings for the school, coupled with an educational program promoting good energy consumption practices, originated from the school community. This project won the Greenpeace's 2020 competition on renewable energy and energy poverty. Students in the final years of primary education have been leading activists in

the fight against climate change, turning a rural public school into a key driver of energy transition.[15]

Photo 5 First session of the Alumbra Energy Community, January 2020, planting of a symbolic tree

Photo 6 School at Arroyomolinos de Leon where the community solar panels were installed

[15] https://youtu.be/aF-MyjFTALU?si=_xTls4H-6m0_GKPO
https://www.youtube.com/watch?v=fhLngW5AxTs

Case 2 Torreblanca, Seville

The Torreblanca Ilumina Energy Community is a project based in the southern zone of Seville, Spain, specifically in the Torreblanca neighborhood. This community was created to address the issue of energy poverty in the area, as Torreblanca has one of the lowest average incomes in Spain. The Torreblanca Ilumina Energy Community was established on March 12, 2020, by an association called "Asociación Torreblanca Ilumina, Comunidad Ciudadana de Energía y Aprendizaje" (Torreblanca Ilumina Association, Citizen Community of Energy and Learning).

The idea for the project emerged from a meeting of the energy cooperative SOM Energía, in which the local group of Som Energia asked the University of Seville's research group, ADICI (Digital Classroom of the City), to organize a workshop on energy communities. A working group was subsequently formed, which included the school communities of two local schools, the local Som Energia group, the Social Services Center, the Civic Center of the neighborhood, the ADICI research group, and the Ecosocial Workshop (consulting firm). The project also received support from the local government.

The Torreblanca Ilumina Energy Community is a learning and community-building project that includes activities such as presentations, workshops, and initiatives to raise awareness of energy conservation and environmental issues among the school community and the neighborhood. The project is publicly and privately funded by the local government, the Andalusian Energy Agency, the Filosolar Association, and the Som Energia cooperative. The project has received positive feedback from the City of Seville's Energy and Sustainability Agency and has been declared of public interest.

In more detail, the Torreblanca Ilumina Energy Community is a pilot project that involves the installation of two photovoltaic solar systems with a total of 70 panels and a power of 10 kW and 5 kW on the roofs of the Vélez de Guevara and Príncipe de Asturias public schools. The project provides free energy to 11-13 vulnerable families and helps them save 40% on their electricity bills, with each family receiving around 900 watts. Additionally, the schools are using 5% of the energy produced. The association chose not to include batteries in the installation to avoid the pollution caused by these elements. The city council has granted the temporary and exclusive use of the roofs of two public schools in the neighborhood: the Vélez de Guevara Primary School and the Prince of Asturias Primary School, with the aim of generating and producing self-consumption electrical energy for a period of 25 years.

The photovoltaic panels were donated by the Filosolar Association, who received them through funding from the Dutch company Trina. This association, along with OK Planet, Amalgama, and CEIT-CLIMATE KIK, promoted the CLIMATHON of Seville 2020, held from November 13-15, which was a contest on projects to tackle climate change, and

Torreblanca Ilumina applied to it. Initially, the panels were intended for a cooperation project in Africa, but the shipment was hindered due to bureaucratic problems. Consequently, the panels were donated to Torreblanca Ilumina.There are a total of 422 panels, donated in February of 2021. Currently, only part of the available solar panels has been installed. The transportation cost has been paid for with the award received by the project in the "Germinador Social" call from the energy cooperative Som Energía (2nd prize in the "Energy Communities" category).

In the framework of the European project Powerty (which aims to tackle energy poverty through the use of renewable energies and includes a specific line to carry out demonstration experiences), the Andalusian Energy Agency has financed expenses for social dynamization, legal assistance to overcome legal difficulties, and technical assistance to size the self-consumption installation, among other issues. Finally, a methodological guide on the social management carried out in Torreblanca will be published (by the Andalusian Energy Agency through POWERTY), which will collect the process developed with all the agents involved.[16]

Photo 7 School in Torreblanca.

Source: http://www.torreblancailumina.com/galeria/

Italy

[16] https://www.youtube.com/watch?v=XYqXfi_CmS8
https://www.youtube.com/watch?v=kbXmssZeU6Y&t=4s
https://www.youtube.com/watch?v=hypcSvgdvEk

Policy Framework

In Italy, the REC system is regulated by L. 8/2020, which converts into law Article 42/bis of the Decreto Milleproroghe (DL 162/19) and stands as an early transposition law of the RED II directive. Through this transposition, as well as through the regulatory model determined by the Regulatory Authority for Energy Networks and Environment (ARERA) and of the incentive system identified by the MISE, L. 8/2020 defines the possibility of establishing - albeit in terms of experimentation - collective self-consumption models and energy communities. Subsequently, it has then intervened Legislative Decree 199/2021, implementing the RED II, according to which: "the primary objective of the community is to provide environmental, economic or social benefits at a community level to its associates or members or to the local areas where the community operates, rather than to make financial profits [...]; the participation in renewable energy communities is open to all consumers, including those from low-income or vulnerable households."[17]

That said, renewable energy communities are made up of a union of different entities (public bodies and organizations, companies, and private citizens) who choose to equip themselves with infrastructure for the production of renewable energy and adopt consumption patterns based on sharing. It is clear that the strength and novelty of this model are based on the incentivizing mechanisms of social, environmental and economic responsibility, focusing on the active participation of the community in the stages of production, consumption and energy exchange, rather than complying with the mere satisfaction of the energetic needs.

However, this model of energy production is not entirely new but finds its roots in the model of user cooperatives (cooperative di utenza) activated in the power sector (electricity, gas) that developed in the Alpine region. These were the so-called "historical cooperatives," defined and regulated by ARERA.

These cooperatives had emerged between the 19th and 20th centuries in areas of the Italian territory not very attractive for public and private investments due to their low population density and frequent exposure to significant natural hazards. In these areas, the inhabitants organized themselves in cooperatives to exploit locally available natural resources (generally, water) and set up their own electricity grids, performing for their members (and the community as a whole) the service of production and distribution of electricity.

According to ARERA, today all those electricity production and distribution cooperatives established before 1999 (year of Legislative Decree 79/1999) are considered historical cooperatives. This can be open to interpretation if we look at the law on the

[17] https://www.gazzettaufficiale.it/eli/id/2021/11/30/21G00214/sg

nationalization of energy, namely L. 1643/1962 establishing the National Electricity Authority. According to the latter, in fact, it should be considered historical electric cooperatives only those established before 1962[18].

Nowadays there are at least 28 historical cooperatives, in most cases based on hydropower and biomass plants.

More recently, and even before the European Union began encouraging the creation of renewable energy communities, there were Italian citizen-led initiatives aiming at the production of renewable energy, such as the cooperatives Retenergie Società Cooperativa (created in 2008), ènostra (2014) or Energia Positiva (2015).

Nevertheless, in spite of the favourable historical and sociocultural background and increasing investment on renewable energy production throughout the country, there has been criticism regarding the efficiency of the system for issuing authorizations for the implementation of renewable energy communities. As a consequence, and in line with the Italian government's goal of promoting renewable energy production, by the end of 2022, ARERA approved a new Integrated Text that simplified and rationalized the rules for both groups of self-consumers acting collectively in buildings and condominiums, energy communities, and individual self-consumers.

[18] The all abstract of this chapter is a synthesis in English of the work of: Sforzi., Bettani L., Burini C., De Benedictis C., Gaudioso D., *Le comunità intraprendenti in Italia*, Research Report n. 023 | 22, EURICSE (2022).

Energy communities

Much like in Portugal and in Spain, Italy also recognises several types of distributed generation projects: REC and collective prosumption. According to Legambiente, in 2022 there were around 74 such projects, most are REC and only 16 collective prosumption. Most of these REC rely on photovoltaic energy, but biogas, hydroelectric, thermal solar and, in a much lower proportion, wind power can also be found.

The number of REC has been growing steadily since 2020, though many are still in the planning stage or waiting for authorisations. Funding comes both from public and private sources and in some cases European programmes. Projects mostly rely on partnerships between municipalities, companies, business associations, energy agencies, regional authorities. A few also include energy cooperatives (Energia Positiva, City So.la.re, Friendly Power, isonostra) and fewer still private citizens.

Map 3: Energy communities in Italy

Source: Legambiente, 2022, p. 34

Case 1 Ferla

Ferla is a municipality of about 2,500 inhabitants located in the province of Syracuse in south-eastern Sicily. Since 2015, the Municipality of Ferla has initiated a series of administrative and planning activities dedicated to renewable energy. Thanks to the PO FESR 2007/2013 and the PO FESR energy 2015/2016, have been realized 6 photovoltaic plants for a power of 311 kW, with an on-site exchange system with 90,000 euros of energy savings. For these activities, the GSE (Gestore dei Servizi Elettrici) has transferred 30,000 euros that were forfeited to the municipal budget. In 2018, the municipality of Ferla was honoured by Legambiente as one of the 100 best stories of the territory in Italy. Thanks to this proactiveness, it becomes part of the Multiply project. Multiply is a European project that provides participating administrations with opportunities for discussion, study and insights into the tools available today for proper and forward-looking spatial planning from a climate perspective. In 2021, thanks to a collaboration between the local administration of Ferla and the University of Catania, the TREPESL project is launched, addressing the topic of energy transition and new models of participation and local development. The project, launched in January 2021, was aimed at establishing the first energy community in Sicily.

To enable the REC, from March 2021, the municipality initiates several actions to involve the community, first by publishing on the Municipality's institutional website a permanent notice addressed to citizens and businesses in order to express their adherence to the project of establishing the community. Then by starting a communication plan. Unfortunately, due to the Covid-19 pandemic, it could be only an online campaign without a live engagement of the population. At the same time, a municipal manager was identified and an ad hoc office was created to respond to citizens' questions and needs. The GSE (Italian public company managing electric services) accepts Ferla's energy community application in May 2022.

By resolution of the city council No. 6 of 19.05.2021, the Municipality of Ferla approves the Statute and the articles of incorporation of the association that was going to constitute the Energy Community, named Common Light. The promoters chose the legal form of the association to manage the REC because it allows the subsequent and constant entrance of new members, including low-income families or those in fuel poverty. In addition, it also allows its members to choose how to participate (whether as an end customer, producer or prosumer) Finally, it allows members to withdraw at any time from the association.

The municipality of Ferla and 4 individuals - 2 citizens and 2 businesses - are the first members of the association. The association has its own bylaws, memorandum of association, and internal regulations. There are eight applications for membership in the association still in the preliminary stage. The association structure is open to be edited

at any time, pandering to the hoped-for growth of the community, both in the number of members and in the installed capacity of the facilities. The governance of the association is left to the members themselves, according to the criteria of egalitarian participation, whereby each member has the same weight as the other, starting from the moment of the allocation of one's vote.

Common Light is a REC that produces energy from photovoltaic systems installed in municipalities areas. To date, the beneficiaries of the REC are the association's members. The benefits expected, in general, can be summarized as follows. From an environmental perspective: CO2 reduction; from an economic perspective: cost reduction and incentive recognition; from a social perspective: increased territorial cohesion and local economic savings.

Specifically, the incentive system is structured as follows:

- 20% windfall the goal is to stimulate new entries into the REC and overcome a potential initial distrust.

- 30% in proportion to the energy shared the objective is to guide the energy consumption during the production hours of the community facilities to maximize the overall incentive mount.

- 50% to producer members only the objective is to incentivize private investment by REC members.

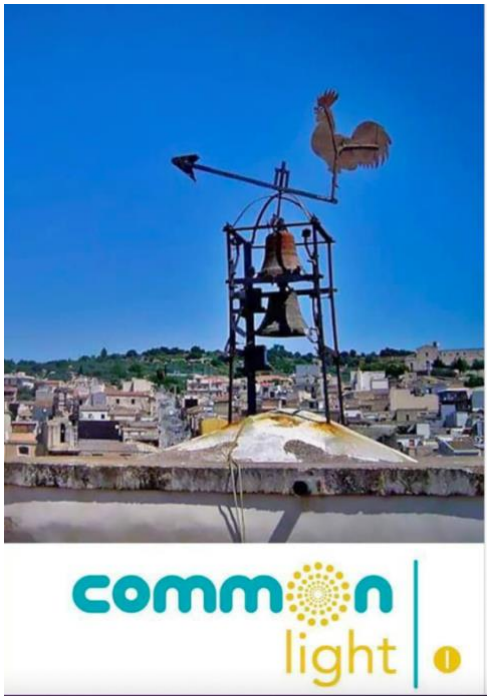


Photo 8 Ferla energy community

Photo 9 Solar panels of the Ferla energy community

Photo 10 Postcard of the Ferla energy community

Case 2 CER "La Buona Fonte" Riccomassimo

The first REC in the region of Trentino was created in Riccomassimo, a small mountain village of 51 inhabitants in the Municipality of Storo. The REC was registered on June 21, 2021, and was officially inaugurated shortly after, on July 16. The project was implemented by *Consorzio Elettrico di Storo* (CEDIS), a century old electricity cooperative with over 3000 members, in partnership with the association for social promotion *La Buona Fonte*, the legal entity that owns the REC.

In 2020, *Ricerca sul Sistema Elettrico SpA* (RSE), a company engaged in research applied to the energy sector, launched a call for partners for a study on energy communities. CEDIS submitted a proposal that was subsequently approved. Following a feasibility assessment, Riccomassimo was identified as a suitable pilot site and, together with nine other RECs, was integrated in RSE's study. According to CEDIS, Riccomassimo fulfilled important technical and social requirements, namely: the availability of a public building granted by the municipality on loan for the installment of a photovoltaic system; the existence of a unified, vibrant, and supportive community.

CEDIS first contacted the village's representative to introduce the project in December 2020. The initiative was warmly welcomed, not least because it fitted in the recovery work already initiated by the Administration of the Municipality of Storo in the former Riccomassimo primary school, which sought to create spaces for socialization and a playground. Thus, CEDIS acted as a third-party producer, securing the initial investment, and providing legal and technical assistance throughout the process.

In January 2021, the roof of the former primary school building was deemed adequate for the installation of the photovoltaic system, and it was made available for free by the Municipality of Storo. That same month, the local community was informed about the initiative through the village's WhatsApp group. The photovoltaic system was installed in March and started operating the next month.

La Buona Fonte, the first association born in the village, was constituted in April. It is open to all owners of an electric meter and its mission is twofold: it legally represents the REC, while also acting as an engine of community and local development, expanding its activities beyond the production of renewable electricity.

Representatives of the association got in touch with all electricity users to inform them of the advantages the REC. Most residents joined the association, deciding to become members of the REC as well. Currently, *CER Riccomassimo* is one of the most numerous in terms of associated end users in Trentino – 26 are connected (compared to an average of eight).

In 2022, at the Italian Forum of Energy Communities, Riccomassimo was recognized as the most innovative REC in Italy. The award acknowledged both its technological

advancements, as well as its socioeconomic merits, underlining its contribution to enhance the territory.

From a technological standpoint, the REC is based on an 18 kWp photovoltaic system and the production is combined with an energy storage system, a 13.5 kWh battery that accumulates excess energy, ensuring that consumers can use it even when the sun is not out. Production and consumption are monitored in real time through an app, which allows for immediate control and optimization of energy flows to minimize dependence on the electricity grid. Apart from being the local manager of the electricity grid, CEDIS has created a fiber optic network to which every home in the village is connected, thus enabling real-time monitoring of the system. Moreover, to encourage electric and sustainable mobility, a charging point for e-bikes was installed near the facility and can be used free of charge by residents and tourists alike.

In addition to these technological improvements, the REC seeks to: avoid depopulation; bolster the social, cultural, environmental and energy development of the territory; implement projects aimed at enhancing the historical and cultural heritage of the region; offer services to the community. Therefore, its members unanimously agreed to reinvest all the proceeds in the territory and the community. The REC has since embraced other projects, for instance, the renovation of a small church in the village, the maintenance of mountain trails and actions of urban beautification.

New developments are expected soon, as *CER Riccomassimo* won the Calì prize (awarded by the family of Michele Calì, Professor Emeritus of the Turin Polytechnic who passed away in 2021), which consists of a donation of 2400 euros to further develop the REC.[19]

[19] https://www.youtube.com/watch?v=JPpYeAFRfs8 (Inauguration of CER Riccomassimo, 16 July 2021)
https://www.youtube.com/watch?v=Zw0NY2c9pFQ (Pannel discussion about CER Riccomassimo organized by CEDIS, 16 July 2021)

Photos 11 and 12: Photovoltaic system of CER Riccomassimo

Source:

https://www.tesla.com/it_IT/customer-stories/la-prima-comunit%C3%A0-energetica-sostenibile-del-trentino?redirect=no

Greece

Policy Framework

Law 1559/1985 and law 2244/1994 represent the first legal framework for alternative forms of energy for power generation in Greece.[20] Law 1559/1985 concentrates on the exception to the exclusive right of the Public Power Corporation (PPC) to develop electric energy. Law 2244/1994 sets a legislative structure for the development of Renewable Energy Sources (RES) by giving access to individual energy producers of electricity.

In 1999, and for the following ten years, three legislative acts were introduced (L2773/1999; L3468/2006; L3734/2009)[21] which aimed at promoting electricity from RES and deregulating the Electricity Market. The first legislation (L2773/1999) also established two administrative bodies: the Regulatory Authority for Energy and the Electricity Transmission System Operator. Alongside this, a procedure for providing licenses for electricity generation (basically allowing to produce electricity) was enacted. The procedure required a pre-sitting permit, a land use permit, the environmental terms and conditions' approval, an installation license, and an operation license. Eventually, the legislative act was revised and modified to address the administrative and technical challenges. But instead of simplifying the procedure, it created a complex and fragmented legislative framework for RES distributions. The second legislative act from 2006 aimed at monitoring the geographical circulation of RES installations with the help of limiting the kWp per region. The regulation included the distribution of solar radiation over the country and the mechanical limitations of the islands' electricity systems. This legislative framework between 1999 and 2009 was lengthy, difficult, and very bureaucratic, which hindered the sustainable development of RES in Greece. In parallel, the European Directive 2009/28/EC made RES targets mandatory for all European Member States, which for Greece, was fixed at 18% of the total national energy consumption. With law N3851/2010,[22] the Greek Government fixed a target of 20% for RES specializing in 40% in power generation, 20% for thermal RES, and finally 10% for

[20] Greece. Law No. 2244/1994 on the Regulation of power generation issues from renewable energy sources and conventional fuels and other provisions. Official Government Gazette.
[21] Greece. Law No. 2773/1999 on the liberalisation of the Energy Market and on the Regulation of Issues Related to Energy Policy. Official Government Gazette.
Greece. Law No. 3468/2006 on the Generation of electricity from renewable energy sources and through high-efficiency co-generation of electricity and heat and miscellaneous provisions. Official Government Gazette.
Greece. Law No. 3734/2009 of the promotion of CHP, provisions concerning the Hydroelectric power plant in Mesochora and other provision. Official Government Gazette.

[22] Greece. Law No. 3851/2010 on Accelerating the Development of Renewable Energy Sources to Deal with Climate Change – Photovoltaic Greece. Official Government Gazette.

biofuels. The law also aimed to facilitate the processes of issuing licenses and the issue deadlines were shortened for procedural and administrative problems.

In 2016, law 4414/2016 addressed other forms of energy by implementing a new legal framework enhancing the national net-metering scheme to further technologies such as photovoltaic (PV), small wind, small hydropower, combined heat, and power, and biogas/bioliquid/biogas. The law also provided the opportunity for public and private law bodies, farmers, and agricultural owners to follow objectives for the public's purpose to use virtual net-metering for solar PV and small wind projects.

Finally, in 2018, the concept of 'Energy Communities' was presented, representing a shift from the traditional relationship between energy consumers and dominant energy utilities. According to the European Commission's Clean Energy Package published in 2018, 'Energy Communities' refer to the active involvement of local communities and citizens in the energy sector. Specifically, 'energy communities' are defined by two different laws. Firstly, the Renewable Energy Directive (EU) 2018/2001 provides a framework for 'Renewable Energy Communities'. Secondly, the Electricity Market Directive (EU) 2019/944, sets the framework for 'Citizen Energy Communities' by providing new roles and responsibilities for all types of electricity.

Greece implemented law 4513/2018 [23] preceding the Clean Energy Package, which includes elements from both RECs (REDII) and CECs (IEMD) combining them into a single definition of 'energy community'. 'Energy Communities' are understood as promoting solidarity, social economy, and innovation within the energy sector through cooperation, in store sustainable energy production to reduce energy poverty, energy management, storage, self-consumption, distribution, and energy supply and finally strengthen energy self-sufficiency and security.

The EU Directives and Greek Laws 4513/2018 and 1667/1986 provide also elements and conditions defining Energy Communities, including governance, ownership and control, purpose, geographical scope, activities, participants, and autonomy [24]. Additionally, Energy Communities must follow cooperative principles established by the International Cooperative Alliance (ICA). Seven principles are outlined, starting with Voluntary and Open Membership, followed by Democratic Member Control, Economic Participation through Direct Ownership, Autonomy and Independence, Education, Training, and Information, Cooperation among Cooperatives, and Concern for Community.

In other words, by introducing 'Energy Communities', the aim is to decentralize electricity generation by actively including not only Regional and Local Authorities but

[23] Greece. Law No. 4513/2018 on Energy Communities and other provisions. Official Government Gazette.
[24] For details, see Caramizaru, A., & Uihlein, A. (2020). Energy Communities: An Overview of Energy and Social I-Innovation. JRC Science for Policy Report JRC119433

also medium-sized local businesses, individual citizens, and local communities in energy projects, focusing on Renewable Energy Sources.

Overall, the notion of 'Energy Communities' was widely embraced in Europe, seen as a participatory and innovative approach, to empowering local communities. But, as shown in the REScoop.eu report among other publications, the progress of Energy Communities within Greece's legislative framework threatens citizen participation in the energy transition.[25] As already mentioned above, the laws remained fragmented and thus complex over the years, hindering the involvement of the communities. The procedures are expensive, and the application and access to finance and information continue to be difficult. Moreover, private investors have taken advantage of the new framework, and started to dominate the market of renewable energy sources. Consequently, the Ministry decided that from the start of 2022, all energy communities must compete with private actors to secure the functioning of RES projects. By adopting this competitive and discriminatory stance, energy communities are gradually excluded from participation and take the rest to vanish from the energy transition market. Greece's institutional framework violates the Renewable Energy Directive II and the Internal Energy Market Directive, by not enhancing the development of Renewable Energy Communities and Citizen Energy Communities.

Recently, law 4864/2021 was implemented for projects defined as 'strategic investments' with regard to the local or national economy needing a significant budget. The law grants financial and location incentives while also providing more advantages to projects in 'delignification zone', for example by giving access to administrative acts. Finally, the last law implemented in relation with renewable energies is the National Climate Law 4936/2022 on the transition to climate neutrality and adaptation to climate change. It also includes emergency provisions for energy crisis.

In March 2023, a significant amendment to energy community legislation was enacted, aligning it with European Directives 2018/20012 (Renewable Energy Directive - REDII) and 2019/9443 (Internal Electricity Market Directive - IEMD), ushering in a new era for this institutional framework. So, a revision to the regulatory framework for energy communities took place through the enactment of Law no. 5037/2023. It introduced two new types of energy communities, namely Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs), while concurrently eliminating the option to establish new energy communities as stipulated in the original Law no. 4513/2018. While existing Energy Communities established under founding Law no. 4513/20185 continue to operate, the possibility of establishing new ones has been discontinued as of 01/04/2023. The primary objective for all three types of energy communities remains

[25] Schokaert, H. (2021): Executive summary: development of community energy in Greece under pressure. REScoop.eu, [13.06.2023] https://www.rescoop.eu/news-and-events/news/executive-summary-development-of-community-energy-in-greece-under-pressure

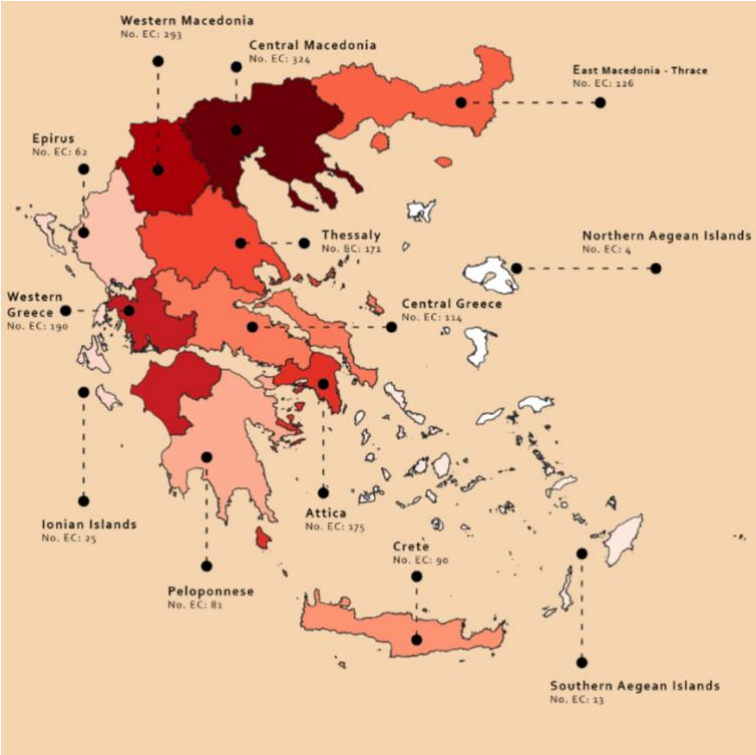
consistent, focusing on delivering environmental, economic, and social benefits to their members or their respective local areas of operation. Additionally, measures were implemented to prevent the exploitation of energy communities for financial gain, which notably included a substantial reduction in the portion of REC and CEC surpluses that could be distributed among members, limiting it to just 20%.

Energy communities

According to the data by the General Commercial Registry (GEMI), the Hellenic Electricity Distribution Network Operator (HEDNO) and the Independent Electricity Transmission Operator (IPTO) as presented in the Community Energy Watch by The Green Tank, in October 2023, there are 1.677 active energy communities recorded in Greece[26]. Of these, 1.668 are active Energy Communities under Law no. 4513/2018, increased by 18,6% compared to November 2022 (1.406). Moreover, eight Renewable Energy Communities (REC) and one Citizens' Energy Community (CEC) were established via Law No. 5037/2023 (March 2023)[27]. The difference in numbers between other European Countries is evident and can be explained by the fact that with law 4414/2016,[28] Greece became the first country in the EU that enables virtual net-metering.

Energy Communities in Greece are mainly: (a) self-production projects aimed at meeting the energy needs of members (virtual net-metering projects) and (b) commercial RES projects, which generate profits for community members through market participation.[29]

[26] The Green Tank (2023). Energy Communities in Greece and its Lignite Areas no. 4. Community Energy Watch. https://thegreentank.gr/wp-content/uploads/2023/10/202310_TheGreenTank_Brief_EnergyCommunities4_EN.pdf
[27] Greece. Law No. 5037/2023. Modernization of legislation for the use and production of electrical energy from renewable sources through the incorporation of EU Directives 2018/2001 and 2019/944. Official Government Gazette.
[28] Greece. Law No. 4447/2016 Spatial planning - Sustainable development and other provisions. Official Government Gazette.
[29] Greenpeace, WWF, Electra Energy, Rescoop EU, (2021). Development of energy communities in Greece: Challenges and proposals. [1-11-2023] ΕΚΘΕΣΗ: ΠΡΟΚΛΗΣΕΙΣ ΚΑΙ ΠΡΟΤΑΣΕΙΣ – Electra Energy

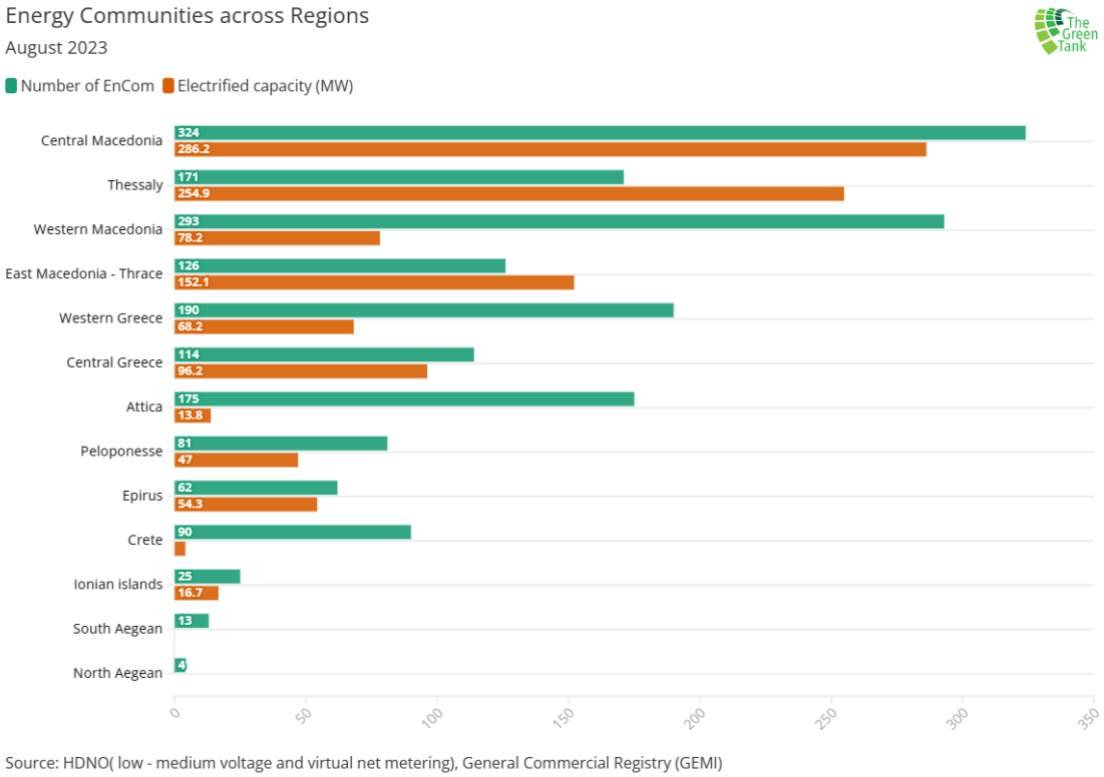


Map 4: Energy Communities in Greece by Region, 2023

Source: Data from GEMI, HEDNO as presented by The Green Tank, 2023

In August 2023, the electrified capacity of self-production initiatives undertaken by energy communities stood at 7.5 MW. Although this represents a threefold increase since November 2022, it pales in comparison to commercial projects, which exhibit a substantially greater capacity at 1,064.2 MW, marking a staggering 142-fold difference[30].

[30] The Green Tank (2023). Energy Communities in Greece and its Lignite Areas no. 4. Community Energy Watch. https://thegreentank.gr/wp-content/uploads/2023/10/202310_TheGreenTank_Brief_EnergyCommunities4_EN.pdf



Graph 1: Energy communities by region in Greece

Source: The Green Tank Community Energy Watch – The Green Tank

The demand for self-production projects initiated by energy communities has experienced a remarkable rise, with the number of requests surging from 147 in November 2022 to 577 in August 2023, reflecting a notable uptick of 292.5%. Concurrently, the corresponding requested capacity has also risen from 87 MW to 350 MW during this period[31]. Additionally, there is a growing interest in Municipality – led energy communities with several projects running or in the process.

To mention some diverse Energy Communities examples with a variety of characteristics and social-technological innovation:

- ESEK – Karditsa Energy Community: Research (Agrochain, Horizon BEcoop), biomass utilisation (ESEK).

- Minoan Energy EC-Crete: Virtual net metering, research, collaborations, photovoltaic plants (Αρχική - Μινώα Ενεργειακή Κοινότητα - MinoanEnergy)

[31] The Green Tank (2023). Community Energy Watch. Community Energy Watch - The Green Tank

- WenCoop EC – Thessaloniki: the 1st Energy Female Social Cooperative for women entrepreneurs and their businesses in Greece, photovoltaic plants (Wencoop - wencoop.gr).
- Sifnos Energy Community: pump storage and Wind energy generation (not producing yet) (Ενεργειακή Κοινότητα Σίφνου Ε.Κοιν.Π.Ε. – Sifnos Energy).

Case 1 Hyperion

The (solar) energy community Hyperion emerged in 2019, as a result of Law 4513/2018 which gives energy communities (defined as cooperative) more ownership over their activities inter alia. A group of seven individuals had the wish to create an energy community based on energy democracy and the social and solidarity economy in the energy sector, showing the wider public how it works while also providing a replicable case. The idea was to create a collective solar panel park to promote renewable energies, fight energy poverty and sustainably use local energy resources for local communities. Founded in 2020, the project started with a visual campaign, a business plan, and the goal of creating an economic, social, political, and environmental narrative.

In Greece and specifically in Athens, residents usually don't have access to their buildings' roofs, which does not allow them to use the space for solar panels for example. The newly implemented legislation gave individuals access to collective energy self-consumption through virtual net-metering. In other words, individuals and households would invest in solar panels located in a park in the region of Corinth (close to Athens) equivalent to their average annual energy consumption. Apart from using cleaner energy sources, it radically reduces energy bills and thus holds multiple benefits.

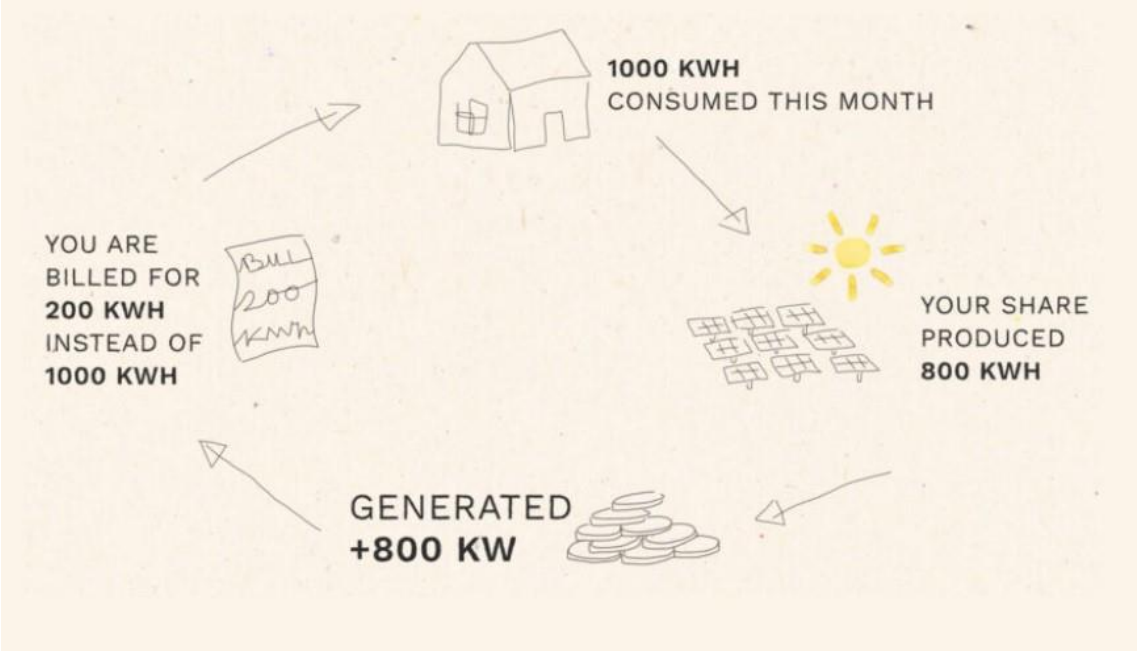


Figure 1: https://hyperion-community.gr/en/

The project counts today about 120 members, including SMEs, NGOs (Greenpeace, WWF, Impact Hub Athens, and Boroume among others), researchers, experts, activists,

artists, but also regular civilians. Members of the community are involved by participating in general assemblies reflecting the horizontal and democratic values of the cooperative. Additionally, a board of directors was elected constituting a few members whose role is to make sure that the community runs on a daily basis. Alongside, an oversight board focuses on the economic aspect of the project. The rights and roles of the members are defined by the statute. Through weekly emails and the Viber's group chat, people can keep in touch, build a network, and exchange on several topics. Recently, a voluntary group has been formed for those who wish to work on more specific topics such as gender justice and eco-feminism, energy poverty, housing renovation, degrowth, or electric mobility to name a few. For those who wish to join Hyperion, a regular membership form must be filled, and approved by the board and later the assembly. Nevertheless, usually, new members join when a new project is being developed. Alongside, Hyperion also organizes twice a year 'energy cafés', where individuals can exchange knowledge and practices, and discuss on various topics.

Hyperion's social goal is to give people agency over their energy consumption while contributing democratically to a just energy transition. This is done through an inclusive, participatory, and decentralized approach. Environmentally speaking, the goal is to promote clean energies while economically speaking, the objective is to reduce energy bills.

Hyperion also faced challenges, mainly regarding the bureaucratic process that is lengthy and complex. Building the solar panel park took about two weeks but setting up the community and its functions requires a more significant human and economic capital, delaying the project's implementation by several weeks. Additionally, the community also faced obstacles with the connection of the distribution system operation to the grids as most of them are not modernized and/or most of the electrical space is occupied by larger projects.

Finally, creating a community in times of neo-liberalism and increased individualism is equally challenging. Highlighting the notion of 'community' founded on trust and social capital, Hyperion also faces challenges due to the competitive and unfair environment in which energy communities in Greece must compete with megaprojects and large companies. Consequently, the cooperative also raises awareness of the need to implement a second pathway to setting up energy communities, in which smaller groups of people or SMEs must not face bigger actors.

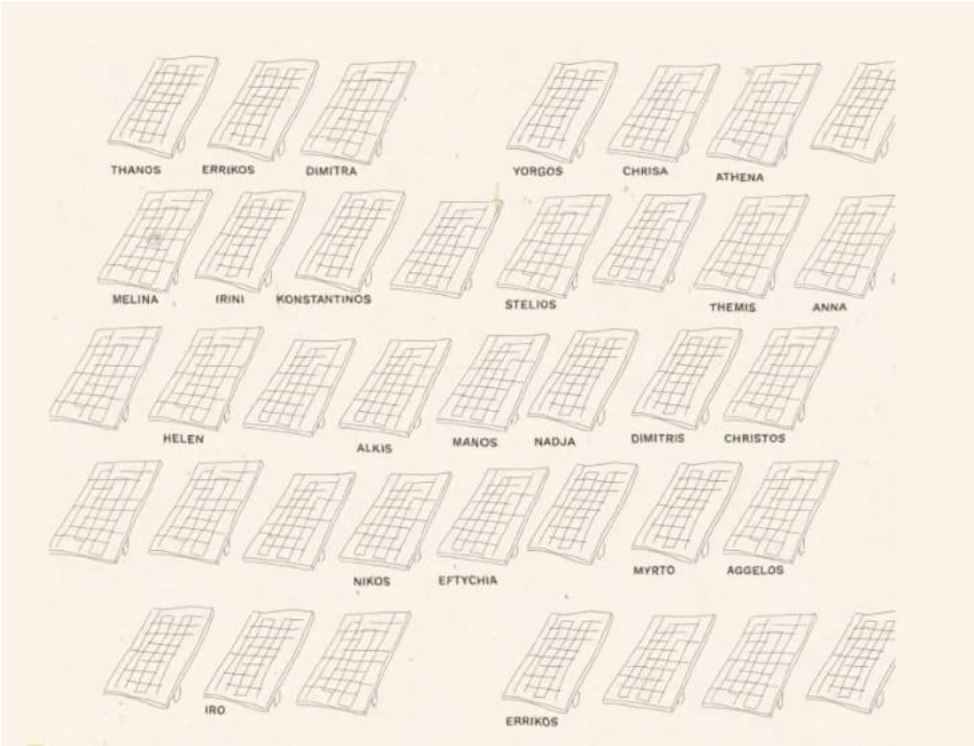


Figure 2: https://hyperion-community.gr/en/

Today, the photovoltaic station holds a capacity of 499,5kWp and is connected to a medium voltage network (MV). The produced energy is not sold but balanced against the energy consumer. This means that the members/consumers are just charged with the difference if more is consumed, or not charged at all if there is surplus. In total, about 355,000 euros were invested so far which allowed to reduce the CO2 emissions of 328 tonnes per year. To conclude, Hyperion's next steps will focus on finalizing the collective solar park.

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