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Sun4All Sustainable Implementation Plans for nine Community of Practice Observers

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1. Executive summary

Eurobarometer survey "Europeans' attitudes towards European Union energy policy" published on 24 September 2024 shows that European citizens support the energy policy pursued by the European Union (EU) in the last five years. Looking to the future, when asked to choose from a list of policy options to reach climate neutrality, most respondents say the **EU should encourage Member States to focus on measures that support households** in energy poverty (53%), to reduce energy consumption (50%) or measures that help citizens to produce or consume energy from renewable sources (50%).[1]

The "Sun4All – Eurosolar for All: Energy Communities for a Fair Energy Transition in Europe" (Sun4All) project, funded by the European Union's Horizon 2020 research and innovation program, focuses on setting up a **financial support scheme for renewable energy access for energy vulnerable households in Europe.** Four European cities and regions: Almada (Portugal), Barcelona (Spain), Coeur de Savoie (France), and Rome (Italy) are pioneering the Sun4All project's financial support scheme for renewable energy access. This scheme has been tailored to the **specific characteristics of each pilot location,** ensuring that all activities are oriented towards local needs.

One of the key objectives of the Sun4All project is to ensure **it is both sustainable and replicable across Europe.** To support this aim, a Community of Practice (CoP) Observer Group for European cities was created to oversee the project and facilitate the replication of Sun4All schemes in their respective regions. Composed of nine members from four EU countries – Italy, Poland, Portugal, and Spain – selected through an Open Call, the group observed the implementation of Sun4All pilots to **gain direct insights and apply these learnings** to develop their own energy poverty eradication strategies and local business models.

With the technical support of nine expert organizations, the **CoP Observer Group members developed the Sun4All Sustainable Implementation Plans.** These plans organize and consolidate the knowledge and experiences gathered through both group and individual activities, carried out online and in person, alongside collaboration with mentor organizations and the Sun4All pilots. Developed using co-creation methods, the Sun4All Sustainable Implementation Plans represent **a major outcome of the CoP Observer Group's involvement in the project.**

The Sun4All Sustainable Implementation Plans **will act as a strategic tool to expand the Sun4All financial support scheme** across Europe and beyond.

This report "Sun4All Sustainable Implementation Plans for nine Community of Practice Observers" is one of the key intellectual resources of the Sun4All project.

[1] Eurobarometer. Special Eurobarometer survey "Europeans' attitudes towards EU energy policy". European Commission, Directorate-General for Energy. Available at: https://europa.eu/eurobarometer/surveys/detail/3229. Accessed on 28 September 2024.

It is a comprehensive collection of nine Sun4All Sustainable Implementation Plans developed by the expert organizations for the CoP Observer Group members. This Sun4All project deliverable targets local and regional governments, public and private utilities and energy agencies, civil society organisations, social housing associations, energy cooperatives, energy agencies, and other audiences.

Annex 1

Sun4All Sustainable Implementation Plan for the City of Warsaw

Sun4All Sustainable Implementation Plan

City of Warsaw

May 2024

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Executive summary

Energy poverty affects approximately 12% of Poland's population, with regional variations ranging from 7% to 20%. In Mazovia, the rate is around 11%. Key factors contributing to energy poverty include low energy efficiency in buildings, insufficient incomes to cover energy costs, and rising energy prices.

In Warsaw, energy poverty is exacerbated by higher living costs and legal issues related to property status, which impede significant investments in building modernization. Specific areas, such as Praga-Południe, Praga-Północ, and Wola, face severe challenges due to outdated heating systems and reliance on expensive electric heating. These factors pose significant challenges to the energy transition process. However, well-designed public policies can mitigate energy poverty by enhancing building energy efficiency and promoting renewable energy sources.

Energy communities can significantly contribute to the energy transition by promoting decentralized and democratized energy production and consumption. This study defines energy communities as voluntary entities involving citizens, local governments, micro and small enterprises, and NGOs, focusing on producing energy for local needs and increasing energy self-sufficiency.

Several legal and organizational frameworks have been introduced in Poland to facilitate local energy production and consumption, enhancing community resilience to energy price fluctuations. However, financial barriers and the national specificities of energy poverty challenge the inclusion of low-income households in energy communities. Addressing these requires targeted support and ensuring that energy community models are adapted to local conditions. This study examines the relevance of collective, tenant, and virtual prosumer models for municipal policies tackling energy poverty in multi-apartment buildings.

The Sun4All project aligns with these goals, aiming to develop energy communities that foster a fair energy transition at the local level. Beneficiaries of Sun4All should primarily include entities managing multi-family residential buildings. Two approaches are proposed: a top-down approach using technical and social criteria based on administrative data and a bottom-up approach involving pilot projects in selected communities. We recommend customizing two Sun4All solutions to fit national and local contexts, focusing on collective energy production and basic models. Successful implementation of Sun4All models requires proper identification of vulnerable households and collecting and coordinating data on building conditions and energy use.

The successful implementation of the Sun4All model in Warsaw will help create sustainable, resilient communities capable of withstanding energy price fluctuations and improving the quality of life for vulnerable residents. Developing a system to share best practices and guide the creation of local energy communities will foster knowledge and collaboration among stakeholders.

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Introduction

Approximately 12% of the population in Poland lives in energy poverty. This percentage varies between 7% and 20% across different regions of the country, reaching 11% in Mazovia[1]. The reasons for difficulties in maintaining adequate indoor temperatures and suboptimal use of electrical appliances are varied. These include, but are not limited to:

- living in buildings with low energy efficiency, which require high energy inputs to maintain thermal comfort.
- low incomes that are insufficient to cover high energy costs.
- increasing prices of energy and fuels necessary for daily life.

These factors pose a challenge to the energy transition process. However, appropriately conducted public policies can mitigate the issue of energy poverty. Improving the energy efficiency of buildings and utilizing renewable energy sources can enhance local energy security. Increasing households' resilience to energy price changes also supports the development of innovative solutions that enable communal (collective) energy generation within local communities.

The Sun4All project aligns with the local government's efforts to initiate and support the development of energy communities. Its primary goal is to implement solutions that combat energy poverty and promote a fair energy transition at the local level by developing energy communities. This requires adapting the community energy models developed within the project to the existing legal frameworks in Poland and local conditions and needs. Therefore, the scope of this study encompasses the following tasks:

Diagnosing the state of energy poverty in Warsaw and analysing documents (strategies, plans, studies, etc.) that set the framework for mitigating the problem of energy poverty.

- Identifying local energy communities and actors involved in reducing energy poverty. Analysing existing connections between key actors and promoting local strategic frameworks for multi-stakeholder partnerships.
- Analysing experiences, identifying barriers and opportunities for developing energy communities in Warsaw, and presenting best practices implemented by local authorities and communities in Poland and countries with similar climatic conditions (e.g., Germany, Czech Republic, Lithuania, etc.).
- Identifying potential Sun4All financial support model beneficiaries based on their socio-economic characteristics (i.e., determining local requirements: criteria and conditions for utilizing the Sun4All model) in Warsaw.
- Analysing financing conditions and planning aspects for the local implementation of the Sun4All model (i.e., selecting an appropriate implementation model,

[1] Polish Statistical Office, Household Budget Survey 2023

preparing data and financial flows, defining stakeholder roles, designing local business models, conducting financial risk assessments, etc.).

This study consists of five parts. First, we analyse the conditions for creating energy communities in Poland and their potential use to reduce energy poverty. Next, we characterize energy poverty in Warsaw, paying particular attention to its specifics and actions taken to mitigate the scale of the problem. The third part identifies challenges related to developing energy communities and aiming to reduce energy poverty. The fourth part discusses the proposed method for identifying beneficiaries of the Sun4All project. Finally, the fifth part presents conclusions and recommendations for implementing the project's solutions in Warsaw.

1. Energy Communities in the Context of Energy Poverty

Energy communities utilizing renewable energy sources can play a significant role in accelerating the energy transition. From the perspective of national and local governments, their activities facilitate the energy system's decarbonization, decentralization, and democratization, contributing to achieving energy and climate goals. From the citizens' standpoint, energy communities enable active participation in the energy market, offering opportunities for self-generation of energy or providing an additional source of income. Local energy communities can increase households' resilience to price fluctuations in the energy market and enhance social acceptance of the energy transition. However, this requires developing rules for accessing jointly produced energy and ensuring a fair distribution of costs.

In this study, we define **energy communities as entities based on the voluntary engagement of citizens, local governments, micro and small enterprises, and other local entities (such as NGOs) in projects that aim at producing energy (electricity or heat) for their own needs**. These communities must focus on increasing energy self-sufficiency and providing local energy services, including improving energy efficiency. Following this logic, energy communities do not aim solely at achieving profit as the primary goal of their activities; instead, they emphasize building social bonds within local communities.

In Poland, energy communities can be established in various organizational and legal forms. These solutions evolve in response to the changing needs, local communities' expectations, and the necessity to implement EU legal regulations. In this study, we focus on energy communities in urban areas, comprising residents living together in multi-family buildings: cooperative, communal, and municipal housing. Currently, they can generate energy from renewable sources through the following four solutions (Table 1):

- Collective prosumer,
- Tenant prosumer (solution available from the end of 2023),
- Virtual prosumer (solution available from July 2025),
- Energy cooperati

Table 1. Legal forms of energy communities available in Poland

Aspect	Collective Prosumer	Virtual Prosumer	Tenant Prosumer	Energy Cooperative
Legal Basis	Article 2, Section 27c, Renewable Energy Act (REA)	Article 2, Section 27b, REA	Article 2, Section 27a, REA	Article 2, Section 33a; Article 38c, REA; Regulation on the Settlement of Energy Cooperatives
RE Installation Capacity	Up to 1 MW; total capacity billed per connection point cannot exceed 50 kW	Up to 1 MW; total capacity billed per connection point cannot exceed 50 kW	Up to 50 kW	Up to 10 MW; energy production must meet at least 70% of the cooperative's needs
Required Legal Form	None; A cooperation agreement between prosumers is required	None	None	Required registration with the National Court Register (KRS) and the National Support Centre for Agriculture (KOWR))
Number of Members	No limits	No limits	No limits	Minimum of 10 individuals or 3 legal entities, but fewer than 1,000 members
Settlement Model	Net billing[2]	Net billing	Net billing	Net metering[3]
Ownership of Installation	Housing cooperative or association and their members, third-party	Local government; cooperative or housing association, third party	Cooperative or housing association, third party	Energy cooperative or individual members
Location of Installation	On multi-apartment buildings	Not specified: possibility of placement on a building, ground, or other structure (e.g., a parking shelter)	On multi-apartment buildings	Within the community
Administrative and Spatial Requirements	Multi-apartment buildings	Multi-apartment buildings	Multi-apartment buildings	Up to 3 neighbouring rural or urban-rural municipalities operating within a single energy distributor area

Source: Based on A. Stupkiewicz i in., *Prawne aspekty tworzenia społeczności energetycznych. Poradnik*, Frank Bold, Kraków, 2023

[2] The net-billing settlement system is a mechanism for prosumers that assumes separate settlement of the value of electricity fed into the power grid and electricity drawn from the grid. The basis for settlements is the value of energy determined according to the market price. Energy settlements are conducted using individual accounts, so-called "prosumer accounts," which are managed by energy sellers.

[3] Net-metering is a quantitative model for settling energy from renewable sources. Energy surpluses fed into the grid by the prosumer can be drawn in later periods. In this way, energy grids function as energy storage for the prosumer. Surpluses fed into the grid can be drawn from it with a deduction of a set portion of energy, which constitutes compensation for storing energy in the grid.

1.1. Collective prosumer

The collective prosumer model enables the production of renewable energy (RE) in multi-apartment buildings. The legal basis for this model is the Renewable Energy Sources Act, which implements the provisions of the RED II Directive. These regulations have been in force since April 2022. The collective prosumer model was primarily designed for housing cooperatives and associations and their residents, but there are no formal obstacles to applying it in municipal buildings.

This solution allows for small RE installations (up to 1 MW) on a given building, with each apartment and common area able to be assigned no more than 50 kW of installed capacity. The generated energy should be used to meet the needs of the residents and the respective community. This model requires the conclusion of a cooperation agreement among prosumers, defining, among other things, the legal title and the percentage share allocated to individual prosumers (apartments, common areas) in the installation. The shares can be determined based on the financial contribution of households, or another distribution key established in the prosumer agreement (e.g., level of energy consumption, location of the apartment, income factors, number of residents, or other criteria considering the specifics of a given investment). These shares form the basis for the residents of multi-apartment buildings to utilize the appropriate portion of the produced energy. Full settlement of individual apartments (energy production and consumption) should be based on readings from smart meters for each apartment (point of consumption). This current requirement poses a barrier to the broad development of the collective prosumer model. Therefore, in most cases, the generated energy is allocated to community needs: lighting common areas, powering elevators, heating water, powering heat pumps, etc. This leads to underutilization of the potential for developing this model.

A separate issue is the settlement of the amount of energy consumed and supplied to the grid. Energy generated in a photovoltaic installation should be used to meet the residents' own needs and to power the common areas of the building. However, if a surplus of energy is produced, it is sold to the distribution grid and constitutes a so-called prosumer deposit. The funds accumulated in the deposit are used to settle the costs of energy drawn from the grid during periods when the amount of energy produced by the prosumer's installation is insufficient to meet their demand. Significantly, settlements are based on value, not the amount of energy produced and consumed, and are conducted in monetary terms rather than physical units (kWh). Funds that remain in the deposit in a given month roll over to subsequent periods within the same settlement year. If, at the end of the settlement year, there are still free funds in the prosumer deposit, the prosumer can withdraw 20% of them (the rest expires). This settlement method is known as net billing. Its main consequence is the requirement to adequately size the installation to match the prosumer's energy consumption profile.

It's worth noting that different models of photovoltaic installation ownership can be applied to the discussed collective energy production method. The installation can be owned by:

- the building manager and used solely for the common areas, only for residents, or in a combined form of these two variants.
- an external entity that leases the installation and sets the terms for its use.
- interested residents who use the installations for their own needs.
- the building managers and residents jointly bear the investment costs and use the energy according to the prosumer agreement.

Thus, the collective prosumer model allows for investments by external entities, enabling local governments to act as strategic investors in projects implemented in municipal buildings. This model can also serve if a larger number of municipal apartments are in buildings owned by other entities. A key element for local government involvement as an investor is the agreement specifying participation conditions, settlement mechanisms, exit conditions, and costs associated with the installation's operation.

Box 1. Case study: Collective prosumer in a housing cooperative in Ryki

The first energy community in the collective prosumer model was established in the Ryki Housing Cooperative (Lublin Voivodeship) in 2023. In the pilot project, the photovoltaic installation is owned by an external entity responsible for management, accurate billing, and representing the prosumers. Interested residents (collective prosumers) use the installation by paying fixed fees according to their share in the investment. In the case of the collective prosumer, residents can individually benefit from the photovoltaic system installed on the building, reducing their household energy bills. This way, the financial benefits of renewable energy sources are greater and more noticeable for the residents. The initiative in Ryki resulted from a collaboration between the National Centre for Nuclear Research, the employee-owned company Enercode, the Ministry of Development and Technology, and two companies: PEB and IB Company.

Source: https://www.gov.pl/web/rozwoj-technologia/pierwszy-prosument-zbiorowy-juz-czerpie-korzysci; Establishing the first collective prosumer in Poland, conference presentation available at http://www.2050.ptpiree.pl/konferencje/prosument/2023/materialy/24.pdf

1.2. Tenant prosumer

The tenant prosumer model was developed in response to the need to change the accounting method for collective prosumers. This solution was introduced into the Renewable Energy Sources Act in September 2023. Key changes enable compensation for energy. According to this model, power is generated solely for the common needs of residents, and the building itself must have a predominant residential function. In this model, the energy produced and consumed within the same hour constitutes self-consumption. The energy fed into the grid (hourly surplus) is converted into a monetary value at the market price, which is recorded in the prosumer's account as a prosumer deposit. At the end of the settlement period, the seller transfers the total funds from the prosumer deposit to the dedicated bank account. These funds can be withdrawn and used to settle electricity purchase charges by the housing cooperative or association or to reduce costs associated with the property where the RE installation is located (e.g., renovation fund, heating, property management, or cleaning services). The surplus can also be used for the same purposes in other buildings with a predominant residential function managed by the prosumer.

However, to take advantage of the tenant prosumer formula, it is necessary to connect the installation behind the meter of the shared parts of a multi-unit building. The building must have a predominant residential function, and the micro-installation (with a maximum capacity of 50 kW) must be located on the building (e.g., on the roof, balcony, or facade) and not on the ground. The capacity of the micro-installation cannot exceed the total connection capacity of the entire multi-unit building (shared parts and individual units combined). Since the installation covers energy consumption only in the common areas, smart energy meters are not required in each apartment. Despite the inability to use energy for individual needs, the benefits of self-generated energy arise from the possibility of reducing fees associated with powering common areas and using the funds from the sale of energy to lower administrative fees, support maintenance funds, etc.

The tenant prosumer model enables housing cooperatives and communities to invest in energy sources and reduce the burden of energy costs and other building maintenance expenses. It also facilitates the development of renewable energy investments in urban areas. Regarding the support provided to households in difficult energy situations, the advantage of the tenant prosumer model is the reduction of residents' maintenance costs. Similarly to the collective prosumer, this model can be implemented using various forms of financing, including leasing installations.

Box 2. Implementation of the Tenant Prosumer Model in the Przecław Housing Cooperative

In Przecław, a suburban village near Szczecin, the housing cooperative decided to establish an energy community operating on the principles of the tenant prosumer model. The housing cooperative purchased 100 PV modules for installation on the roofs of two multi-family buildings utilizing two renewable energy grants (covering 50% of the investment). These modules will supply energy to the common areas of the buildings. SM Przecław will be one of the first housing cooperatives in Poland to introduce this solution, additionally leveraging external financing. This financing will enable co-funding for the purchase of heat pumps and an energy storage system and allow the cooperative to increase its level of energy consumption for its own needs and to provide energy for lighting staircases, garage gates, intercoms, electric vehicle chargers, and other shared infrastructure, which is primarily used outside of peak photovoltaic hours.

Source: Przecław Housing Cooperative website and the portal przeclaw24.pl

1.3. Virtual prosumer

In the virtual prosumer model, energy is generated in one location but consumed in another. This solution allows for using the energy produced in an installation distant from the point of consumption. In this case, there is no typical self-consumption of electricity. All produced energy is fed into the grid and can be billed to designated energy consumption points. This solution is highly flexible and particularly beneficial when installing a renewable energy system on the property is impossible. The source can also be built using any technology (PV, wind, biogas, water, etc.). This solution will be incorporated into Polish law starting from July 2025.

The virtual prosumer model can be an appropriate tool to provide affordable energy to tenants of municipal housing in buildings where the municipality is not the sole owner or where, due to technical or legal reasons, the installation location is not feasible. The model allows for the settlement of energy consumed in a given area. The right to use the energy is established for 12 months, with the possibility of changing it for subsequent 12-month periods. This schedule means that the scope of provided support can be adjusted in subsequent billing periods. Implementing this solution will require equipping the billed apartments with smart meters.

Box 3. Local Energy Community in Jazdów

A solution similar to the virtual prosumer model was considered for the Jazdów estate in Warsaw. The concept was to create the first zero-energy quarter in Poland – a part of the city equipped with an internal grid and energy sources capable of covering the energy demand. This project was primarily to be implemented through extensive modernization and the replacement of all heat sources with heat pumps and energy storage systems. Additionally, a dedicated photovoltaic system was essential for this project. Due to the dense tree cover of the Jazdów estate, the historical significance of its buildings, and the lack of consent from the Heritage Conservator to install such invasive elements within the historic urban area, the installation of photovoltaic panels on the roofs of buildings was abandoned. Instead, the installation of a large-scale photovoltaic system on a nearby school building was proposed. The installation could partially cover the electricity consumption of both the school and the estate buildings.

Źródło: Miejska energetyka obywatelska. Możliwości utworzenia spółdzielni energetycznych w miastach na przykładzie warszawskiego osiedla Jazdów, CoopTech Hub oraz Fundacja im. Heinricha Bölla, Warszawa 2024

The introduction of the virtual prosumer model enables the use of photovoltaic energy even in cases where legal or technical obstacles hinder or prevent the installation of photovoltaic systems on the roof or facade of a specific building. Within this model, the city of Warsaw could generate energy, for example, for the residents of municipal buildings by utilizing installations located on public utility buildings (e.g., offices, schools, sports halls) or municipal land outside densely built-up areas. Moreover, this model supports energy-poor households living in municipal units within buildings owned by entities other than the city. In such cases, the virtual prosumer model could reduce household energy costs in difficult economic situations without establishing more complex energy community models.

However, the drawback of this solution is the lack of opportunities to use energy solutions for building local communities and social bonds. This drawback stems from the fundamental characteristic of the virtual prosumer, which is the separation of energy production and consumption locations.

1.4. Energy cooperative

Although, under the current legal conditions, the energy cooperative model cannot be fully implemented in Warsaw, we present this solution due to the popularity of this form of collective energy production in EU countries.

An energy cooperative's core activity is producing electricity, biogas, or heat from renewable sources exclusively for the cooperative's use and its members. This requirement means that cooperatives cannot sell electricity to entities that are not cooperative members. According to current regulations, this solution can be implemented solely in rural or urban-rural municipalities. This limitation prevents urban cooperatives from accessing more favourable energy settlement systems and other solutions available to energy cooperatives operating in rural areas. On the other hand, an urban energy cooperative can function as a citizen energy community; however, by law, its activities are limited to producing electricity and biogas.

There are three possible ownership models for installations within an energy cooperative:

- Installations are owned by the cooperative. In this case, the costs of purchasing, installing, and maintaining the installations are covered by the cooperative's budget, funded by membership fees. The energy settlement between the cooperative and its members is based on a predefined formula, often linked to the size of the member's shares in the cooperative. This solution benefits the cooperative's ability to obtain external financial support and determine an energy allocation mechanism. It is also the most suitable model for supporting energy-poor individuals or residents of municipal housing.
- Installations are owned by cooperative members. In this case, each cooperative member becomes a prosumer who sells the generated energy to the cooperative, which further distributes the energy internally.
- Installations are leased. In this case, the energy cooperative does not own the installations but leases them from an external provider or from cooperative members who own them. Leasing renewable energy-generating units allows the cooperative to avoid significant capital expenditures when purchasing and installing the system. Instead, the costs are spread over time and covered by the cooperative's current energy sales revenue. This approach provides flexibility and requires less initial capital investment in the early stages of the cooperative's operation.

Regarding the energy settlement method for energy fed into the grid, energy cooperatives are subject to different rules than the previously discussed prosumer models. A cooperative can use net metering to settle the amount of energy previously fed into the grid. Over 12 months, 60% of the energy fed into the grid can be returned to the prosumer. Hence, this system is described as a mechanism in which cooperatives use the public power grid as an energy storage system.

Box 4. Social Cooperative "Neighbours" in Pieniężno

The Social Cooperative "Neighbours" is a social economy entity established by the municipalities of Pieniężno and Lelkowo - two small local governments with very high unemployment, located about 100 kilometers east of Gdańsk. The cooperative started its activities in 2019, and its main goal is to create jobs for the long-term unemployed. The cooperative's activities include maintaining the cleanliness of roads and streets, green areas, waste collection, and running a canteen in the local school.

In 2023, "Neighbours" established an energy cooperative intending to install photovoltaic panels on residential buildings managed by the municipality, producing over 1MW of energy. The goal of the project is to enable residents of municipal buildings to access cheap and clean energy. The long-term plans of the "Neighbours" cooperative also include thermal modernization and upgrading the heating system to utilize heat pumps.

The project received over 230 thousand PLN funding from the RES Grants financed by the National Recovery Program (KPO) for the construction of photovoltaic installations.

Source: https://spnsasiedzi.pl; Polska Zielona Sieć Elektryzujące Wspólnoty. Transformacja Polskiego Sektora Elektroenergetycznego Przez Lokalne Źródła Odnawialne https://zielonasiec.pl/wp-content/uploads/2024/05/energising-communities-pl.pdf

Solutions within various prosumer models also create opportunities for establishing local energy communities in Warsaw, with consideration given to the needs of those experiencing energy poverty. The following section will discuss the scale and specifics of this issue in the city.

2. Diagnosis of Energy Poverty in Warsaw

While energy poverty is well-diagnosed at the national and regional levels in Poland, the local level struggles with a lack of adequate data. This gap is primarily due to the difficulty in collecting detailed household data. Investigating energy poverty requires gathering dispersed information on building energy efficiency, residents' incomes, and energy bill amounts. Especially the last two issues, being sensitive data, are protected, and their direct use for monitoring energy poverty at the local level is not possible. As a result, local governments – including large ones like Warsaw – must rely on other data, which usually comes from ad hoc studies, moderately useful in later local government practice. Such analyses allow for estimating the scale of energy poverty and the specifics of this phenomenon on a city scale. However, they do not allow for detailed identification of buildings or households that require investment or support first. According to one such study conducted in 2023 at the request of the Municipal Social Welfare Center in Warsaw[4]:

- 15% of Warsaw residents have difficulty maintaining a comfortable temperature in their homes,
- 14%-17% of people report problems with timely payment of gas, electricity, and heating bills,
- 15% of people have payment delays for energy, most of which are up to 3 months.

2.1. Specifics of Energy Poverty in Warsaw

Factors that define the specifics of Warsaw and may influence the level of energy poverty include higher living costs compared to other cities and issues arising from the unregulated legal status of buildings. The claims often restrict the ability to carry out substantial investments in buildings, including the modernization of heating systems. This situation usually results in the lack of appropriate heating and gas installations or outdated solutions, such as solid fuel boilers that cause air pollution. Consequently, residents are forced to use electric heating.

The effects of using such a heating method include higher costs and an increased fire risk due to outdated electrical installations and inadequate safety measures. This phenomenon mainly affects the less affluent parts of districts such as Praga-Południe, Praga-Północ, Włochy, Rembertów, and Wola. It is worth noting that areas especially vulnerable to energy poverty have been identified by social welfare centres in each of Warsaw's districts[5]. The poor technical condition of buildings and historical factors often cause energy poverty in these locations. In the post-war period, buildings not destroyed by wartime actions were heavily utilized due to a housing deficit. During the city's reconstruction from destruction, not all buildings were equipped with basic installations. This results in numerous construction defects, dampness and mould, which directly impact the residents' health. Despite intense investment pressure and a challenging housing situation, an additional significant issue in Warsaw is the presence of vacant properties. Their presence also worsens the technical condition of the remaining parts of buildings.

Municipal buildings pose a particular challenge in terms of modernization. According to the Multi-Annual Plan for the Management of Warsaw's Housing Stock, the technical condition of 77% of buildings is poor, acceptable, or sufficient. While significant progress has been made recently in connecting buildings to the district heating network and eliminating coal-fired sources, a problem persists with apartments heated by inefficient electric installations, particularly in buildings that

[4] Kalinowski S., Łuczak A., Zwęglińska-Gałecka D., Paczek D., Szczygieł O., Wojciechowska A., 2023. Diagnoza przyczyn ubóstwa energetycznego w województwie mazowieckim. MCPS/IRWiR PAN, Warszawa.

[5] Polska Zielona Sieć/Instytut Reform, 2023. Analiza społeczno-polityczna dotycząca ubóstwa energetycznego w Warszawie, Warszawa.

have not undergone thermal modernization. Such heating accounts for 14% of all municipal units in the city. Often, it is not feasible to use other heating technologies for these buildings because connecting them to the district heating or gas network is technically impossible or economically unfeasible. Additionally, the city aims to consolidate its housing stock in modern multi-family buildings.

Since the problem of energy poverty mainly relates to difficulties in maintaining a comfortable indoor temperature, it is equally essential to ensure adequate cooling during heatwaves. The increasing frequency of heat waves makes this issue more pressing. Consequently, there is growing attention to installing fans or air conditioning units in residential buildings. Notably, the installation of these devices increases the household demand for electricity.

Residents of Warsaw are mobilizing against energy poverty. Unique nationwide initiatives included tenant actions in the second half of the last decade, which highlighted the issue of energy poverty[6]. They also emphasized the consequences of this problem for urban policy, criticizing the poor technical conditions and delays in connecting some buildings and tenements to the district heating network. They also highlighted the dramatic health impacts of energy poverty: more frequent lung diseases or even rare diseases among people living in poor conditions affected by energy poverty. Due to these actions, energy poverty and the connection of buildings to the district heating system, where possible, have been included in the 'Housing Policy – Housing 2030'[7], the 'Green Vision of Warsaw'[8], and other municipal documents. It is also worth noting that while the issue of energy poverty is recognized in municipal and single-family buildings (due to anti-smog actions), it remains significantly less understood in buildings belonging to housing associations and cooperatives.

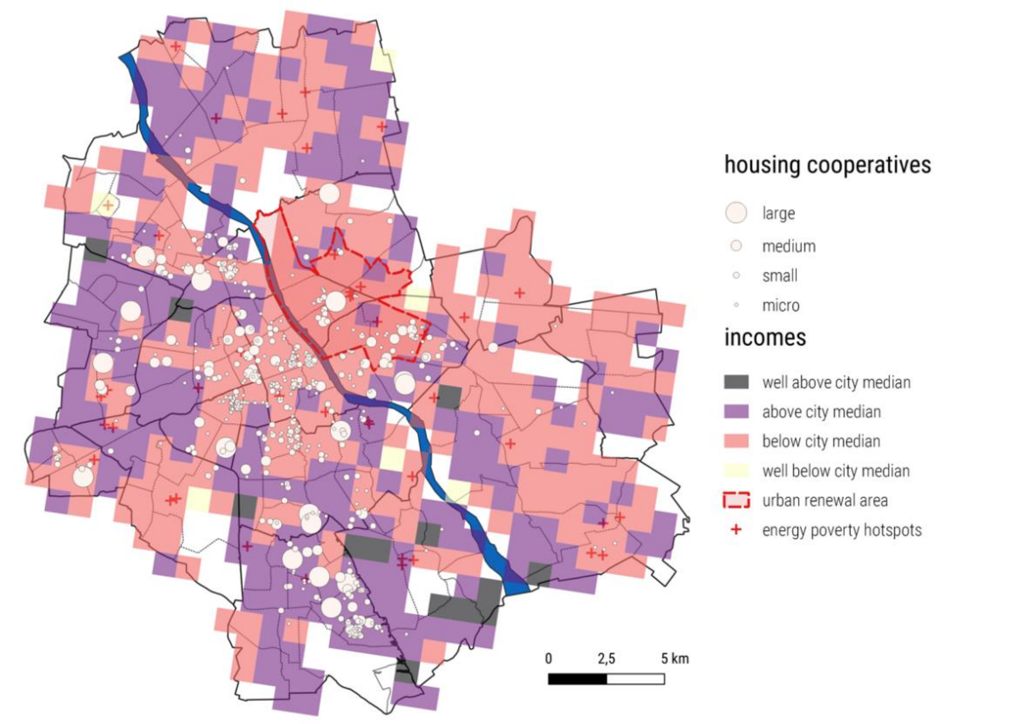
[6] Zak D., 2019. Lokatorzy komunalnych kamienic chorowali. Raport mykologa: Osiem gatunków trujących grzybów, 10.02.2019, Tok.FM. https://www.tokfm.pl/Tokfm/7,130517,24433946,lokatorzy-komunalnych-kamienic-chorowali-raport-mykologa-osiem.html

[7] Resolution of the City Council of the Capital City of Warsaw No. LIX/1534/2017

[8] Resolution of the City Council of the Capital City of Warsaw No.LXXX/2648/2023

Box 5. Energy poverty hotspots in Warsaw

The Social Welfare Center (OPS), in a study conducted for the C40 network in 2023, identified specific streets across all districts where residents struggle with energy poverty (see map below). These streets are mainly located in areas outside dense multi-family housing developments. Additionally, data from the most detailed income distribution map in the city (from 2018) indicate that relatively less affluent areas include regions with scattered informal and suburban housing owned by private individuals (e.g., Siekierki, Zerzeń, Kobiałka), as well as areas where social housing buildings were located (e.g., Olszynka Grochowska) or are currently located (e.g., Placówka – a part of Bielany district). Municipal buildings close to hotspots are primarily found in revitalization areas, such as Grochów, Kamionek, Szmulowizna, and Targówek Przemysłowy (outside these areas: e.g., Falenica and Nowe Włochy)[9]. At the same time, these areas have significant income disparities, resulting in income values closer to the city median (though not exceeding it). Interestingly, most housing cooperatives in Warsaw also fell below the city median, except for Ursynów and Gocław[10].



Source: Own elaboration based on Statistics Poland (2021), IBS Research Report 03/2023 and C40 report on energy poverty in Warsaw (2022).

[9] Areas outside the revitalization zone are also located in parts of the Wawer district (Falenica) and the Włochy district (Nowe Włochy).

[10] It should be noted that the location of housing cooperatives is based on the cooperative's headquarters. Some cooperatives, particularly the two largest ones (RSM Praga and WSM), manage buildings in several districts of the city.

2.2. Actions to Reduce Energy Poverty

Urban policy regarding energy transition and combating energy poverty is dispersed among various departments. The City Hall's units dealing with energy poverty are as follows:

- Office of Housing Policy, responsible for managing the city's housing stock, including direct cooperation with Property Management Departments.
- Office of Air Protection and Climate Policy, dealing with, among other things, obtaining funds for the thermal modernization of buildings.
- Office of Projects and Social Assistance, and social policy centres, performing tasks delegated by the state, such as disbursing benefits to compensate for high energy costs.
- Office of Infrastructure, crucial for decisions on the city's energy transition possibilities and directions, responsible for the development of renewable energy sources (RES) in municipal institutions and the development of the Energy Management System in municipal institutions.
- District Offices, whose tasks include maintaining and operating municipal housing resources and conducting activities related to energy advice.

Such dispersion of competencies stems from the complex nature of energy poverty. From the perspective of conducting effective urban policy, however, it hinders monitoring the scale and dynamics of the problem. It also impedes the coordination of intervention and preventive actions. Therefore, all actions promoting cooperation between city hall units, data exchange, and coordination of other activities at the intersection of housing, climate, and social policies are needed.

Energy poverty is gaining the attention of city authorities and currently forms a significant part of the municipal agenda. In the main development strategy for Warsaw, which focuses on housing ("Housing Policy – Housing 2030"), combating energy poverty is treated as a positive side effect of increasing building energy efficiency (Warsaw City Hall, 2017). Meanwhile, tackling energy poverty is an essential aspect of investment and renovation activities in the Multi-Annual Housing Resource Management Program for Warsaw for 2021–2025. The document's authors link "changing heating methods based on solid fuels to reduce air pollution and eliminate energy poverty" (Multi-Annual Housing Resource Management Program for Warsaw 2021–2025, p. 17, 35) and indicate that the issue of energy poverty is addressed within actions related to the energy transition. In the program's diagnosis, energy poverty is defined as "a situation in which the tenant, due to the cost of necessary heating, cannot maintain an adequate air temperature in the apartment due to their income" (Appendix 1 to the Multi-Annual Housing Resource Management Program for Warsaw 2021–2025, p. 17). This approach reflects the initial conceptualizations of the phenomenon, linking energy poverty primarily with heating. The document's authors diagnose the problem in buildings lacking central heating and hot water, noting the escalation of energy poverty in buildings in poor technical condition, and discuss the consequences of the phenomenon (greater likelihood of deteriorating residents' health and housing degradation). The developed program accurately identifies the phenomenon, defining it as a problem of lack of access to networks and the necessity of using coal heating (causing air pollution) or electric heating (causing high costs).

2.3. Funding Sources for Modernization Investments in Multi-Family Buildings

The city is actively facilitating the energy modernization of buildings. This includes leveraging existing support instruments for residents of single-family homes (such as the Stop Smog program or the Clean Air program and municipal grants) and multi-family buildings (Table 2). One of the most important funding sources for municipal buildings is the BGK[11] Subsidy Program, which offers non-repayable support to expand the stock of municipal and TBS (Social Building Society) units using state budget funds. Housing cooperatives and associations can use various credit instruments and the RES grant, enabling a 50% subsidy for photovoltaics or other renewable energy source installations with energy storage.

Since 2022, the city has also been providing funds for heat pumps, solar collectors, photovoltaic panels, and wind turbines. These funds are accessible to institutions managing multi-family buildings. Depending on the technology, city support ranges from 15,000 to 40,000 PLN. These initiatives primarily aim to enhance the energy efficiency of buildings, which can indirectly and significantly reduce residents' energy bills. However, solutions that would achieve this directly are not yet available, and energy cooperatives could play a crucial role in this regard.

An alternative to using own funds or taking out loans for photovoltaic investments is leasing. This solution is available to businesses, housing communities, cooperatives, and municipalities. Commercial entities often offer leasing programs, such as photovoltaic companies collaborating with banks or by the banks themselves. The benefits of leasing are related to the possibility of gradually repaying the costs of the project. After fulfilling the obligations specified in the agreement, the installation becomes the investor's property and generates measurable profits. Utilizing leasing in energy projects allows for reaping the benefits of renewable energy sources and optimizing investment costs.

[11] Bank Gospodarstwa Krajowego (BGK) is a Polish national development bank.

Table 2. Funding Sources for Modernization Investments in Multi-Family Buildings

		Beneficiaries				Type of investment			
Funding Institution	**Program**	Municipality / Local Gov.	Housing Cooperatives	Housing Communities	**Type of Support**	Energy Audit	Thermal Modernization	Heat Source Replacement	PV Installation
National Fund for Environmental Protection and Water Management (NFOŚiGW)	Ciepłe Mieszkanie (Warm Apartment)	v		v	grant	v	v	v	v
Regional Fund for Environmental Protection and Water Management (WFOŚiGW)	Program OA-P1 Zadania z zakresu ochrony powietrza (Air Protection Tasks)	v	v	v	loan	v	v	v	v
BOŚ Bank	ELENA	v	v	v	grant	v			
National Development Bank (BGK)	Thermal Modernization Bonus with the Option of a Thermal Modernization Grant	v	v	v	partial repayment of the loan taken out for the thermal modernization investment		v		
	MZG Bonus with the Option of an MZG Grant: funding for improving the technical condition of the municipality's housing stock	v			grant		v	v	
	RES Grant	v	v	v	grant				v
Masovian Unit for the Implementation of EU Programs (MJWPU)	Energy Efficiency Project: Improving the Energy Efficiency of Public and Residential Buildings No. FEMA.02.01-IP.01-036/24 for the RMR Region	v			grant		v	v	v
City Office	Municipal Photovoltaic Development Program	v			grant				v
	Grants for Residents for Boiler Modernization	v	v	v	grant			v	v
	Grants for Residents for Local Renewable Energy Source Investments	v	v	v	grant				v
Commercial and cooperative banks	Individual investment loans	v	v	v	loan	v	v	v	v

3. Opportunities for the Development of Energy Communities to Reduce Energy Poverty

3.1. Challenges Related to the Development of Energy Communities to Reduce Energy Poverty

European legislation (RED II Directive) emphasizes the role of energy communities in combating energy poverty, linking their development to the obligation to ensure the participation of all consumers, including low-income or vulnerable households. Although the specific models for the operation of energy communities and the implementation of their social role are not precisely defined, at least three ways in which energy communities can help alleviate energy poverty can be identified:

- Ensuring access to cheaper energy within local energy projects.
- Considering the specific energy needs of community members (e.g., using electricity for heating, operating medical and rehabilitation devices, etc.) in securing energy access for these households (e.g., priority for using jointly generated energy at a specific time).
- Conducting educational activities to address the challenges that vulnerable energy consumers face in the energy market.

However, existing experiences show that individuals experiencing energy poverty and vulnerable energy consumers face significant difficulties in accessing renewable energy production. Financial barriers are the primary challenge for the active participation of energy-poor households in energy communities. Involvement in local energy projects as investors (shareholders, cooperative members) is challenging for low-income households due to a lack of capital. The situation of households in energy poverty does not allow investments in long-term assets, such as shares in community energy projects. Due to their financial difficulties, membership agreements specifying the conditions and costs of withdrawing from investments and the procedures for terminating agreements may also pose a barrier. Therefore, integrating energy-poor and vulnerable households into energy communities requires support.

Another barrier that may significantly impact the effectiveness of energy communities in combating energy poverty is the national specificity of this phenomenon. In Poland, it is primarily associated with inadequate access to heat. Therefore, improving the situation of households struggling with energy poverty will largely depend on the technologies used in heating systems. Energy generated within an energy community through photovoltaic installations will not affect heating bills if the heating systems are powered by other fuels (e.g., gas, coal, or biomass). At the same time, expanding investments to include the installation of heat pumps or systems allowing the heating of domestic water using solar installations can increase the impact on energy-poor households.

The effective use of PV installations to support heating systems also requires ensuring an adequate technical standard of the building. In some cases, parallel or preliminary investments are necessary to reduce energy demand. The method of including technical issues in the criteria for selecting beneficiaries is proposed in section 3 of this study.

Another challenge related to the development of energy communities is the anticipated changes in energy billing methods. Currently, energy fed into the grid is settled monthly, based on the average market price from the previous month published by PSE (Polish Power Grids). However, starting in July 2025, it is anticipated that prosumers will be able to settle in an hourly system. As a result, there is a risk of negative prices during peak renewable energy production periods. Collective prosumers are not protected from covering additional costs related to energy overproduction during peak hours. Therefore, optimizing the use of energy produced in their installations will require the implementation of energy management systems by collective prosumers. Properly sizing the capacity of installations and introducing solutions that increase the potential for self-consumption (e.g., by installing energy storage, heat pumps, electric vehicle charging stations) will also become critical.

A further obstacle is identifying households affected by or at risk of energy poverty. It is challenging to reach households which, despite experiencing energy poverty, are not eligible for social assistance due to having incomes that are too high[12]. The main barrier is obtaining sensitive household data, including income levels and energy expenditures. Using administrative data registers can provide significant support in this regard. Administrative data registers, maintained by state and local government institutions, contain extensive information about buildings and households. The necessary data scope and the method of incorporating it into the criteria for selecting beneficiaries are described in section 4.2 of this study.

3.2. Best Practices of Using Energy Communities to Reduce Energy Poverty in Other Countries

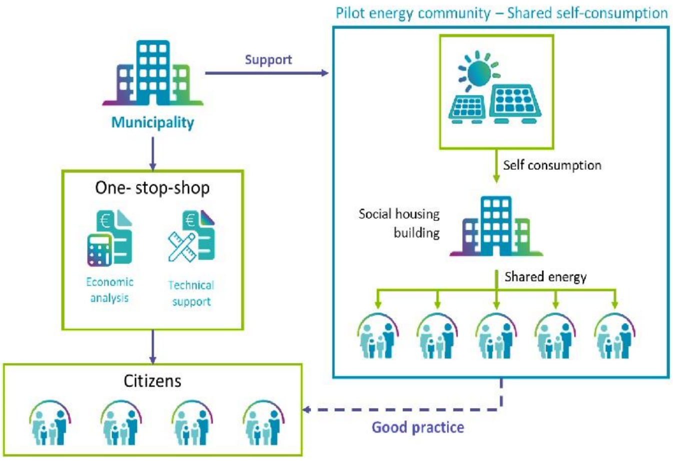
Pilot solar installation in Rožnov pod Radhoštěm (Czechia)

As part of the Horizon2020 POWER-UP project, the local government of the small town of Rožnov pod Radhoštěm (17,000 inhabitants) in the eastern part of the Czech Republic is implementing a pilot photovoltaic installation on a municipal multi-family building. This installation aims to reduce electricity bills for households experiencing energy poverty by providing power for common areas and individual

[12] Although energy poverty is expected to decrease along with increasing household income, this problem may also affect those who are not income-poor. In this case, the main risk factor is high energy expenditure resulting from the specific needs of a given household. The above-standard energy consumption may result from, for example, the health condition of household members and the need to constantly use medical devices.

apartments[13]. According to the project assumptions, 50-70% of the generated energy will be consumed locally, with the remaining surplus fed back into the grid, from which residents will also benefit[14]. This example is intended to encourage other city residents to undertake similar actions without direct municipal support. In such cases, the city will offer support for business and technical analysis through a one-stop-shop model.

Figure 1. Model for Rožnov pod Radhoštěm



Source: Jaroslav Klusák, SEMMO (projekt POWER-UP)

In 2023, as part of the POWER-UP project, the city, in cooperation with its partner SEMMO, engaged the local community, focusing mainly on young families and retirees experiencing energy poverty[15]. The project identified the following conditions for effectively engaging individuals facing this issue[16]:

- Building trusting relationships,
- Building equitable processes and procedures,
- Ensuring diversity of membership,
- Ensuring tangible benefits to participants.

Rožnov pod Radhoštěm's pilot project results from the high activity of the local government in the energy sector. The city is a member of the Association of Energy Managers of Cities and Municipalities in Czechia (SEMMO)[17], which allows for acquiring unique knowledge tailored to the needs of local governments and

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[13] https://energycommunityplatform.eu/wp-content/uploads/2024/02/Inclusivity-Guidebook_SCCALE203050_updated.pdf
[14] https://nuitlasuisse.net/?_=%2Fceske-republice%2F%23KJWqMdlUlBn8PPpbQxLjjor5fY9lCVi4u%2B8xN2KEfBkllA%3D%3D
[15] https://www.dataplan.info/img_upload/f96fc5d7def29509aeffc6784e61f65b/07_klusak_semmo_prezentace_brno_nszm_2023.pdf
[16] Burbidge M., Petrova S., 2022. Engaging with Vulnerable Households – A Practical Toolkit. POWER-UP Project Resources.
[17] https://semmo.cz/2019/09/rozhovor-se-starostou-roznova-pod-radhostem/

implementing innovations. The city has established an Energy Commission. According to the mayor, the city has saved 1.9 million CZK over two years and implemented several innovative solutions, such as public buildings built to passive house standards. The next step is to form a local energy community within a multi-family building, and it is worth observing the implementation of this pilot project.

Supporting Local Communities within Energy Cooperatives in London

The Newham Borough Council, located in the eastern part of London, has been a key partner in the activities of Repowering London. Repowering London is a non-profit social enterprise established to empower local communities by developing renewable energy projects within the city. The enterprise's activities focus on supporting communities, particularly those in inner-city social housing estates, in initiating and managing renewable energy projects. These projects aim to engage people in the energy transition, create local job opportunities and reinvest profits into community initiatives. Since its establishment in 2014, Repowering London has installed photovoltaic systems that power over 125 homes on social housing estates. The role of the Newham Council in these activities was to help identify locations for PV panels and to initiate cooperation between parties interested in establishing an energy cooperative.

In 2023, the energy cooperative Community Energy Newham (CEN) completed the construction of its first photovoltaic installations, which will supply energy within the borough. Solar panels were installed at three locations on the roofs of libraries (East Ham, Beckton Globe, and Stratford). Collectively, these installations provide enough energy to power about 50 homes. CEN is also identifying additional locations, with plans to generate 2 MW of solar energy to power approximately 620 London homes.

According to the model developed by Repowering London, volunteers run the cooperative, and the profits generated from the sale of energy are directed to local projects through co-called *Community Benefit Societies*. Members join the community by making an investment in a local renewable energy project. Revenue generated by projects is distributed to investors and funnelled into a community benefit fund. Members of each Community Benefit Society decide how revenues are spent to support the local community best.

The purchase and installation of the systems were financed with the support of the Mayor of London and Repowering Communities (RC), an association supporting the development of energy communities in the city. RC provides financial resources for purchasing and commissioning the installations, thereby reducing project risk. The cooperatives can gradually buy out the photovoltaic installation according to their fundraising schedule. This financing model allows for affordable conditions for individuals wishing to join the cooperative and benefit from access to renewable energy.

Repowering London launched a pilot micro-donations (crowdfunding) program in 2021 to quickly respond to the increased needs of households in financial difficulties. One way to raise funds is to develop an offer to persuade local businesses (small and large) to donate to Repowering London as part of their corporate social responsibility (CSR) strategy. At the end of 2022, €2,800 in funding was distributed across the Community Energy London network to support energy efficiency measures for people living in fuel poverty.

Model of a Prosumer Community in Lithuania

Lithuania is a country where a public platform for purchasing solar energy has been launched. The Lithuanian Solar Energy Community ("Saulės Bendruomenė") is a government project that allows citizens to buy or rent a remote solar panel through an online platform[18]. This solution is based on the virtual prosumer model.

Consumers can buy or rent part of a solar power plant or build their installation anywhere in Lithuania and use the energy produced there in another place. The available installation capacities for prosumers range from 1 kW to 10 kW and deliver the electricity to the grid to meet the later needs of households. The basis for choosing the installation size and reserving production capacity in PV systems is the calculation of energy consumption by the household.

This solution addresses the needs of low-income individuals and those living in multi-family buildings. The Lithuanian government has introduced financial incentives that accelerate the return on investment in solar power plants. The support program allows consumers to apply for subsidies to purchase energy from photovoltaic panels. The amount of support is 323 euros per 1 kW, with a maximum grant amount of 3230 euros[19]. This support enables a return on investment within 4-5 years. Additionally, in the updated National Energy and Climate Plan, the Lithuanian government announced increased incentives for individuals who have been granted social assistance. The program aims to allow for subsidies covering 85% of installation costs[20].

4. Identification of Beneficiaries of the Sun4All Project

4.1. Institutional Landscape of Multi-Family Buildings in Warsaw

Identifying the beneficiaries of the Sun4All project, whose end-users are residents experiencing energy poverty, should primarily include entities managing multi-family residential buildings. In the Polish legal context, these entities are naturally predisposed to establish a local energy community in the city. They likely possess

[18] https://saulesbendruomene.lt/saules-parkai

[19] Eurofound (2022), *Compensating purchasing costs of remote solar power plants, measure LT-2022-29/2902 (measures in Lithuania),* EU PolicyWatch,
Dublin, https://static.eurofound.europa.eu/covid19db/cases/LT-2022-29_2902.html

[20] Draft Update of The National Energy And Climate Plan of The Republic of Lithuania 2021-2030,
https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

the best knowledge about the building's technical condition and capabilities, as well as an understanding of household situations. Entities managing multi-family residential buildings can be divided into:

Private entities:

- Housing cooperatives,
- Housing communities and property administrators managing properties on behalf of the communities,

Public entities:

- TBS (Social Building Societies),
- District offices and property management departments managing municipal housing stock.

In the case of public entities and housing cooperatives, there is a complete listing of such entities due to their legal form and registration in state records. Warsaw is home to **497 housing cooperatives[21] and two municipal TBS companies** (Towarzystwo Budownictwa Społecznego Warszawa Północ Sp. z o.o. and Towarzystwo Budownictwa Społecznego Warszawa Południe Sp. z o.o.). Additionally, there are **12 municipal property management departments (ZGN)** in Warsaw, managing municipal housing units (ZGN Białołęka, Bielany, Mokotów, Ochota, Praga Północ, Praga Południe, Śródmieście, Targówek, Wawer, Wola, Włochy, Żoliborz). In other districts, this function is performed by respective **departments within the district office structure** (np. Bemowo, Rembertów, Ursus, Ursynów, Wilanów, Wesoła). Data on individual buildings are available in the continuously expanding SEIZBIL system, though it requires enhanced reporting.

The situation is more complicated for housing communities. Housing communities do not have a KRS (National Court Register) number and do not report like businesses. Available estimates suggest about **10,000 housing communities** in Warsaw (REGON), while the number of entities managing them is significantly lower. Partial listings of these entities are published by ZGNs only for buildings containing city-owned units; however, this represents a small portion of the total. The situation is further complicated because, in some cases, housing communities manage housing cooperatives.

Consequently, monitoring housing data is complex[22] and would require a separate analysis based on data directly obtained from the REGON system. Moreover, unlike public entities and housing cooperatives, accessing information on the expenditures of these entities on energy and materials is much more difficult, as housing communities do not submit their financial documents to the KRS. Similar data gaps (lack of knowledge on the exact number and diversity of entities, as well as information on energy usage) also affect collective housing – both temporary (e.g., dormitories, shelters, boarding schools) and permanent residences (e.g.,

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[21] Frankowski, J., Świetlik, T., Prusak, A., Mazurkiewicz, J., Sokołowski, J., Bełch, W., Staňková, N. (2023). Housing cooperatives facing the energy transition. Insights from Poland and Czechia. IBS Research Report 03/2023.

[22] Milewska-Wilk H., 2023. Działalność i znaczenie spółdzielni mieszkaniowych w Polsce. Instytut Rozwoju Miast i Regionów, Warszawa.

retirement homes, religious houses), managed by other public or non-governmental entities.

In the case of public infrastructure not used for residential purposes, which could serve the purposes of virtual prosumer investments, this resource is well-mapped. Individual municipal institutions' energy consumption data are available to the Office of Infrastructure. From an analytical perspective, publicly available data on procurement groups' websites include listings of electricity consumption points. To describe each one, they contain the point name, contract party, address, meter number, tariff, forecasted and actual energy consumption, distributor and supplier information, contract terms, and renewable energy production. In 2023, there were 130 such points, of which over 30 showed energy production surpluses from renewable sources. These included ZGNs, nursing homes, schools, and district offices. The listing of these units is publicly available[23] and can help design potential virtual prosumer solutions.

4.2. Sun4All Proposed Approaches to Identifying Entities for the Sun4All Project Solutions

In planning solutions to support individuals affected by energy poverty, we propose focusing investments in the most problematic housing resources where the City Office can intervene. Initially, we suggest applying the criterion of building ownership to which the energy produced by the city will be directed. There are two possible approaches: a top-down approach and a bottom-up approach. Below is a brief overview of these approaches.

4.2.1. Top-Down Approach

The first proposed method is to identify potential beneficiaries based on technical and social criteria developed using administrative data available to the city. We suggest adopting one of two variants:

The first variant includes electricity production in the collective prosumer model in installations located on the roofs of residential buildings wholly owned by the city. These buildings include about 25,000–28,000 units or about one-third of Warsaw's municipal housing stock. In this case, the selection criteria should combine the technical characteristics of the building with social criteria.

The second variant involves the production of energy using the virtual prosumer model. In this solution, electricity is produced in an installation located on the roof of a public sector institution or municipal land and billed to the municipal building. The criteria for selecting project beneficiaries should then primarily consider social criteria. This solution could address the needs of individuals living in municipal units

[23] This is Appendix No. 2 to the Terms of Reference in the tender documentation (Purchase of electricity for the period from January 1, 2024, to December 31, 2024, for the Warsaw Purchasing Group: link)

within multi-family buildings owned by other entities (e.g., cooperatives or housing communities). These units make up about two-thirds of Warsaw's municipal housing stock.

Technical Criteria

In developing the technical criteria for identifying buildings, we propose using data gathered in the municipal Building and Premises Registration and Management System (SEIZBIL). SEIZBIL contains data on buildings owned by the city (both residential and non-residential), which are entered and updated by Property Management Departments (district units responsible for managing municipal property). Among the data available in the SEIZBIL database that could be used for technical criteria identification, useful variables for identifying buildings suitable for developing community energy solutions may include:

- Number of above-ground floors,
- Usable floor area,
- Number of units (with designated use),
- Elevator,
- Technical condition of the building,
- Legal status of the building,
- Fire resistance class,
- Type of roof covering,
- Roof covering area,
- Presence of electrical and lightning protection installations and central heating,
- Monument status.

Additionally, this data could be supplemented with criteria such as the building's solar exposure or broader potential for solar energy generation at a given location. However, this information is available for a fee and is not linked to the above dataset, which may also recommend further development of the SEIZBIL system. An additional data source in this regard could be specialized GIS tools (e.g., Solar Analyst) available in some software, which allow for such analyses[24]. However, a solution in the form of a city solar map requires the laborious integration of vector and raster data, which exceeds the scope of this study.

At the current stage, using municipal administrative data may face challenges. These include data incompleteness, including building data (e.g., lack of numbers from the Land and Building Register). Address inconsistencies, such as the exact address appearing for multiple buildings (particularly concerning outbuildings in central Warsaw tenements), also pose a barrier. However, suppose data is supplemented to a full extent. In that case, the above system can become a valuable tool for selecting city-owned buildings with appropriate parameters for

[24] Koster G., van Sark W., Ricker B., 2024. Solar potential for social benefit: Maps to sustainably address energy poverty utilizing open spatial data in data poor settings. Energy for Sustainable Development 80, 101453. https://doi.org/10.1016/j.esd.2024.101453.

investment and subsequently establishing further contact with the residents. Efforts to supplement municipal administrative data are underway, including within the CARE project (Carbon-neutral and Affordable Retrofits for Everyone in Need).

An example of selecting municipal building locations using technical criteria is shown in Box 6. The following variables were used for location selection:

- Good technical condition of the building,
- Functional electrical installation,
- Functional lightning protection installation,
- Presence of at least eight units in the building.

The selection of criteria significantly narrows the number of potentially attractive locations due to the small number of buildings wholly owned by the city with appropriate technical conditions. This relatively small stock of buildings suitable for developing energy communities indicates the need for prior or concurrent renovation. Additionally, solutions are needed to include project beneficiaries in those municipal units located in buildings not owned by the city.

Box 6. Mapping Potentially Attractive Locations for PV Installations Using Administrative Data

The map illustrates the locations of municipal buildings most suitable for PV Installations.

Adopting technical criteria narrows the number of potentially attractive locations due to the limited number of buildings wholly owned by the city that meet the required technical conditions. This approach also highlights the need for prior or concurrent renovation activities.

Source: Own study based on administrative data.

Social Criteria

In addition to technical criteria, we propose using social criteria to identify the beneficiaries of Sun4All solutions. These criteria can be based on the following indicators available in municipal repositories:

- Use of social assistance funds at a given address,
- Past use of various forms of energy allowances (e.g., protective allowance) at a given address,
- Use of coal, electric or oil heating at a given address (based on CEEB),
- Presence of rent reduction compensations due to electric heating at a given address.

Obtaining the first two pieces of information will require cooperation with other municipal units, including social assistance centres, to obtain sensitive data. The third data point is available in the Central Register of Building Emissions. However, this database, like SEIZBIL, faces similar address-related barriers where one address may include multiple buildings, and it is not complete even for buildings under municipal management. The fourth data point also requires obtaining sensitive information, with housing departments in district offices being the appropriate data controllers. Unfortunately, according to our sources, it is not possible to get income information at the building level, which would be the best way to identify Sun4All beneficiaries. If it is possible to verify income data for municipal tenants or convince tax offices or the Ministry of Finance to provide tax data at a very low aggregation level (building), then the precision in identifying buildings and, therefore, potential stakeholders affected by energy poverty would be much more significant[25]. The same applies to electricity, gas, and heating bills.

Social criteria should be the key solution in the case of solution number 2 – the virtual prosumer, where the household is the main analytical unit. In this case, the photovoltaic installation is located in a different building, not necessarily residential or near the beneficiary. However, it is debatable to what extent this kind of support will constitute a "local energy community" and to what extent it will simply be an interesting mechanism for transferring support to the poorest regarding reducing their energy bills.

Combining Technical and Social Criteria

Next, technical and social criteria can be combined to form a synthetic indicator, which can be used to identify optimal locations and for discussions with stakeholders. A key aspect of the correct choice is balancing the social objective on the one hand and minimizing the risk of investment failure on the other.

A good practice would be to establish a team to determine the essential indicators/criteria for the investments and their respective weights. These criteria may include entry requirements, such as the minimum number of

[25] Interesting Case Study in This Area Conducted in The Hague https://www.sciencedirect.com/science/article/pii/S2214629623003055?via%3Dihub#b14

people/apartments in the building, the technical condition of installations, and the presence of lightning protection installations. This approach is particularly important as knowledge and competencies in energy have been distributed across various city office departments in recent years.

4.2.2. Bottom-Up Approach

Implementing ready-made solutions requires a certain level of institutional and legal stability. Considering the current conditions, including the unverified provisions regarding the functioning of various new legal forms establishing energy communities, a more appropriate and realistic may be the 'bottom-up' approach. This method could involve piloting the solution in a specifically selected location. This proposition is the best available formula, but it would require the involvement of various city offices and the energy billing operator.

In implementing such an investment, we propose consultations with municipal property management departments and the selection of a relatively small, typical multi-family municipal building, preferably in locations identified as energy poverty hotspots, whose residents would express willingness and readiness to cooperate in the investment in exchange for possible reductions in their bills. The building and its resident group could then promote the model solution.

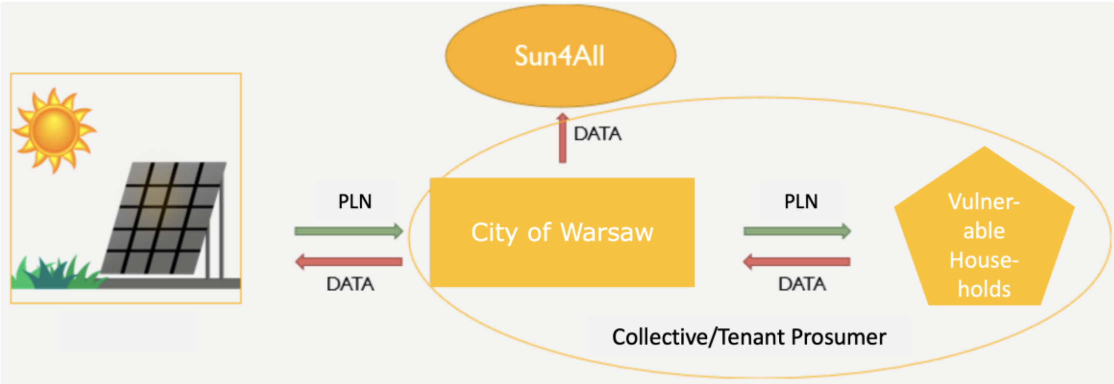
5. Recommendations for Implementing the Sun4All Model

The use of renewable sources is a fundamental element of the energy transition and can contribute to increasing the resilience of households to energy price fluctuations. This shift is significant for individuals and families at risk of energy poverty. Due to their difficult situation, they require support to engage in the = energy communities. Such support is also essential for the fair distribution of benefits and the minimization of social costs associated with the transformation and decarbonization process. Our recommendations include the following issues:

1. **Adapting models** developed under the Sun4All project requires customising these solutions to national and local conditions. Considering the legal framework and the specifics of municipal housing and energy poverty, the models that can be applied in Warsaw relate to the Energy Community Model and the Basic Model.

The proposed collective energy production model in the Sun4All project (Figure 2) can be implemented in municipal buildings owned by the city. In this case, tasks related to the operational management of the building can be carried out by ZGNs (Municipal Property Management) or relevant departments within district offices. The legal solutions enabling the application of this model are the collective prosumer or tenant prosumer. For the collective prosumer, the energy produced in the PV installation should power the common parts of the building. The justification for this restriction is the complexity of prosumer agreement processes and the risk associated with the turnover of residents in municipal units. Support for vulnerable residents within this solution includes reducing energy costs through self-consumption and, in the case of the tenant prosumer, also reducing maintenance costs associated with building upkeep.

Figure 2. Model of Collective Energy Production



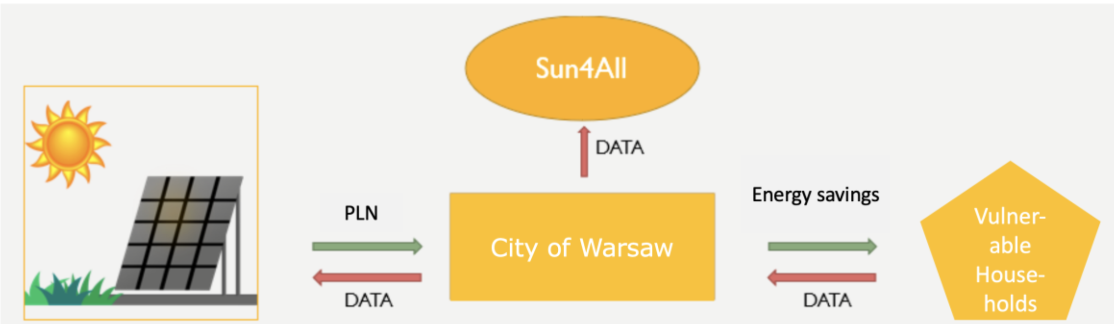
Source: Sun4All D2.1. Blueprint model for the Sun4All programme

In the basic model (Figure 3), the city acts as an "intermediary" between energy production in the photovoltaic installation and the project beneficiaries (end users). The legal solution corresponding to this model is the virtual prosumer. The city's tasks in this model would be:

- Collecting data on energy production,
- Determining the share of energy produced allocated to individual municipal units,
- Selecting the entity responsible for managing financial flows associated with potential energy production surpluses to ensure appropriate benefits for the end users of the project, i.e., vulnerable consumers.

This model can be particularly beneficial for municipal housing in buildings where installation on the premises is not feasible due to technical or legal reasons.

Figure 3. Basic Model



Source: Sun4All D2.1. Blueprint model for the Sun4All programme

2. **Beneficiary Identification**: The identification of beneficiaries for solutions based on the Sun4All project in Warsaw can be conducted both in a top-down manner (using objective technical and social parameters) and a bottom-up approach (selecting a specific community and conducting a pilot). We recommend starting with the bottom-up approach and scaling the developed solution based on administrative data.

3. **Modernization of Municipal Buildings**: Modernizing municipal buildings in cities requires considering technical and social criteria for selecting beneficiaries. This approach will enable the achievement of economic and social efficiency goals. When planning solutions to support individuals affected by energy poverty, we propose concentrating investments on problematic yet representative housing assets where the City Office may intervene and have higher chances of successful pilot implementation. Using social criteria based on measurable and transparent data will allow for the fair modernization of municipal buildings and the development of renewable energy sources.

4. **Complexity of Energy Poverty Information**: The complexity of energy poverty results in the dispersion of information needed to identify vulnerable households correctly. Therefore, it is necessary to coordinate the activities undertaken within the City Hall and verify the information gathered in the city's information resources. The actions we identify include:

   - Completing and improving the functioning of systems that collect information on the technical and legal status of buildings,
   - Collecting and aggregating information on energy use and consumption in individual municipal buildings,
   - Coordinating decisions on the placement of PV installations, initiating energy communities in municipal buildings, and renovation activities undertaken by other municipal units.

5. **Information System on Community Energy Models**: Creating an information system on the functioning models (best practices) of energy communities in Warsaw. An information campaign detailing the pathways for creating local energy communities would help propagate knowledge about the formal and technical requirements, establishment procedures, and financing options for developing such communities in the city. These activities would also inspire other entities (e.g., housing cooperatives, associations, and local neighbourhood organizations) to engage in collective energy production in the city.

These recommendations aim to support the effective implementation of the Sun4All model, ensuring it addresses the specific needs of energy-poor households in Warsaw and promotes the development of sustainable energy solutions.

Conclusion

Successfully implementing renewable energy solutions is a crucial step toward achieving energy transition. The Sun4All project aims to develop energy communities that foster a fair energy transition at the local level, emphasizing the involvement of multi-family municipal buildings.

Energy communities play a significant role in promoting decentralized and democratized energy production and consumption. However, this process is not possible without support from local governments and city authorities, including vulnerable households. Therefore, targeted support is required to ensure that energy community models are adapted to local conditions and provide solutions that leave no one behind.

The Sun4All model's implementation in Warsaw will help improve the quality of life for vulnerable residents. By leveraging renewable energy sources and fostering local collaboration, the project will enhance the resilience of vulnerable households to energy price fluctuations. Additionally, it will encourage knowledge sharing and collaboration among stakeholders, guiding the creation of local energy communities.

References

Burbidge M., Petrova S., 2022. Engaging with Vulnerable Households – A Practical Toolkit. POWER-UP Project Resources.

Draft Update of The National Energy And Climate Plan of The Republic of Lithuania 2021-2030, https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

Empowering Londoners to build a clean, local and affordable energy future for everyone, https://www.repowering.org.uk/

Eurofound, 2022, Compensating purchasing costs of remote solar power plants, measure LT-2022-29/2902 (measures in Lithuania), EU PolicyWatch, Dublin, https://static.eurofound.europa.eu/covid19db/cases/LT-2022-29_2902.html

Frankowski, J., Świetlik, T., Prusak, A., Mazurkiewicz, J., Sokołowski, J., Bełch, W., Staňková, N. (2023). Housing cooperatives facing the energy transition. Insights from Poland and Czechia. IBS Research Report 03/2023.

GUS, 2020. Stratyfikacja dochodowa mieszkańców miast - raport końcowy, Warszawa.

GUS, 2023. Badanie Budżetów Gospodarstw Domowych, Warszawa

Inclusivity Guide For energy communities, https://energycommunityplatform.eu/wp-content/uploads/2024/02/Inclusivity-Guidebook_SCCALE203050_updated.pdf, [dostęp]

Just Transition Plan for the London Borough of Newham, https://www.newham.gov.uk/council/just-transition-plan/2

Kalinowski S., Łuczak A., Zwęglińska-Gałecka D., Paczek D., Szczygieł O., Wojciechowska A., 2023. Diagnoza przyczyn ubóstwa energetycznego w województwie mazowieckim. MCPS/IRWiR PAN, Warszawa.

Klusák J., Sdružení energetických manažerů měst a obcí, https://www.dataplan.info/img_upload/f96fc5d7def29509aeffc6784e61f65b/07_klusak_semmo_prezentace_brno_nszm_2023.pdf

Koster G., van Sark W., Ricker B., 2024. Solar potential for social benefit: Maps to sustainably address energy poverty utilizing open spatial data in data poor settings. Energy for Sustainable Development 80, 101453. https://doi.org/10.1016/j.esd.2024.101453.

Miejska energetyka obywatelska. Możliwości utworzenia spółdzielni energetycznych w miastach na przykładzie warszawskiego osiedla Jazdów, CoopTech Hub oraz Fundacja im. Heinricha Bölla, Warszawa 2024

Milewska-Wilk H., 2023. Działalność i znaczenie spółdzielni mieszkaniowych w Polsce. Instytut Rozwoju Miast i Regionów, Warszawa.

Polska Zielona Sieć, 2024. Elektryzujące Wspólnoty. Transformacja Polskiego Sektora Elektroenergetycznego Przez Lokalne Źródła Odnawialne https://zielonasiec.pl/wp-content/uploads/2024/05/energising-communities-pl.pdf

Polska Zielona Sieć, Instytut Reform, 2023. Analiza społeczno-polityczna dotycząca ubóstwa energetycznego w Warszawie, Warszawa.

POWER UP in Czech Republic: Rožnov pod Radhoštěm https://nuitlasuisse.net/?_=%2Fceske-republice%2F%23KJWqMdlUlBn8PPpbQxLjjor5fY9lCVi4u%2B8xN2KEfBkllA%3D%3D

Rozhovor se starostou Rožnova pod Radhoštěm, https://semmo.cz/2019/09/rozhovor-se-starostou-roznova-pod-radhostem/

Saulės parkai, https://saulesbendruomene.lt/saules-parkai

Uchwała nr LIX/1534/2017 Rady Miasta Stołecznego Warszawy z dnia 14 grudnia 2017 r. w sprawie uchwalenia polityki mieszkaniowej - Mieszkania 2030 dla Miasta Stołecznego Warszawy

Uchwała nr LXXX/2648/2023 Rady Miasta Stołecznego Warszawy z 20 kwietnia 2023 roku w sprawie przyjęcia „Zielonej Wizji Warszawy"

Zak D., 2019. Lokatorzy komunalnych kamienic chorowali. Raport mykologa: Osiem gatunków trujących grzybów, 10.02.2019, Tok.FM. https://www.tokfm.pl/Tokfm/7,130517,24433946,lokatorzy-komunalnych-kamienic-chorowali-raport-mykologa-osiem.html

Zakup energii elektrycznej na okres od 1 stycznia 2024 r. do 31 grudnia 2024 r. dla Warszawskiej Grupy Zakupowej: https://zamowienia.um.warszawa.pl/pn/umw/demand/notice/public/101762/details

Annex 2

Sun4All Sustainable Implementation Plan for the Comune di Sezze

Sun4All Sustainable Implementation Plan

Municipality of Sezze (LT)

June 2024

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
Work Package	**WP2** "Business Model. From "Solar for all" programme to Eurosola to all (Sun4ALL) designing the scheme in an European context" **WP5** "Sustaining Transferability and Upscaling"
Dissemination Level	PU
Author(s)	Sezze Technical Partner - EnGreen
Co-Author(s)	-
Contributor(s)	-
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Status	Final
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Executive summary

Main objective of Sezze municipality is to create a Renewable Energy Community, with the aim of promoting a more affordable, sustainable, and efficient way to produce and use energy.

Sezze, although located in a hilly area, benefits from a favourable location for large portions of the territory, which lends itself well to the exploitation of renewable resources and therefore to the installation of green energy systems. Many areas enjoy good or high exposure to both the sun.

A key pillar of the project would be to ensure that vulnerable households have access to renewable energies to cover their energy needs: this objective will support multiple policy goals, such as affordable energy, job creation, and improved public health.

Although the need to use renewables is commonly agreed as the only way to ensure a sustainable future, many households may not be able to afford the related needs for different reasons (such as lack of access to information, difficulties to access finance or ownership patterns). The inability will than create different consequences, starting for the inhibition in participating at the energy transition.

For this reason, the Energy Community might become the main actor in the energy transition, by allowing all the citizens to participate, giving them solar shares instead of a traditional social subsidy. The beneficiaries of the programme will be as well co-owners of some local PV plant, and the revenues produced through the generation and selling of the energy will be used to reduce energy bills.

In terms of urban planning, the small size of the inhabited area would be extremely favourable for achieving the maximum effectiveness of any energy initiative. Furthermore, within the municipal area, there are some large buildings that could be made available to the entire community for future installations of solar systems. Finally, still in the field of local resources, the presence of an industrial area is of considerable importance which could represent the ideal place for a recovery and reconversion which tends to create a totally circular supply chain, becoming at the same time an example that can be replicated in many other areas characterized by deindustrialization.

In the regulatory field, the municipality, in line with its ecological footprint policy, undertakes to issue specific municipal ordinances which tend to facilitate the installation of photovoltaic systems also in its historic centre. The initiative is an example of consolidation at the regulatory level of the already present environmental predisposition of the community of the valley itself.

This document sets the strategic ground for developing the Sun4All Sustainable Implementation Plan for the Municipality of Sezze to plan to adopt and up scale the Sun4All programme locally. This document is developed in the form of a guidelines. It presents the guiding principles on learning and knowledge focus areas needed for the Sun4All programme sustainable implementation and replication planning locally. This document aims to ensure that Sun4All Sustainable Implementation

Plan is built under integrated management processes and based on a deep understanding of the energy poverty challenges identified during project development phases. It compiles the key information about the objective (section 2) and thematic content (section 3) of the Sun4All Sustainable Implementation Plan.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
REC	Renewable Energy Community
RES	Renewable Energy Source

1. Introduction

The main objective of the Sun4All Sustainable Implementation Plan is to outline the steps and actions the Municipality of Sezze should take to support the implementation and continuation of Sun4All beyond the Sun4All project timeline, fostering replication at local level.

Sun4All Sustainable Implementation Plan should streamline systematization of knowledge and experience of member of the Sun4All Community of Practice gained through the group level and individual online and onsite engagement activities and collaboration with the mentor organisation and the Sun4All pilots. The Sustainable implementation Plan will be built under co-creation methods and will be resulting document from participating in the Sun4All project as members of the Community of Practice Observes Group.

The overall idea of the project is to contribute to the achievement of energy self-sufficiency in the municipality of Sezze through the establishment of a REC (Renewable Energy Community) and to pursue following benefits for Sezze population:

- Save money through a free REC participation.
- To ensure access whether participants are renters or homeowners, especially if in a situation of vulnerability.
- Promote and facilitate the participation into the energy transition and leaving no one behind.
- To facilitates a behaviour, change and tailored advice to beneficiaries.
- Optimization of public funds management, and transforming funds into a profitable investment for the beneficiaries
- Beyond improving access to energy, it fosters energy citizenship among vulnerable groups, in line with the EU Green Deal principles and the Clean Energy for all Europeans packages.

Strengthened by this initiative, Sezze could aim to become in the short term a virtuous example of local energy production and use, targeting in the medium term at territorial energy self-sufficiency. The ambition of the project will therefore be to trigger a process of innovation and awareness of the territory's values andpotential, which will allow a system to be structured on a solid basis that can support the administration's decisions in the areas of investment planning, social and territorial policies.

The participation in the Sun4All project will allow Sezze to offer the possibility to the selected citizens to join energy efficiency workshops, to get empowered and, in the future, to join the Renewable Energy Community that Sezze aims to create.

2. Work Process

Table 1 presents the modular structure of the Sun4All Sustainable Implementation Plan. Specifically, this document traces the working steps and related actions carried out for planning and developing Sun4All program. It is worth noting that the activities listed in Table 1 were partially funded by the Sun4All project in accordance with the financial support service requirements.

In future chapters of Sun4All Sustainable Implementation Plan individual activities will be described.

Table 1 Structure of the Sun4All Sustainable Implementation Plan

Working steps	Activities	Deliverable	Budget allocation	Time allocation
Current State of Energy Poverty Action	Energy poverty state of the art research	Description of energy poverty situation of Sezze and moreover initiatives promoted by local entities and social assistants to combat the vulnerable situations.	8.000 €	3 months
Criteria and conditions for participation in the Sun4All program adoption	Eligibility criteria definition to differentiate households' categories.	Description of the rules for the participant categorization.		2 months
	General Data Protection Regulation protocols and procedures	GDPR rules and templates.		1 month
Citizen Engagement and Activation	Citizen engagement and Activation	Attendances lists. Flyers, brochures, public notices to promote the project.		1 month
Community building and raising of energy literacy for the Sun4All programme adoption planning	Training/ Education	Educational sessions to fight energy illiteracy (these sessions to help citizens to learn how to reduce energy consumption, sensibilize citizens on environmental issues, teach citizens how to create/join a REC)		3 months
Stakeholders mapping and coordination	Stakeholders mapping and coordination.	Lists and meeting calendar	15.000 €	6 months
	Research and analysis of possible 'green' energy systems	Report highlighting the different options that Sezze Municipality must cover his energy needs with renewable sources, like sun, wind, water, and biomass.		

<table>
<tr><th>Working steps</th><th>Activities</th><th>Deliverable</th><th>Budget allocation</th><th>Time allocation</th></tr>
<tr><td rowspan="3">Technical adoption planning</td><td>Feasibility study of the conversion of abandoned industrial buildings</td><td>Report describing the possible abandoned areas which can be converted into production sites.</td><td rowspan="3">-</td><td rowspan="3">-</td></tr>
<tr><td>Consumption analysis to estimate the energy patterns and properly dimension the generation systems</td><td>Report highlighting the consumption and production curves of REC members.</td></tr>
<tr><td>Technical assessment of possible sites suitable for the development of the plants</td><td>Feasibility plan of the possible generation sites.</td></tr>
<tr><td rowspan="3">Legal adoption planning</td><td>Legal support for the establishment of a REC</td><td>Choice of the legal entity most appropriate to the purpose of the REC</td><td rowspan="3">5.000 €</td><td rowspan="3">3 months</td></tr>
<tr><td>Creation of legal templates.</td><td>Contracts and subscription forms</td></tr>
<tr><td>Cooperative administrative procedures.</td><td>Book of procedures</td></tr>
<tr><td rowspan="3">Financial scheme adoption planning</td><td>Business model and financing scheme definition</td><td>Business model highlighting the economical KPIs</td><td rowspan="3">5.000 €</td><td rowspan="3">3 months</td></tr>
<tr><td>Technical-administrative support for access to PNRR funds for the realisation of renewable plants for RECs</td><td>Direct support to municipality officers</td></tr>
<tr><td>Shared self-consumption implementation to distribute advantages and funds.</td><td>Yearly report of energy, economic and CO_2 flows</td></tr>
</table>

Working steps	Activities	Deliverable	Budget allocation	Time allocation
Replication and scalability potential	Development, maintenance, and promotion of the project website.	Web site	8.000 €	3 months
	Promotion via social media.	Post lists		
	Development of a project video.	Video		
	Feed project information into newsletters, magazines, and other media, either thematic or targeting dedicated audiences	Newsletters		

3. Current State of Energy Poverty Action

Energy poverty is a social priority in Europe. It has always existed but, it has been tackled in silence from the local social services and charities. Since 2007, after the first EU project on energy poverty (EPEE project), energy poverty was uncovered, and many initiatives have been implemented in Europe for years. However, most of them target energy efficiency and behavioural change but, to match the targets set by the energy transition leaving no one left behind, any energy poverty initiative must ensure the access to renewable energy also to those suffering a situation of vulnerability.

Renewable energy communities are an innovative tool that can mark a strong cultural and environmental change. The municipality of Sezze proposes this intervention also to overcome energy poverty and social weaknesses: this new REC must meet the needs identified by the members themselves and, consequently, clearly respond to the specific characteristics of the realities involved in these initiatives.

Through Sun4All project, Sezze contributed to a socially fair energy transition, giving access to RES to people suffering a situation of energy poverty, and, at the same time, the programme supports and empowers them to overcome the situation.

Energy poverty state of the art research is necessary to better define the project boundaries. Sezze Municipality with social assistants analysed energy poverty situation through direct meetings with citizens and analysing socio-economic conditions. Through the help of social assistant, Sezze Municipality described also the initiatives promoted by local entities regarding, more generally, the poverty situation.

The municipality of Sezze has **a history of proactive measures** to combat poverty. Utilizing direct interactions with citizens and the expertise of social workers to analyse and address socio-economic conditions, the municipality has effectively identified and responded to the evolving needs of its community. These efforts underscore the local government's commitment to alleviating hardship and enhancing the quality of life for its residents.

- *Solidarity Card Initiative ("Carta Solidale"):* During the COVID-19 pandemic, Sezze introduced the "Carta Solidale," a support mechanism for families with an annual ISEE (economic situation indicator) not exceeding €15.000.This initiative helped eligible families purchase necessities, particularlyduring a time when many were facing increased economic instability. The program meticulously targeted the most vulnerable families, ensuring that those most in need received timely assistance.
- *Rapid Response During COVID-19*: As the pandemic exacerbated poverty levels, Sezze swiftly implemented emergency social services. These interventions were crucial in providing immediate relief to those that were hit harder by the crisis, including temporary housing and essential supplies. This rapid response helped mitigate the severe impacts of the pandemic on the most disadvantaged populations, demonstrating the municipality's agility and compassion in times of crisis.
- *"Spazio(IN)" Project:* Addressing educational poverty, the "Spazio(IN)" project was launched to enhance educational opportunities for minors. This initiative focused on engaging children and teenagers through artistic and visual activities, workshops, and performances, enriching their social and emotional development. Despite the challenges posed by health restrictions, the project adapted to continue providing valuable cultural and educational experiences, underscoring the community's resilience and dedication to its younger members.
- *Subsidized Energy Bills*: Programs are in place allowing low-income families and elderly residents to apply for subsidies that assist with their energy bills.
- *Energy Efficiency Grants:* National bonuses offer grants for residential improvements that boost energy efficiency, such as the installation of insulation, double-glazed windows, and more efficient heating systems.

These initiatives exemplify how the municipality of Sezze has not only addressed immediate needs but also worked towards long-term social and educational development. By integrating various stakeholders, including local NGOs and community organizations, Sezze continues to foster a supportive and inclusive environment for all its residents.

In response to the escalating challenge of energy poverty in Sezze, the municipality has proactively engaged both **social workers and the city's associative sector** to support this critical initiative. This collaborative approach underscores a comprehensive strategy designed to tackle the multifaceted issues of energy insecurity affecting many of its residents. By involving social assistants, the initiative benefits from specialized expertise in identifying and addressing the immediate needs of the most vulnerable populations. Simultaneously, partnering with local associations enhances the reach and effectiveness of the program, ensuring that solutions are community-driven and tailored to the unique challenges faced by the town. This collective effort is a testament to Sezze's commitment to fostering a supportive and resilient community where all residents can access the essential energy services necessary for a dignified and comfortable life.

To fully appreciate the actions taken and the future steps planned by Sezze to combat energy poverty, it is essential to first understand what energy poverty is and how it impacts communities.

Energy poverty refers to a situation where individuals or households are unable to access or afford sufficient energy to meet their basic living needs, such as heating, cooling, lighting, and running essential devices. It typically affects those in low-income brackets, but the issue extends beyond mere income constraints to encompass a range of social, economic, and environmental factors. For example, poor building insulation, high energy prices, inefficient energy use, and socio-economic disparities contribute significantly to energy poverty. This condition not only leads to physical discomfort but also poses serious health risks, including respiratory problems from inadequate heating, increased stress, and reduced well-being.

The adverse effects of energy poverty are profound, contributing to social exclusion and diminishing quality of life by limiting individuals' ability to perform basic daily functions and participate fully in society. Moreover, it can perpetuate a cycle of poverty as high energy costs constrain household budgets, forcing choices between essential expenditures such as food, healthcare, and education.

Tackling energy poverty requires a **multi-faceted approach**. Governments and organizations often focus on improving home energy efficiency through upgrades and renovations, subsidizing energy costs for vulnerable groups, and investing in renewable energy sources to reduce overall energy expenses. Additionally, policies aimed at improving the energy efficiency of public housing, enhancing the energy standards of new buildings, and providing targeted financial assistance can play crucial roles in addressing the root causes of energy poverty. These strategies not only help alleviate immediate hardships but also contribute to broader environmental goals by reducing overall energy consumption and associated emissions.

Traditionally, energy poverty has been viewed as a residential issue, impacting individual households that struggle to keep their homes adequately warm or cool due to high energy costs, inefficient buildings, or low incomes. However, the concept has now broadened to include **businesses**, particularly small and medium-sized enterprises (SMEs) which are increasingly facing similar challenges. Businesses, especially those operating in older or less efficient buildings, may incur excessively high energy bills which can consume a substantial portion of their operating budget. This issue can impede their ability to compete, innovate, and even survive, especially in energy-intensive industries.

The spread of energy poverty among businesses highlights the growing importance of energy efficiency and access to affordable energy as critical components of economic stability and competitiveness. Addressing this broader impact of energy poverty requires comprehensive strategies that encompass not only residential but also commercial and industrial sectors, aiming to improve energy efficiency, reduce costs, and ensure sustainable energy use across all levels of society.

In order to address energy poverty, the Municipality of Sezze is taking proactive steps beyond its current measures by actively engaging in the drafting and planning of potential strategies. This initiative involves a structured approach with various stages and strategies that the municipality could implement to effectively combat energy poverty. These planned actions are designed to tackle the issue from multiple angles, ensuring a comprehensive response that aims to improve energy access and affordability for all residents of Sezze.

The current state of energy poverty in Sezze, sheds light on the profound challenges its residents encounter and the commendable initiatives local entities and social assistants have implemented to address these vulnerabilities.

a) Economic and Social Factors

Sezze, like many Italian towns, grapples with significant economic challenges that exacerbate the issue of energy poverty. These challenges include:

- *High Unemployment Rates:* The local economy's persistent struggles have precipitated elevated levels of unemployment and underemployment, straining household budgets and limiting financial flexibility.
- *Low-Income Households:* A substantial portion of Sezze's population subsists on meagre incomes, which complicates their capacity to cope with rising energy costs, thereby increasing their vulnerability to energy poverty.
- *Aging Population:* A significant demographic of the population consists of elderly individuals reliant on fixed pensions that fail to keep pace with inflation, especially with respect to escalating energy prices.
- *Housing Conditions:* Numerous residential structures in the town are antiquated and deficient in adequate insulation, leading to excessive energy consumption for heating, which is not only inefficient but also costly.

b) Impact on Residents

The ramifications of energy poverty in Sezze are extensive, adversely affecting residents in various critical ways:

- *Health Risks:* The lack of proper heating during the colder months can lead to considerable health risks, particularly for the vulnerable segments such as the elderly and children. This insufficient heating can increase the incidence of respiratory diseases and exacerbate other health conditions related to cold exposure.
- *Reduced Quality of Life:* As energy costs spiral, families are often forced to reduce expenditures on other essential needs, such as nutritious food and healthcare. This not only affects their health and well-being but also their ability to lead fulfilling lives.
- *Social Isolation:* The economic strain caused by high heating costs can result in social isolation, as individuals might avoid social interactions or hosting guests due to the discomfort of a cold home. This isolation can lead to significant psychological stress and a decrease in quality of life.

The situation in Sezze reflects a broader issue that demands comprehensive strategies and proactive governance. Addressing energy poverty in Sezze requires not only immediate relief measures but also long-term strategies that include improving residential energy efficiency, increasing access to affordable energy solutions, and fostering community engagement to ensure that all residents, especially the most vulnerable, have access to the essential energy services needed to lead healthy and productive lives.

The next steps for Sezze in combating energy poverty could focus on strengthening and expanding current initiatives while introducing innovative approaches to ensure energy security for all residents.

This plan includes both short-term and long-term strategies aimed at reducing energy consumption and enhancing energy efficiency across various sectors of the community.

A. Short-Term Sustainability Plan:

1. *Implementation of the Sun4you App:* Utilize the Sun4you app to monitor and optimize solar energy usage in homes and businesses within the community. This tool will help users reduce energy costs and enhance overall energy efficiency.
2. *Awareness Sessions:* Organize informative meetings and workshops to educate citizens about the benefits of renewable energy and energy-saving practices, thereby fostering greater awareness and adoption of sustainable technologies.
3. *Feasibility Study for Renewable Energy Community (CER):* Conduct a feasibility study to explore the establishment of a Renewable Energy Community in Sezze that would collectively manage the production and consumption of renewable energy.
4. *Setia Factory:* Increase the installation of photovoltaic solar systems and solar water heaters for self-consumption, reducing external energy dependency and promoting the use of clean energy.

B. Long-Term Sustainability Plan:

1. *Partnerships and Collaborations:* Establish strategic collaborations with local associations like Legambiente, private companies, and other entities to support the expansion of renewable energy infrastructure and ensure access to funds and resources.
2. *Incentives and Financial Support*: Work with regional and national authorities to secure financial incentives for residents and businesses adopting sustainable energy solutions.
3. *Monitoring and Evaluation:* Implement a monitoring system to assess the effectiveness of the energy sustainability initiatives, ensuring that energy poverty reduction goals are achieved and maintained transparently within the community.
4. *Creation of the REC:* Based on the feasibility study, proceed with the development and implementation of the Renewable Energy Community, encouraging active participation from all sectors of the community.

By integrating these strategies, Sezze is committed to creating a robust framework that not only addresses immediate energy needs but also ensures long-term sustainability and energy security. This comprehensive approach demonstrates a proactive effort to combat energy poverty and foster a resilient, energy-efficient community.

4. Criteria and conditions for participation in the Sun4All program adoption

In the identification phase, it would be very important to develop an eligibility criteria framework as well, to identify vulnerable consumers that would benefit from the programme. Criteria would consider "hidden energy-poverty" and integrate intersectional criteria, notably gender and age differences, as well as ethnicity, income class, and socio-spatial patterns of inclusion and exclusion within urban environments. Active participation of beneficiaries in the definition of the community work plan will give a better understanding of types and needs of energy vulnerable houses.

Thanks to Sun4All project, social assistants together with Sezze municipality had an important role to define eligibility criteria based on objective requirements of National Energy Bonuses (ISEE, Bonus Energia, Reddito di cittadinanza etc.). At the same time, it was important to dedicate an important role to the local context, especially due to the rise of energy prices of the last years. The definition of eligibility criteria is formalized with a list of rules for the participant categorization, written by social assistants with the help of Sezze municipality. The timeline useful to conclude this activity was about two months. This set of criteria includes several key requirements aimed at accurately identifying those most in need of support. These requirements specify that individuals receiving the "reddito di cittadinanza" (citizenship income), those who qualify for the energy bonus due to low ISEE (Equivalent Economic Situation Indicator) thresholds, and companies facing economic difficulties are eligible. By targeting these groups, the initiative ensures that the aid reaches residents and local businesses that are most susceptible to the impacts of economic instability and energy poverty. This targeted approach helps in efficiently directing resources towards fostering economic resilience and sustainability within the community.

Moreover, to ensure the consent of residents and condominiums for the implementation of this project, General Data Protection Regulation protocols and procedures must be adopted. Sezze technical partner and the Municipality of Sezze presents the consent for the processing of data. A draft of consent for the processing data is attached to this document (ANNEX I and ANNEX II).

5. Citizen Engagement and Activation

Citizen Recruitment and Engagement will be coordinated by social assistants and Sezze municipality. Flyers and brochures can be distributed among citizens to promote the initiative. Communication channels such as Municipality of Sezze's website or other citizen association's social media promoted the initiative. Moreover, personal emails can be used to invite identified people to activities scheduled in the Sun4All project.

In detail, the project team distributed informative materials such as flyers and brochures throughout the community to raise awareness about the initiative. These materials were designed to be clear and accessible, ensuring that all residents could understand the benefits and opportunities presented by the project. Additionally, the team employed direct communication strategies such as personalized phone calls and the formation of a dedicated WhatsApp group, which served as a dynamic platform for sharing information, addressing concerns, and fostering a sense of community among participants.

The document outlines further steps that can be taken to enhance citizen engagement. These include organizing more targeted workshops thataccommodate family schedules and address specific educational needs. By continuing to leverage both traditional and digital communication channels, and by ensuring that engagement strategies are inclusive and adaptive to the community'sneeds, Sezze can further strengthen its approach to combating energy poverty andenhancing sustainable living practices.

Enhanced Communication and Engagement Strategies

1. *Interactive Workshops and Seminars*

- Schedule workshops during weekends or after work hours toaccommodate working individuals.
- Incorporate family-friendly activities to encourage participation fromall age groups.
- Offer incentives like small gifts (e.g., energy-efficient bulbs,educational materials) for attendance.

2. *Direct Communication*

- Utilize direct phone calls to personally invite residents to participate in project activities, ensuring a higher personal touch and engagement.
- Establish a dedicated project hotline for inquiries and assistance, providing a direct communication link between the project team andthe community.

3. *Use of Digital Platforms*

- Create and maintain a dynamic WhatsApp group specifically for project communication, sharing updates, tips, and workshop schedules.
- Develop a mobile app or an interactive website section dedicated tothe Sun4All project, featuring resources, interactive tools, and a calendar of events.

4. *Informative Materials*

- Distribute well-designed, easy-to-understand flyers and brochures in community centres, local businesses, and through mail drops.

- Create engaging digital content such as videos and infographics thatexplain the benefits and methods of reducing energy consumption, which can be shared on social media and the project website.

New Initiatives for Community Involvement

5. *Community Energy Champions*

- Recruit and train residents as Energy Champions who canadvocate for energy conservation within their neighbourhoods.
- Champions can organize small group meetings, distribute materials,and act as points of contact for their immediate community.

6. *Partnerships with Local Businesses*

- Collaborate with local businesses to promote the project and engagein co-sponsored events or initiatives.
- Businesses can offer discounts or sponsorships for energy-savingproducts and services as part of the project.

7. *Educational Programs in Schools*

- Integrate energy conservation and sustainability topics into school curricula through partnerships with local schools.
- Organize school competitions and projects related to energy savingsand renewable energy, fostering early awareness and involvement.

8. *Public Installations and Demonstrations*

- Set up public demonstrations of energy-efficient technologies and renewable energy systems in common areas such as parks or community centres.
- Use these installations as educational tools and as practical demonstrations of the benefits of energy efficiency.

9. *Feedback and Continuous Improvement*

- Regularly solicit feedback from participants through surveys, focus groups, and community meetings.
- Use collected feedback to refine and improve the project continually,ensuring it remains aligned with community needs and expectations.

Policy and Advocacy

10. *Advocacy for Supportive Policies*

- Work with local and regional government bodies to advocate for policies that support energy conservation and provide benefits for low-income households tackling energy poverty.
- Organize community forums and workshops to educate citizens on their rights and on how to engage in advocacy for sustainable energypolicies.

By implementing these detailed strategies, Sezze can enhance its community engagement, making the Sun4All project more effective and inclusive, ultimately leading to a more sustainable and energy-aware community.

Attached in Annex III are flyers of the three workshops posted on the official channels of the Sezze municipality and WhatsApp channels with interested citizens.

6. Community building and raising of energy literacy for the Sun4All programme adoption planning

To create an energy community is not only about receiving a bonus to cover basic energy needs but about empowerment, and participation. The scheme will actively contribute to the alleviation of energy poverty by promoting active citizenship, generating inclusive community energy environments where to learn, exchange and facilitate behaviour change.

To pursue this objective, a strong increase in knowledge and awareness of the community is needed, and an ad-ok campaign will be implemented: this first operational stage is necessary for the local population to understand the nature of the proposal and the benefits it brings. The activities will be carried out by using ad hoc trained personnel who already have experience in specific area. The aim is to generate a new energy culture through meetings, seminars, and direct meetups. There will be a voluntary membership drive, i.e.: interested citizens will have to submit an expression of interest on a voluntary basis to join the newly established energy community and through the leadership of the municipal administration and socially oriented associations, community awareness events are to be organised and implemented with two objectives:

a) Activation of citizenship: in the initial phase, it is necessary for the local population to understand the nature of the proposal and the benefits it brings. This can be achieved by using ad hoc trained personnel who already have experience in small Abruzzo localities. Operationally, it is proposed to generate a new energy culture through meetings, seminars, and direct confrontations with the town assembly.

b) Awareness Activities: interested citizens will have to submit an expression of interest on a voluntary basis to join the newly established energy community and to received specific trainings on the same topic.

Through Sun4All project, Sezze Technical Partner (EnGreen) coordinated three workshops focused on:

- Methods of reducing consumption
- Bonus and incentives to increase energy efficiency
- The role of RECs in facing energy poverty.

In addition to the technical partner, the cooperation of social assistants, Sezze municipality and other stakeholders is of paramount importance in promoting and actively contributing to the success of the seminars. In the third meeting, the entire citizenry will be expected to participate, as they are the future protagonists of the REC that will be established. The main goal of the educational sessions is to fight energy illiteracy and also, promote active citizenship, generating inclusive community energy environments. Through informational events and workshops the citizenship well understood the benefits of renewable energy communities and what are the steps to achieve a REC, the concept of energy poverty, and the concept of energy savings.

At the end of the seminars, interested citizens submitted an expression of interest on a voluntary basis to join the newly established energy community. Additional follow-up events will be necessary to inform citizens, who have expressed interest in participating in a REC, about the steps leading to the establishment and start-up of the REC. The module is attached to ANNEX IV.

The overall budget of the activities described so far is estimated to be about € 10.000. One workshop per month was scheduled (March, April, May).

Three workshops were successfully held in March (2 workshops) and finally in May, featuring a blend of both online and in-person formats to maximize community reach and participation. These sessions were collaboratively hosted by the Municipality of Sezze and the technical partner, Engreen, addressing key topics such as methods to reduce energy consumptions, energy bonuses and solidarity renewable energy communities opting for two online workshops allowed us to engage a broader audience, ensuring that more community members could participate without the constraints of physical attendance. This approach not only facilitated easier access for a wider demographic but also leveraged the direct and interactive capabilities of live online platforms, enhancing the overall effectiveness of the information dissemination and engagement process. The successful execution of these workshops highlights the initiative's adaptability and commitment to fostering an informed and involved community.

Recordings of the workshops and the information materials used were subsequently made available to the community through the Sezze municipality's website.

7. Stakeholders Mapping and Coordination

At the conclusion of the activities planned in the workplan of the Sun4All project, the municipality of Sezze will be involved in the continuation of activities to establish a REC. In the context of REC (Renewable Energy Community) development, stakeholder mapping and coordination are crucial aspects to ensure successful implementation and sustainable growth. Stakeholder mapping involves identifying and analysing the various individuals, groups, organizations, and entities that have an interest or influence in the REC development process and in combating energy poverty. Coordination involves managing relationships and communication among these stakeholders to achieve common goals.

Target group of stakeholders will include local entities, social assistants, sector associations operating in the area, renewable energy project developers and operators, energy consumers and businesses committed to sustainability, private families and all other entities that have an interest or influence in the REC development process, and in combating energy poverty.

These groups will meet on a regular basis to assess progress, provide input, and participate in decision-making processes. To promote the project, the entire stakeholder engagement strategy would include communication tools such as newsletters, forums, and advertising campaigns focused on low-income families.

Local civil institutions play an important role in assisting the investment project by providing socio-economic insights: by encouraging relationships with associations synergies will be created, and this Renewable Energy Community will help private apartments and buildings to adopt energy-efficient practices.

Sub-action required in the stakeholder mapping are listed below:

- **Identify key stakeholders** (i.e., Local entities, social assistants, sector associations operating in the municipality, Government agenciesresponsible for energy regulation and policy, renewable energy project developers and operators, electricity utilities and grid operators, financial institutions providing funding for renewable projects, energy consumers andbusinesses committed to sustainability)
- **Assess stakeholder influence and interest**: classify stakeholders based on their level of influence over REC development and their level of interest or commitment.**Understand stakeholder expectations:** conduct surveys, interviews, or workshops to understand the expectations, concerns, and preferences of each stakeholder group. Moreover, is necessary to identify potential conflicts of interest and areas of alignment.
- **Map stakeholder relationships:** visualize the relationships and dependencies between different stakeholders.

Main characteristics required in the coordination strategies are listed below:

- **Communication plan:** develop a clear and transparent communication plan to keep stakeholders informed. Use various channels such as newsletters, workshops, and online platforms.
- **Capacity building:** provide training and capacity-building programs for stakeholders to enhance their understanding of REC mechanisms and benefits.
- **Monitoring and evaluation:** regularly evaluate the impact of REC development on various stakeholders and adjust strategies accordingly. it is advisable to have meeting at least twice a year.
- **Adaptability and flexibility:** remain adaptable and update coordination strategies based on evolving circumstances.

Currently, among the associations contacted by the municipality of Sezze, there is Legambiente, which is particularly active in the renewable energy sector and in activities to combat energy poverty. Further meetings will follow in the following months with other local cooperatives and companies in the energy sector in order to plan together the implementation of a solidarity energy community in Sezze.

8. Technical Adoption Planning

In future months, to adapt and implement technical activities in Sezze (LT), the municipality will fully develop a feasibility plan for a Renewable Energy Community. Collaboration with a technical partner will be necessary to carry out the activities of the study. The technical feasibility study will cover the following aspects:

I. Research and analysis of possible 'green' energy systems that could be implemented in Sezze municipality

II. Feasibility study of the conversion of abandoned industrial buildings

III. Consumption analysis

IV. Technical assessment of possible sites suitable for the development of the plants

A technical feasibility study for the establishment of a renewable energy community encompasses a comprehensive evaluation of several critical aspects. Primarily, it involves a resource assessment to quantify available renewable resources such as solar, wind, hydro, and biomass, alongside an analysis of their temporal variability. The study further identifies optimal renewable energy technologies, assessing their technical specifications, performance metrics, and integration feasibility. Detailed site assessments consider geographic, environmental, and regulatory constraints, while energy demand analysis estimates current and future consumption patterns and peak demands. The study evaluates the existing electrical grid's capacity for renewable integration, including necessary infrastructure upgrades and energy storage solutions. An economic analysis estimates capital and operational costs, potential funding sources, and financial viability metrics such as ROI and LCOE. Environmental impact assessments analyse the project's ecological benefits and potential adverse effects. Regulatory and permitting analysis ensures compliance with relevant legal requirements. A comprehensive risk assessment identifies and mitigates potential technical, financial, and operational risks.

Once the techno – economic feasibility plan will be completed, it will be used to attract funds, both public and private, to finance the REC generation plan realisation. The incomes of the project will be different and, once the REC will be operational, households involved might have access to different "bonus" coming from incentives that Italian legislation foresee or, as well, from shares of a public PV plant. The funds will be than used not only to reduce energy bills in monetary terms but as a vehicle to implement energy efficiency measures, encourage behaviour and attitude change among users, and engender a sense of inclusion among energy citizens as stakeholders in just energy transitions.

The analysis and design phase will cost a total of about € 15.000 and it is required almost 6 months of activities.

At the same time, the municipality of Sezze has a project in the pipeline that could become a pioneer for others and that could incentivize the creation of a renewable energy community based on social purpose to serve the community. The project is described in the following focus.

FOCUS ON...SETIA FACTORY

The Municipality of Sezze is effectively tackling energy poverty and fostering social inclusion through the "Setia Factory" project. Supported by European Union funding under the Next Generation EU within the National Recovery and Resilience Plan, the project is strategically located in the former Pontine Agricultural Colony. Its objective is to establish a multifunctional community hub that combines sustainable production with social services.

Central to the project is the installation of a 20kW photovoltaic solar plant and a solar water heating system, both dedicated to corporate self-consumption. This approach not only reduces dependency on external energy sources but also stabilizes energy costs for the entity, making energy more accessible and sustainable for the community. The generation of renewable energy marks a critical step towards combating energy poverty, ensuring that energy resources are utilized in an optimal and environmentally friendly manner.

Moreover, "Setia Factory" extends its impact beyond energy production to include training and employment integration for socially vulnerable groups, including the disabled and unemployed. These training programs are designed to equip individuals with the necessary skills to enhance their employability and self-sufficiency, thereby addressing the roots of energy poverty which are often linked to broader economic inequalities.

Through these initiatives, the Municipality of Sezze demonstrates an innovative and integrated approach to social cohesion and sustainable development, with a particular focus on the needs of its most vulnerable citizens. This model of integrated intervention serves as an exemplar for other communities aiming to combat energy poverty and promote social inclusion through the sustainable use of local resources.

A cornerstone of the project is the social and labour inclusion of individuals from vulnerable social strata, such as the disabled, unemployed, and migrants. By offering professional training and the opportunity to actively participate in the productive activities of the company, "Setia Factory" seeks to integrate these individuals into the economic life, enhancing their skill set.

Community participation is pivotal in "Setia Factory." The project employs a participatory planning approach for the creation of the "Community Social Plan," a mechanism through which residents can influence social policies and decisions affecting their environment. This process not only ensures that projects more accurately meet local needs but also strengthens the sense of belonging and responsibility among community members.

Sustainability is another key theme of the project. With the production of renewable energy for corporate self-consumption, "Setia Factory" promotes energy self-sufficiency, a vital step towards reducing energy poverty and increasing community resilience to external shoc

9. Legal Adoption Planning

In the realm of legal frameworks, energy communities are mandated to be formally recognized as legal entities. Currently, the existing legislation lacks clarity in specifying the appropriate legal structures for RECs. This imperative task involves a meticulous exploration of predominant models, including those driven by public initiatives, specific non-profit endeavours, or entrepreneurial pursuits. Among the potential legal forms, the front-runners in terms of viability include the unrecognized association, mutual cooperative, and foundation structures. The decision-making process for selecting the most suitable legal model hinges on a comprehensive assessment, considering both the qualitative and quantitative aspects of REC actors. Factors such as the community's objectives, the intended purposes of the energy community, and insights garnered from prior actions will inform this critical analysis.

In general, there are three main constituent models. The first model, public driven, sees the direct and predominant participation of public administration. The second model can have social purposes and, therefore, structure around specific non-profit organizations. The third model instead sees the protagonist of private entrepreneurship. All three of these models respond, however, has a common sense: that of community and the technical partner will be able to provide the necessary models of constitution and affiliation, starting from the models necessary for the collection of pre-accession up to the draft statutes, models relating to the processing of privacy data to those necessary for the deliberations of public bodies.

In the specific case of Sezze, it will be interesting to establish a REC which focuses efforts on combating energy poverty. Incentives generated by energy sharing, can be redistributed in a higher percentage to the most vulnerable consumers. The redistribution of incentives will be agreed upon among all members through the writing of rules of procedure, which can be amended at the assembly session.

In addition, it is possible to join renewable energy communities already established in the area that has the same corporate purpose and ultimate goal. Participating in a renewable energy community spanning multiple municipalities under a single legal entity allows for the optimization of resources and costs, centralizes management, and increases overall energy efficiency. This structure facilitates access to funding, simplifies bureaucratic procedures, and enhances the energy resilience of the involved municipalities. Additionally, it promotes active citizen participation and the widespread adoption of renewable energy.

Another opportunity to keep in mind is the Sun4U project, an information platform that allows you to connect citizens, local governments and other associations to learn about solidarity renewable energy communities in the area by entering lease data. The Sun4U app offers numerous advantages for solar energy users, including real-time monitoring for improved system management and efficiency, detailed data for optimizing energy use, and historical data analysis for long-term optimization. It provides notifications for system issues, features an intuitive interface, and is accessible across multiple platforms. Additionally, it offers technical support, integrates with other energy management systems, helps reduce costs, and promotes environmental sustainability.

The cost of the legal support service is quantified at about €5.000. The last cost does not include costs for actual establishment, such as legal counsel, accountant and notary. This item will be variable, according to the chosen legal form. The technical partner may take about 3 months to analyze the most appropriate legal form and, above all, to engage with the municipality and the citizenry, reminding us that those who join are the main players in the project.

10. Financial Scheme Adoption Planning

Finally, the project will culminate in the formulation of a robust business plan and financial model. This step involves crafting different scenarios and financial models to facilitate an informed decision-making process among REC members. Different scenarios and financial models will then be prepared to allow an informed choice among the various possibilities (public RECs with installations on public buildings vs. residential systems vs. single central plant) and that allow the members of the nascent REC a clear understanding of the advantages and disadvantages of each possibility, highlighting the main economic and financial indices. At the same time, different sizes will also be assumed, to build a sort of roadmap to achieve coverageof electricity needs as they increase.

As previously written in the "Technical adoption planning" chapter, study's findings and recommendations lay the foundation for securing financial support, making the REC project more attractive and viable in the eyes of funding agencies, investors, and community members, thereby ensuring a robust and sustainable renewable energy initiative.

The ultimate goal is to have a fully established Renewable Energy Community (REC) that is not only conceptualized but also prepared for actual implementation. Concurrently, efforts will intensify in the pursuit of funding to facilitate the construction of the pilot plant, a pivotal step towards realizing the REC's potential. Following this crucial financial aspect, the subsequent priority involves the formal registration of the REC. This sequential approach ensures a transition from conceptualization to tangible action, emphasizing the practical and strategic aspects vital for the REC's overall success and effectiveness.

The cost of the business model and financing scheme definition service is quantified at about € 5.000. This activity last almost 3 months.

During the workshops it was possible to promote regional and national grants that people in energy poverty can use to install photovoltaic systems on their owned or rented homes, such as "reddito energetico" ("energy income"). This measure makes it possible to have photovoltaic systems set up in self-consumption mode almost for free, without any down payment. The "reddito energetico" is a system that allows citizens to gain economic benefits from renewable energy production. Users can install photovoltaic systems or other green technologies funded by public entities, sharing the produced energy with the grid and receiving compensation. This approach promotes sustainability, reduces energy bills, and encourages the adoption of renewable sources. Additionally, it contributes to the creation of a self-sufficient and resilient energy community.

Financing renewable plants or mostly photovoltaic installations for a renewable energy community through public and private funds offers numerous advantages. It accelerates the adoption of clean energy by lowering the financial barriers for individuals and organizations, making solar power more accessible. Public funding can provide grants or subsidies, reducing upfront costs, while private investments can offer long-term financial stability and innovation. This dual funding approach enhances energy security and sustainability, reduces dependence on fossil fuels, and promotes economic development by creating green jobs. Moreover, it fosters community engagement and resilience, as members collectively benefit from the shared energy resources and reduced energy costs.

11. Replication and Scalability Potential

The ambition of the project will therefore be to trigger a process of innovation and awareness of the territory's values and potential. To develop sound policy recommendations that contribute to alleviating energy poverty at a local level, and

to create a dialogue with other municipalities about the project best practices, the

lessons learnt from Sezze will be share with other project partners to give practical insights for designing other RECs born to fight energy poverty and involve vulnerable households at larger scale over the next years.

Some activities would be implemented in order to tackle energy poverties in Sezze:

- Development, maintenance, and population of the section dedicated to project in the Municipality website. The section’s website will function as the hub providing all relevant information about the project and presenting its findings to the widest audience.
- Promotion via social media. For this, social media accounts of the Municipality (e.g., Twitter, LinkedIn) will be launched and regularly updated with the information about the project actions and interim results.
- Participation in thematic events. The municipality of Sezze will proactively identify opportunities to present the project at events organised by third parties, either onsite or online.
- Networking and collaboration with related European projects and initiatives, e.g., identifying opportunities for joint activities and aligning work plans and sharing project findings whenever possible, feeding information into communication channels, contributions to events and documents.

The cost to create contents useful to promote the project is estimated to be about € 8.000. The preparation of media items could last almost 3 months, and a communication plan could be planned for the first year of the project.

12. References

Sun4All supporting document. “Sun4All Sustainable Implementation Plan Guidelines”. April 2023

13. Annex

13.1. ANNEX I

CONSENT TO DATA PROCESSING

SEZZE Municipality and his partners, undertakes to comply with the GDPR, in the terms described below:

1. It will ensure compliance with the legislation in force regarding the protection of personal data, namely the RGPD, about the processing of data on behalf of the Responsible, which is, when applicable, also regulated by the Contract(s) and establishes the object, duration, nature and purpose of the treatment, the type of personal data, the categories of data subjects and the obligations and rights of the Responsible.

2. It will ensure the processing of personal data in accordance with the provisions of the Contract (s) under the legal terms.

3. It will ensure, when applicable, that it only subcontracts third parties, under the terms established in the Contract(s) and will obtain, in advance and in writing, specific or general authorization from the Person Responsible.

4. It will ensure that its employees and persons authorized to process personal data are subject to adequate legal obligations of confidentiality, having assumed a confidentiality commitment.

5. According to the nature, scope, purpose, and object of the contracted Services, SEZZE Municipality and his partners will provide, if necessary, assistance and collaboration, through the appropriate technical and organizational measures, to allow the respective obligations to respond to requests from data subjects.

6. It will aid the Controller, according to the nature of the treatment and the information at its disposal, to ensure compliance with the RGDP, namely, regarding the security of the treatment and the notification of violations of personal data.

7. It will facilitate and contribute to audits, including inspections, of the Responsible, another mandated auditor, or entities with legal competence for the purpose, as well as with the control authority.

8. It will keep a written record (including electronic format) of the processing activities conducted in the name and on behalf of the Controller.

9. It will notify the Controller, without undue delay, after becoming aware of a breach of personal data.

10. Depending on the choice of the Controller, it will delete or return all personal data after the provision of Services related to the treatment has been completed, deleting the existing copies, unless the conservation obligation arises from national or European Union law.

13.2. ANNEX II

LIBERATORIA PER LA PUBBLICAZIONE DI FOTO E VIDEO

Il/La sottoscritto/a ____

Cognome ____________________________________ Nome ____________________________________

Nato/a a ____________________________________ Prov. __________ Il ______________________________

Residente a __________________________ Prov. _____ Via ____________________________________n° ____

C.F. ____

Con riferimento ai testi, alle immagini (foto e video) dichiarate e/o scattate e/o riprese in occasione degli incontri pubblici del progetto Sun4All.

con la presente **AUTORIZZA**

A titolo gratuito, senza limiti di tempo, anche ai sensi degli artt. 10 e 320 cod.civ. e degli artt. 96 e 97 legge 22.4.1941, n. 633, Legge sul diritto d'autore, alla pubblicazione e/o diffusione in qualsiasi forma delle proprie immagini sul sito internet del progetto Sun4All, su carta stampata e/o su qualsiasi altro mezzo di diffusione, nonché autorizza la conservazione delle foto e dei video stessi negli archivi informatici di Sun4All e prende atto che la finalità di tali pubblicazioni sono meramente di carattere informativo ed eventualmente promozionale.

La presente liberatoria/autorizzazione potrà essere revocata in ogni tempo con comunicazione scritta da inviare via posta comune o e-mail.

Luogo e Data: __________________________

In fede ______________________________________

IL SOTTOSCRITTO DICHIARA INOLTRE

Di aver letto in ogni sua parte l'Informativa ex art. 13 regolamento ue 2016/679 (GDPR) - pag. 2 del presente documento;

Luogo e Data:_____________ Firma (leggibile) ____________________________

INFORMATIVA PER IL TRATTAMENTO DEI DATI PERSONALI AI SENSI DELL'ART 13 DEL REGOLAMENTO EUROPEO N.679/2016

- Titolare del trattamento dei dati personali:

Il Titolare del trattamento è: Sun4All il quale fornisce le seguenti informazioni ai sensi dell'art. 13 del Regolamento UE 2016/679

- **Oggetto e finalità del trattamento: i dati personali sono trattati per le seguenti finalità:**

1. **produzione di video e immagini**
2. **Attività documentative, informative e promozionali connesse al progetto Sun4All** così come esplicitato nella liberatoria che precede.

Nel caso di minori saranno trattati i dati del genitore del minore nella misura in cui il trattamento si renda necessario per l'ottenimento del consenso relativo al minore stesso.

- **Modalità di trattamento dei dati:** i dati personali saranno oggetto di operazioni di trattamento nel rispetto del quadro normativo di riferimento, saranno trattati con strumenti cartacei, informatici, elettronici e con ogni altro tipo di supporto idoneo, nel rispetto delle misure di sicurezza previste dal Regolamento UE 2016/679.

- **Consenso:** il conferimento dei dati è facoltativo, il mancato consenso non permetterà l'utilizzo delle immagini e/o delle riprese audiovisive del soggetto interessato per le finalità indicate.

- Comunicazione dei dati:
Nei limiti pertinenti alle finalità di trattamento indicate, I Suoi dati personali potranno essere comunicati a soggetti terzi, connessi alla partecipazione al progetto Sun4All.

- **Diffusione dei dati:**
I video (quindi le immagini in esso contenute) ammessi al progetto Sun4All promosso dal Comune di Sezze, come esplicitato nella liberatoria che precede, saranno inseriti sui canali social del comune di Sezze e degli altri enti coinvolti. Potranno essere utilizzati dal Comune di Sezze e da propri partner durante convegni e laboratori inerenti i temi trattati dal progetto. Potranno essere utilizzati anche per proiezioni aperte al pubblico, produzioni multimediali e web, a corollario e completamento delle attività legate al progetto stesso. Le opere potranno anche essere utilizzate dal Comune di Sezze anche in altri ambiti (biblioteche, centri giovani, emittenti televisive, streaming, ecc.) nell'alveo di attività senza scopo di lucro ed a fini divulgativi del progetto Sun4All e dei temi proposti.

- **Periodo di conservazione**: i dati raccolti saranno conservati per un arco temporale non superiore al conseguimento delle finalità per le quali sono trattati e/o per il tempo coerente con gli obblighi di legge.

La verifica sull'obsolescenza dei dati conservati in relazione alle finalità per cui sono stati raccolti viene effettuata periodicamente.

- **Diritti dell'interessato**: all'interessato spettano i diritti di cui agli artt. da 15 a 22 e all'art. 34 GDPR, in particolare il diritto di accesso, di rettifica/cancellazione/limitazione, di opposizione, di portabilità, di revoca del consenso ove previsto, diritti da esercitare nei confronti del Titolare del Trattamento.

13.3. ANNEX III

Sun4All solar power to the people

La Comunità di Sezze e il progetto Sun4All

II Workshop - in presenza

Bonus Energia e Comunità Energetiche Rinnovabili

14 Marzo 18:00

Centro Sociale U. Calabresi - Sezze (LT)

Verso una CER per ridurre la povertà energetica e promuovere l'inclusione sociale

Sessioni educative per combattere l'analfabetismo energetico e promuovere la cittadinanza attiva, generando ambienti energetici comunitari inclusivi.

Partecipa anche tu!

Comune di Sezze

EnGreen

Centro di Ricerca Interdisciplinare Territorio Edilizia Restauro Ambiente CITERA

Sapienza Università di Roma

Sun4All solar power to the people

La Comunità di Sezze e il progetto Sun4All

III Workshop - online

Comunità Energetiche Rinnovabili Solidali

Lunedì 27 Maggio 18:00

Verso una CER per ridurre la povertà energetica e promuovere l'inclusione sociale

Sessioni educative per promuovere la cittadinanza attiva, generando ambienti energetici comunitari inclusivi.

Interverranno:

- Maria Teresa Imparato, Presidente Legambiente Campania
- Micaela D'Ambrosio, partner tecnico EnGreen

Tutta la cittadinanza è invitata a partecipare!

Link evento sarà disponibile sul sito web del comune di Sezze

Comune di Sezze

EnGreen

Centro di Ricerca Interdisciplinare Territorio Edilizia Restauro Ambiente CITERA

Sapienza Università di Roma

13.4. ANNEX IV

COMUNE DI SEZZE

Provincia di Latina

Via Diaz n. 1 - 04018 Sezze (LT) C.F./P.IVA: 00130430598

Tel. 0773.804584 Portineria interno 519 - mail:

protocollo@comune.sezze.lt.itpec: protocollo@pec.comune.sezze.lt.it sito

internet: www.comune.sezze.lt.it

OGGETTO: MANIFESTAZIONE DI INTERESSE ALLA CER DI SEZZE

In caso di persone fisiche

Il/la sottoscritto....................... nato/a a ....il ....residente in ...., Via ....PEC... ...., email ....Telefono ....

***In caso di persone giuridiche*:**

Il/la sottoscritto/a ....
nato/aa il
residente
in ...., Via .... Nr. ....

In qualità di ....
dell'impresa ....con sede
in .... con codice fiscale n. ....con partita IVA
n. ....
....

PEC...email .... Telefon o..........................

MANIFESTA il proprio interesse a partecipare alla costituzione di una CER di Sezze in qualità di:

☐ PRODUTTORE

☐ CONSUMATORE

☐ PRODUTTORE E CONSUMATORE

A tal fine DICHIARA:

a) di aver preso visione della Delibera di Giunta Comunale Nr. 11/2023 del Comunedi Sezze;

b) di essere a conoscenza che la presente richiesta, non costituisce proposta contrattuale e non vincola in alcun modo il Comune di Sezze che sarà libero di interrompere in qualsiasi momento, per ragioni di sua esclusiva competenza, il procedimento avviato, senza che i soggetti richiedenti possano vantare alcuna pretesa.

c) che i dati necessari per lo svolgimento della pratica sono rispondenti al vero e chesono stati forniti senza nulla omettere in merito; pertanto, esonera il Comune di Sezze da ogni e qualsiasi responsabilità riguardo a tale rispondenza. Il presente mandato può essere revocato solo per iscritto.

ALLEGA:

- copia di documento di identità del richiedente;

- copia della fattura di fornitura di energia elettrica del mese di Dicembre 2023;

- **Allegato 1**: Tabella degli estremi della abitazione;

AUTORIZZA:

il Comune di Sezze al trattamento dei dati personali attinenti all'oggetto in conformità alla vigente normativa sulla "*data protection*" (Regolamento Europeo sulla protezione dei dati personali n. 679/2016, cd. "GDPR" e D. Lgs. n. 196/2003, cd. "Codice Privacy", come novellato dal D. Lgs. n. 101/2018).

Luogo e data **Firma**

____________________ ____________________________________

Allegato 1:

TABELLA DEGLI ESTREMI DELLA ABITAZIONE/UTENZA

<table>
<tr><td>Titolare della utenza</td><td colspan="3"></td></tr>
<tr><td>Indirizzo della utenza</td><td colspan="3"></td></tr>
<tr><td>Provincia</td><td colspan="3"></td></tr>
<tr><td>Comune</td><td colspan="3"></td></tr>
<tr><td>Codice fiscale</td><td colspan="3"></td></tr>
<tr><td>Partita iva (in caso di soggetto giuridico)</td><td colspan="3"></td></tr>
<tr><td>POD (presente sulla bolletta)</td><td colspan="3"></td></tr>
<tr><td>Impianti da fonte di energia rinnovabileesistenti nell’abitazione</td><td>SÌ</td><td colspan="2">NO</td></tr>
<tr><td rowspan="2">Se SÌ</td><td>Tipo</td><td>Anno di installazione</td><td>Potenza installat a[kW]</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Annex 3

Sun4All Sustainable Implementation Plan for the Consell Comarcal del Gironès

Sun4All Sustainable Implementation Plan

Consell Comarcal del Gironès

May 2024

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
Work Package	**WP2** "Business Model. From "Solar for all" programme to Eurosola to all (Sun4ALL) designing the scheme in an European context" **WP5** "Sustaining Transferability and Upscaling"
Dissemination Level	Public
Author(s)	Onditz Portabella, Tandem Social SCCL Renato Gozález, Tandem Social SCCL Desirée Gómez, Tandem Social SCCL
Co-Author(s)	-
Contributor(s)	Roberto Burgos, Energía por la Igualdad SCCL
Due date	2024-05-31
Actual submission date	2024-05-29
Status	Final
Reviewer(s) (if applicable)	Paco Jofra, Ecoserveis Jurijs Grizāns, ICLEI European Secretariat

This document has been prepared in the framework of the European project Sun4All – "Eurosolar for all: energy communities for a fair energy transition in Europe".

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101032239.

Contact

info@sunforall.eu

www.sunforall.eu

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Executive summary

The City Council of Salt, in coordination with the Diputació de Girona and the Consell Comarcal del Gironès, in its vocation to make an inclusive energy transition, has initiated a process of reflection on the capability of creating an Energy Community with special emphasis on tackling energy poverty.

The short-term objective will be to reserve energy from two municipal solar photovoltaic installations for households in a situation of energy vulnerability. In the long term, however, the objective will be that the energy community further addresses the fight against energy poverty in a more structural way.

1. Introduction

Salt is the second largest city in Gironès. It has a high density of population, a high percentage of foreign people and furthermore it has the lowest GDP per capita in Catalonia.

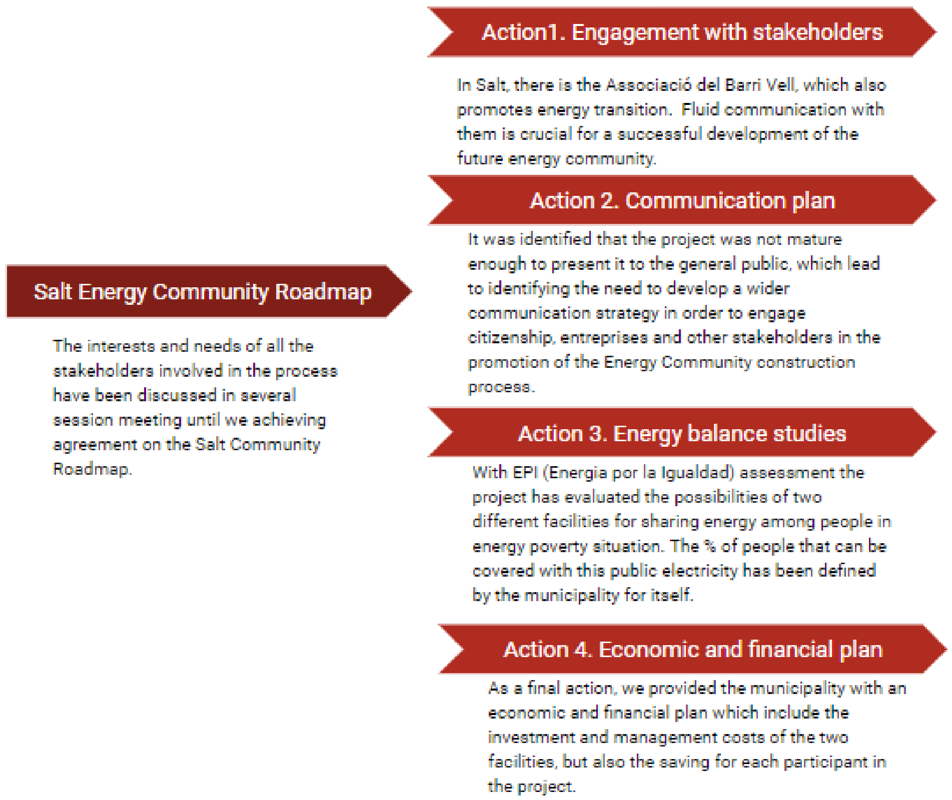
The Salt energy community project aims to become a large community of producers and consumers joining together in an energy enterprise led by the municipality of Salt. This is a long-term objective that has been agreed by the Diputació de Girona, the Consell Comarcal and the municipality of Salt.

The urgency of addressing the care of people who suffer from energy poverty needs also to achieve short term goals, which includes actions that need to be activated as soon as possible.

Three main actions have been detected and prioritised among others:

- Start the mapping of other initiatives within the territory promoting energy communities in Salt.
- Develop a communication strategy with special focus on energy poverty.
- Conduct energy studies for solar photovoltaic plants located in public equipment rooftops (market and theatre) which include economic and financial studies and the costs and savings for people living in energy poverty.

2. Work Process



Activities	Date
Kick-off	26/09/2023
Implementation plan presentation	08/11/2023
Salt Roadmap	13/12/2023
Work session with stakeholders	15/01/2024
Energy balance studies presentation	21/03/2024
Economic and financial Work session	09/04/2024
Economic and financial study presentation	15/05/2024

3. Current State of Energy Poverty Action

As explained in the workplan that has been presented, Salt is the second largest city in Gironès county with the lowest GDP per capita of all cities which have over 20.000 population. It has been estimated that 40% of its population suffers from energy poverty.

4. Stakeholder Mapping and Coordination

The success of the project depends mostly on the ability of the Salt City Council to engage different stakeholders in the process of promoting an Energy Community led by the municipality.

There are several external actors, that have been mapped:

- **Diputació de Girona**, as a public institution that can help financially and with technical knowledge.
- **Som Comunitats**, as a private initiative, provides energy communities around Catalonia with resources and tools to empower them.
- **Energia del Prat**, as a model of an energy community that Salt would like to achieve.
- **Associació Barri Vell de Salt**, as a private initiative also interested in promoting an energy community in the municipality.
- **Civil society**, as a private agent that can get engaged with the municipal project providing their rooftop and sharing the energy generated.

5. Defining Criteria and Conditions for Participation

During the project criteria and conditions for participation were not defined.

6. Planning Citizen Recruitment and Engagement

During the project there has not been time to define the criteria and conditions for participation.

As the project was at the very early stages, there has been a focus in the communication strategy and action prior to engagement which included:

- Civil workers.
- People that could be beneficiary of the energy.
- Citizenship that has means to invest privately in photovoltaic energy.
- Owners of photovoltaic facilities that are already put in place and functioning.
- Potential investors in the energy community.

7. Community Building and Energy Awareness

A communication strategy to achieve community building and energy awareness has been designed but it has not yet been implemented.

8. Technical Adoption Planning

Technical Adoption Planning

Estudi tècnic de la instal·lació

Instal·lacions, consum i distribució d'energia

Nom Instal·lació	P pic kW	P nom kW	Generació anual kWh anuals	Cost de la Instal·lació
Mercat	115	100	145.564	75.974,47€
Teatre	17,94	15	19.063	24.821,63€

Agent	Consum kWh/any*	Assignació energètica (kWh)	% Autoconsum**
Teatre	54.761	4.785	97%
Centre Recursos Gent Gran	23.182	2.021	90%
Mas Llorens	17.980	1.582	100%
Unitat de convivència 1	27.000	10.675	82%
Mercat Serveis Generals	134.521	29.841	99%
Mercat Fred	67.241	14.848	99%
Mercat Vitrines	49.201	10.917	99%
Biblioteca	20.841	4.512	69%
Casa de la Vila - Principal	118.816	26.347	92%
Casa de la Vila - Secundari	36.780	8.152	87%
Unitat de convivència 1	135.000	50.947	82%

*Consum kWh/any: quantitat d'energia consumida per cada agent

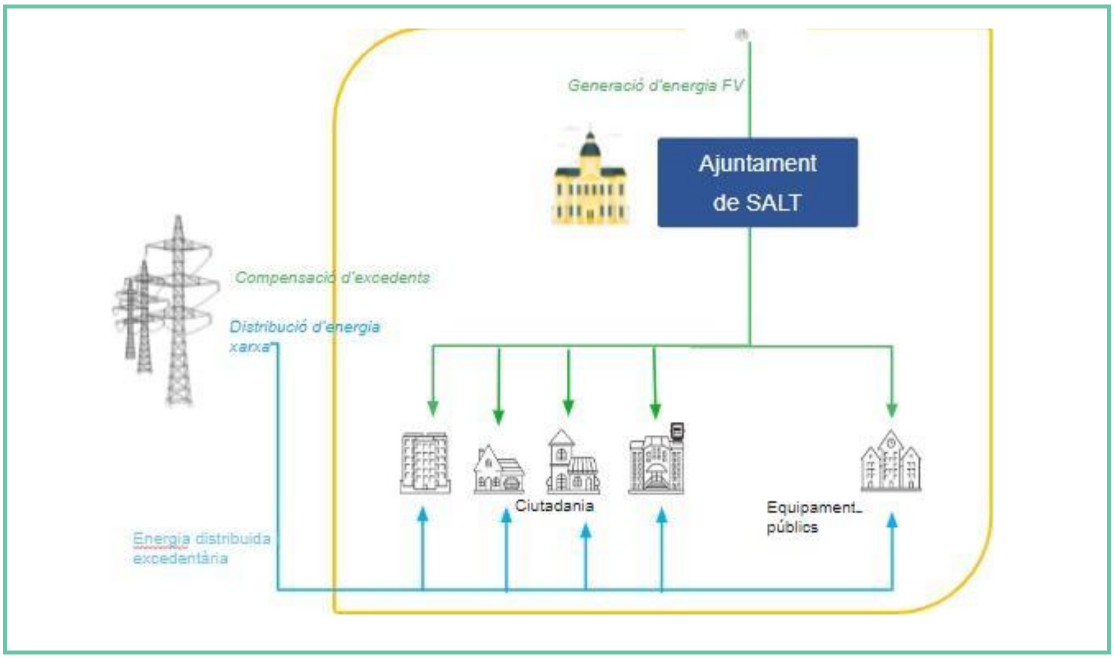
** Percentatge de l'energia assignada que pot ser consumit per cada agent atenent a la seves corbes de consum

The municipality of Salt already has two photovoltaic energy projects in two different public buildings (the market and the theatre)

9. Legal Adoption Planning

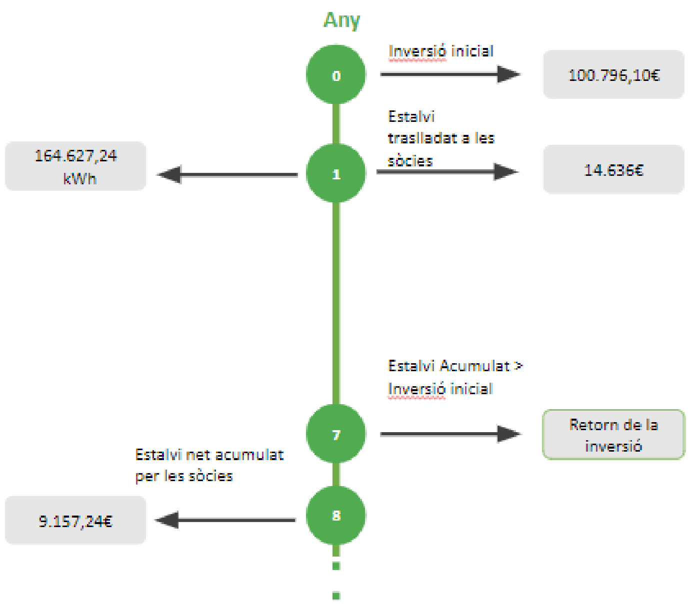
Legal Adoption Planning

The city council will be the owner of the two solar photovoltaic installations, and it will oversee all the needs in the future management procedures. The legal model that has been chosen is widely spread around Girona, and there are examples of other municipalities that can facilitate Salt with legal templates and contracts to share energy with its population.



10. Financial Scheme Adoption Planning

Financial Adoption Planning



The investment and the management of the two solar photovoltaic installations is 100% public. A financial study has been conducted to identify the cost of the energy per kWh, and from this data a political decision can be made to fix the price that people should pay (or not) for the energy provided to them.

11. Replication and Scalability Potential

The first stages of the model are highly replicable as, for itself, it is a replication of one of a model widely spread in the region. The difference within this case is that the main objective in Salt is to provide energy to households which suffer from energy poverty.

In the mid and long terms, it is still difficult to confirm the replications and scalability potential. The Salt municipality aims to be as Energia del Prat, an Energy Community which is a private company led by the municipality. However, Salt needs to make a big effort in promoting energy transition awareness and engaging all the stakeholders in order to make the long-term project possible.

12. References

- Guies i recursos sobre Comunitats Energètiques, Som Comunitats, 2022
- Com elaborar el pla de comunicació de l'associació, Torre Jussana, 2017
- Informe jurídic sobre la cessió d'ús d'instal·lacions fotovoltaiques municipals a comunitats energètiques d'àmbit local, Diputació de Barcelona, 2022
- Bases temporals del concurs per la cessió temporal de quotes, Torroella de Montgrí, 2023
- Sin dejar a nadie atrás, Amigos de la Tierra, 2023
- Comunidades energéticas: una guía práctica para impulsar la energía comunitaria, Amigos de la Tierra, 2022
- Energy poverty in the EU, European Parliament, 2022
- Comunitats energètiques locals (CELS) Xarxa Sobirania Energètica, 2022

Annex 4

Sun4All Sustainable Implementation Plan for the Energia Bonita – Energy Community of La Palma

Sun4All Sustainable Implementation Plan

Energía Bonita

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
Work Package	**WP2** "Business Model. From "Solar for all" programme to Eurosola to all (Sun4ALL) designing the scheme in an European context" **WP5** "Sustaining Transferability and Upscaling"
Dissemination Level	Public
Author(s)	Nuria Albet Torres, La Palma Renovable
Co-Author(s)	-
Contributor(s)	-
Due date	2024-05-31
Actual submission date	2024-06-17
Status	Final
Reviewer(s) (if applicable)	Camila Canelas Navarro, Ecoserveis

This document has been prepared in the framework of the European project Sun4All – "Eurosolar for all: energy communities for a fair energy transition in Europe".

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 101032239.

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11. Replication and Scalability Potential 9

12. References 9

Executive summary

Executive summary – textual element
This Sun4All Sustainable Implementation Plan describes the work done in the efforts for the community energy Energia Bonita to have a positive impact on energy poverty in the island of La Palma, in Canary Islands, Spain. The work process is described, with all actions contained in the different deliverables/phases: work within the energy community, work with relation to the rest of actors of the island and a final closing phase of having identified the existing barriers and finding alternative solutions to the ideas initially planned. The lessons learned are plentiful and although the complexity of the local situation is extremely high, a pathway is set for next steps in the challenge of tackling energy poverty.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
-	-

1. Introduction

Introduction – textual element
Energy Poverty was previously identified as a major problem in the island of La Palma, in Canary Islands [1]. Since then, serious efforts have been put into place in order to involve all social actors in the island to collaborate and find solutions to mitigate the problem, through the Energy Poverty Table. The project Sun4All has facilitated the recently created energy community Energía Bonita to become a relevant actor with an appropriate toolbox to address energy poverty at island level within the Energy Poverty Table collaboration. In the process several strategies were implemented: internal work for the energy community to better understand and address the challenges, and external work with the rest of the actors in order to find solutions and practical collaborations.

2. Work Process

Work Process – combination of textual and visual elements

The working steps were divided into mainly two phases.

The first phase (deliverable 1) had the main focus within the energy community and its existing members in order to train them about energy poverty and create a working group with several member volunteers in order to debate and take some decisions, such as whether to differentiate energy poverty members from other members with different fees or not, and other issues. The actions taken were the following:

- training material was elaborated and sent to all members, the material is still available and open to use at any time (Annex 1) (September 2023)
- an online course session was offered as a training for the members (Annex 2) (October 2023)
- a query was sent to all members to get their opinion about how should the community relate with energy poverty (October 2023)
- a working group of volunteers was created (October 2023)
- a first face to face meeting was arranged in order to debate and take some decisions (Annex 3) (end of October 2023)
- a document with the conclusions was elaborated and decisions taken were brought to the board of the cooperative to validate them (November 2023)
- several online meetings were taken afterwards to discuss updates of the project and the group is open for ongoing needs (November 2023 - ongoing)

A second phase (deliverable 2) had the focus in the members of the Energy Poverty Table (social services of municipalities, insular council and third sector actors) and these different activities were implemented:

- Collection of questions and elaboration of training material about what an energy community is, for the members of the Energy Poverty Table (December 2023)
- Providing training for the Energy Poverty Table (Annex 4) (February 2024)
- Proposing defining a common criterion for the pilot municipality (Annex 5) and a recruitment protocol (Annex 6) (December 2023)
- Proposing collaboration between the energy community and the municipality to cover the entry costs for a person with an energy poverty situation to become a member with full rights (100€ for the obligatory social capital) in 2 different possible ways, through a collaborative agreement (Annex 7) and through a minor contract (Annex 8) (December 2023)

Since the self-consumption PV installation has not been connected to the grid yet (although finished since November 2023) due to problems with the DSO and other bureaucratic issues, there was no time to work with pilot vulnerable families as initially planned in Deliverable 3, but the work has been instead focused both into letting everything ready for that moment and also identifying all barriers in the first pilot municipality and proposing alternative ways to solve the blockages.

For example, the investigation of the possibility of receiving donations directly to the energy community to be used as a pot or pool money for vulnerable people to become members of the cooperative, after being identified (complying with the agreed criteria) by other organisations of the Energy Poverty Table (March 2024).

Figure 1: Picture of debate in energy community

Figure 2: Picture of Social Services Training

Table 1 Deliverables

Nº	Name of action and sub action	Deliverable	Responsibilities
1	Governance process in the Energy Community to get to a set of instructions and processes for vulnerable citizens: Energy Poverty formation for the energy community members, Deliberative process within the energy community, Conclusions and set of instructions and processes	Energy Community formation, debate and decisions for Energy Poverty	La Palma Renovable
2	Social services and third sector instructions to refer vulnerable people to the energy community: Energy Poverty and Energy Community formation for SS technicians, Criteria, collaborative agreement and minor contract project	Social Services Protocol to integrate vulnerable families into the energy community	La Palma Renovable
3	Implementation and identification of barriers.	Implementation and Lessons learned analysis	La Palma Renovable
4	Sustainable Implementation Plan	Sustainable Implementation Plan	La Palma Renovable

Table 2 Budget Allocation

Nº	Unit	Item description	Amount	Cost per unit (€)	Total (€)	Responsibilities
1	€	Sun4All Implementation Plan Deliverable	1	7.808	7.808	La Palma Renovable
2	€	Organization of social dialogues among relevant stakeholders	1	500	500	La Palma Renovable
					TOTAL	**8.308,00€**
		VAT (if applicable)		%	**21**	€ 1.744,68
		TOTAL with VAT included				**€ 10.052,68**

Table 3 Timeline

Nº	Name of action and sub action	Year 2023									Year 2024				
		A	M	J	J	A	S	O	N	D	J	F	M	A	M
1	Energy Community formation,debate, and decisions for Energy Poverty														
2	Social Services Protocol to integrate vulnerable families into the energy community														
3	Implementation and Lessons learned analysis														
4	Sustainable Implementation Plan														

3. Current State of Energy Poverty Action

Current State of Energy Poverty Action – combination of textual and visual elements
Energy poverty in La Palma was previously identified in the study from 2022 [1]. In that study, very alarming indicators were detected.

Current State of Energy Poverty Action – combination of textual and visual elements
As a result of the conclusions of the study an Energy Poverty Table was established in 2023, with representatives of social services of all municipalities, insular council and several third sector organisations. This space serves different purposes: easy communication and coordination among entities, identification and prioritisation of needs and actions, training on energy poverty, elaboration of protocols to better optimise and share resources among organisations. As for other initiatives on energy poverty at the local level, La Palma Renovable is working to establish an office where energy poverty users can be forwarded to to help them save energy and money in their electricity bills. The island council Cabildo Insular together with La Palma Renovable has received mentoring and technical advice in the establishment process from the European project Energy Poverty Advisory Hub (EPAH). Also, some third-sector organizations in the island, as for example, Cruz Roja, occasionally offer courses on energy savings with their users.

4. Stakeholder Mapping and Coordination

Stakeholder Mapping and Coordination – combination of textual and visual elements
This project has had a strong base for the relationship building with all relevant stakeholders in the Energy Poverty Table established in the island last year, where all actors that work with poverty are present: Social Services of all 14 municipalities, Cabildo (Island Council) and several third sector organisations. It was a good place to start since training and exchange of needs and experiences could be shared among everyone at the same time and place, enriching the conversations and advancing faster in the identification of challenges. For this project a municipality was selected as pilot stakeholder, the one where the first shared self-consumption installation was built (but not connected and working yet due to problems with the DSO and other bureaucratic issues). Conversations also started with a third sector organisation, a non-public sector organisation (Red Cross), as a pilot, after several challenges presented by the municipality were identified.

5. Defining Criteria and Conditions for Participation

Defining Criteria and Conditions for Participation – combination of textual and visual elements
The eligibility criteria were elaborated as a draft starting point from this project and shared with the pilot municipality. (Annex 5) There are 3 types of criteria: economic (income lower than 1.5 IPREM), energy poverty (more than 10% of family income to electricity bills, payment delays or having requested aid to pay the bills in the last 12 months) and energy poverty risk (disability or dependency in the family

Defining Criteria and Conditions for Participation – combination of textual and visual elements
unit, illness that requires electric appliances, monoparental families or houses or house in bad habitability conditions). The criteria were found adequate by the pilot municipality, although there were several elements that were evaluated as too risky in order to involve vulnerable people in the project. In the first place, there were uncertainties as to when the shared self-consumption project would start functioning due to issues with the DSO and bureaucracy and how that could affect their billing. In second place, most potential beneficiaries in a vulnerable situation receive a discount in their energy bill which reduces in great measure the benefits of being part of the shared self-consumption plant, because economically it would be very difficult for the energy community to offer cheaper energy fees, representing a higher reduction in euros, than the discounted energy in their bill, especially for the most vulnerable that at this point (temporally as the law is now) receive a 80% discount, therefore, the economic benefit for the users wouldn't be much. That led to the conclusion of prioritizing in the evaluation criteria potential beneficiaries who don't receive the discount for different reasons, or receive low discounts, so beneficiaries with less degree of vulnerability or cases that for some reason even being highly vulnerable don't receive the discount in their bill. Also, it was clear that different services within the energy community would need different criteria. For example, the energy community is preparing an electric car-sharing service to its members, and that would be adequate even for vulnerable people with discounts in their electric bills.

6. Planning Citizen Recruitment and Engagement

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
In the energy poverty working group of the energy community it was debated whether to have the cooperative's own criteria and recruitment process or collaborate with other organisations that would do the selection and recruitment and forward vulnerable people to the energy community through a protocol. It was decided that, for the moment, and with the possibility of changing strategy if the energy community has more resources to do that job in the future and/or many people arrived directly to the community asking for help, the recruitment would be done through collaboration with the municipal social services and other third sector organisations. These organizations already have plenty of potential beneficiaries in their usual users, that's why the most important communication and training is the one done so the social services workers know and understand very well the energy community so they can forward the potential beneficiaries that can benefit the most. Further than that, when the project gets established and the trust grows both in social services and potential beneficiaries, moving from pilot phase to regular implementation in the future, the energy community social media will be used to periodically inform about the project and the benefits achieved by the users.

7. Community Building and Energy Awareness

Community Building and Energy Awareness – combination of textual and visual elements
It was considered that not only the most vulnerable families had to be addressed but also the rest of members of the energy community to transfer a broad knowledge and sensibility of the problem of energy poverty to everyone in the community. The discussions within the energy poverty working group of the energy community concluded that there should be special help to those households with energy poverty, at the same time that it wouldn't be desirable to set too strong differences among members and that vulnerable people should have voice and vote as everyone else in the community, meaning they should have full membership and, then, the problem is how to pay for the entry fee of 100€. The working group also concluded that there should be energy workshops for the vulnerable members of the energy community, but not exclusively to them, trying to mix in the workshop's members from different socioeconomic background, at the same time than facilitating the participation of the most vulnerable ones (taking into account place, schedule, language...).

8. Technical Adoption Planning

Technical Adoption Planning – combination of textual and visual elements
This planning was already done previously to the Sun4All programme. The planned installations were 8 shared self-consumption plants of various power (initially planned to be 100 kW but finally reduced in some of them due to DSO restrictions) distributed in all island territory

9. Legal Adoption Planning

Legal Adoption Planning – combination of textual and visual elements
The planning regarding the public rooftop use by the energy community, was already advanced previously to the Sun4All programme. The roofs where the photovoltaic plants are and will be installed are owned, one by a municipality and the rest by the regional government, with a time allowance of 25 years.

10. Financial Scheme Adoption Planning

Financial Adoption Planning – combination of textual and visual elements
Among the several different business models for the building and exploitation of the collective self-consumption installations that the energy community considered, one of them was finally

Financial Adoption Planning – combination of textual and visual elements
selected, one of the main arguments considered for the decision being energy poverty and not excluding anyone who couldn't make an upfront payment investment. That model consists in finding the investment money through a combination of cooperative own capital emission (not linked to consumption so all energy community members that have savings, can invest but the ones that don't have, don't need to), bank loans and subsidies. In this business model, the income for maintaining the cooperative and paying back the loans comes from fees from the members, proportional to the energy distributed to each one, the fees being lower than the energy market prices, so being an economic saving. This model that has the advantage of including vulnerable families has its challenges, since there needs to be contracts with financial institutions. The experience gathered during the time of this project confirms that the challenges are major and the successes not easy to replicate. Even in the case of having granted subsidies, the money is often paid after justification (for example in the case of Next Generation subsidies of 50% or more of the total investment amount) which means that it must be received from somewhere else and spent before it can be paid in from the subsidy. This is a novel type of business model (shared self-consumption) with, in some regions, a new type of company (the cooperative collective type) and all the unknowns are translated into high risk in the evaluation of banks and guarantee financial institutions. This was the case of Energía Bonita. To finally get the necessary money, two different banks and a not-for-profit foundation acting as a guarantee were needed in order to lower the risks. Considering that not all banks are willing to collaborate in order to distribute risks and that it is not easy to find private foundations or other organisations willing to act as a guarantee for big amounts of money, other solutions should come from the public administrations if the model wants to be easily escalated. For example, public guarantees or subsidies that pay in advance of spending for the investment.

11. Replication and Scalability Potential

The potential for replication and scalability is high. The lessons learned and challenges in the first pilot municipality can be applied to the rest of municipalities of the island and beyond to scale faster.

Understanding how municipalities perceive the risk in novel projects that have external barriers due to DSO and bureaucracy is key to address solutions. Increasing the services that the energy community gives to the members beyond shared self-consumption would also help in scaling the projects. As a conclusion to better replicate the project, training in energy poverty to as many actors as possible, facilitates a correct identification of the challenges and possible solutions.

12. References

1 López Fernández, J.L., Albet Torres, N., Mayorga Sánchez, D., 2022. Pobreza energética en la Isla de la Palma. La Palma Renovable, La Palma

https://lapalmarenovable.es/wp-content/uploads/2022/10/Estudio_PobrezaEnergetica_LaPalma.pdf

Annex 5

Sun4All Sustainable Implementation Plan for the Junta de Freguesia do Lumiar

Sun4All Sustainable Implementation Plan

Lumiar Parish Council, Portugal

June 2024

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
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Executive summary

The Lumiar Parish Council joined the Sun4All Community of Practice to exchange experiences and build capacity to further develop its energy community initiatives. The focus was the Telheiras Renewable Energy Community (Telheiras REC) project promoted by the Lumiar Parish Council in collaboration with the Local Partnership of Telheiras. The Viver Telheiras Associations is the legal entity responsible for the management of the Telheiras REC and provided the expertise to develop this Sun4All Sustainable Implementation Plan for Lumiar. It should be noted that the Telheiras REC has already installed its pilot solar photovoltaic (PV) project and has successfully recruited the founding members before joining the Sun4All Community of Practice; the planning stage of the pilot project was the focus of a technical assistance by the European Union (EU) Energy Poverty Advisory Hub (EPAH) with the involvement of the renewable energy cooperative Coopérnico and of the Centre for Environmental and Sustainability Research of the NOVA School of Science and Technology of the NOVA University of Lisbon (CENSE NOVA-FCT).

Thus, the workplan for the Sun4All Community of Practice (section 2) was specifically focused on the scale-up of the Telheiras REC through a second solar PV installation, by refining a process and criteria for the identification, selection, and engagement of energy-poor households by the Lumiar Parish Council and its partners in the social support area (section 5), providing a technical assessment for the PV system to be installed in a gymnasium managed by the Lumiar Parish Council (subsection 8.3), and developing a recruitment campaign and communication materials for local citizens, businesses, and associations to join the energy community as investors and consumers of the renewable energy generated and shared by the solar PV systems (section 6). Other sections describe the overall context of the project in the EU and in Portugal (section 1), the energy poverty situation at national and local scale (section 3), the stakeholders engaged at local, regional, and national scale (section 4), the types of community and capacity building activities developed (section 7), and the technical (section 8), legal (section 9), and financial aspects (section 10) of the Telheiras REC. Finally, the Sustainable Implementation Plan ends with a critical outlook on the possibilities and challenges for scaling up and replicating the approach of the Telheiras REC both at local and national levels.

The Lumiar Parish Council, the Local Partnership of Telheiras, the Viver Telheiras Association, and its partners are committed to continuing their development of renewable energy communities with the goals of fostering decarbonisation, energy poverty mitigation, energy democratization and citizenship, and empowered, vibrant and resilient communities. To this end, collaboration with other stakeholders at local, national, and international scale – such as the pilots and Community of Practice members of the Sun4All European project – is the key for cross-fertilization and capacity building for an impactful role of renewable energy communities in just energy transitions.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
ADENE	Portuguese Energy Agency
DGEG	Directorate-General for Energy and Geology
EPAH	Energy Poverty Advisory Hub
EPVI	Energy Poverty Vulnerability Index
EU	European Union
INE	Portugal Statistics
PV	Photovoltaic
SCI	Self-consumption index
SSI	Self-sufficiency index
Telheiras REC	Telheiras Renewable Energy Community

1. Introduction

Energy poverty is a key concern in the European Union (EU), defined by the Energy Efficiency Directive as the "lack of access to essential energy services […] caused by a combination of factors, including at least non-affordability, insufficient disposable income, high energy expenditure and poor energy efficiency of homes". The EU Energy Poverty Advisory Hub (EPAH) has compiled indicators for a multidimensional assessment of energy poverty at EU and national scale (Gouveia *et al.*, 2022; Gouveia *et al.*, 2023). These show, for instance, that 10.6% of the EU's population was unable to keep their home adequately warm in 2023, representing a sharp increase since 2021 (Eurostat, 2024a). In addition, 15.5% of the EU population was living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames or floor in 2023 (Eurostat, 2024b). Energy prices have risen in the energy crisis, representing a significant burden for families.

In the latest Recommendation on Energy Poverty, the European Commission (2023a) highlighted collective self-consumption schemes, including energy communities and energy sharing schemes, as an important piece for energy poverty mitigation. Collective self-consumption schemes are stated to be able to "overcome the limited capacity of households affected by energy poverty to access renewable energy and become active - as consumers while producing electricity (so-called 'prosumers')". Furthermore, participating in collective self-consumption schemes is expected to bring "wider non-financial benefits, such as empowerment, new skills and social inclusion for the individual, as well as trust and interconnections for the community".

Renewable energy communities are defined by the Renewable Energy Directive as a legal entity based on open and voluntary participation, autonomous, and effectively controlled by its members that are in the proximity of the renewable energy projects. The members should be families, small and medium-sized enterprises, and local governments. The main goals of energy communities should be to deliver environmental, social, and economic benefits to its members or location rather than financial profits. Still, renewable energy communities are just kick-starting in Europe and approaches for the effective involvement of energy-poor households are still limited.

Portugal usually performs amongst the worst EU Member States in several energy poverty indicators. For instance, 20.8% of the population was unable to keep their home adequately warm in 2023, and 29.0% of the population was living in dwellings with leaks, damp, or rot in 2023 (Eurostat, 2024a; Eurostat, 2024b).

In 2024, the Portuguese Government published the National Long-Term Energy Poverty Combat Strategy 2023-2050, estimating that up to 29% of the population (around three million people) – is energy-poor (Portuguese Government, 2024). In this strategy, collective self-consumption schemes and renewable energy communities are mentioned as "instruments to reduce energy bills […] through access to local renewable energy generation and sharing", establishing the need to "promote the integration of low income and vulnerable households in renewable energy communities".

Energy communities first appeared in Portuguese legislation in Decree-Law no. 162/2019, transposed from European Directives. In 2022, Decree-Law no. 15/2022 defined collective self-consumption and renewable energy communities. Both concepts allow for the production and sharing of renewable energy among their members, differing mainly in that a renewable energy community is a legal person, with open and voluntary participation, legal personality and with the right to perform other services in the energy system beyond producing and sharing energy.

Lisbon is the capital of Portugal with a population of around 550 thousand people. Lisbon's Climate Action Plan 2030 formulates the city's strategy to become "a climate neutral city by 2050, adapted to extreme climate events and resilient to crises and shocks" (CML-DMAEVCE *et al.*, 2021). This plan is also "an instrument of integration and management of city policies and instruments in matters of [climate] mitigation and adaptation, eradication of energy poverty, and improvement of well-being". A key goal of this plan is to have 100 MW of solar power installed in Lisbon by 2030. The city has a very promising solar potential with 44% of rooftops having good or very good solar exposure. The potential for solar power generation is equal to 95% of the electricity consumption of 2016 (CML-DMAEVCE *et al.*, 2021).

In Lisbon's Climate Action Plan 2030, solar power is seen as a key tool for decarbonisation and energy poverty eradication (CML-DMAEVCE *et al.*, 2021). This plan seeks to "encourage solar culture and [energy] citizenship" and to "contribute to the evolution of the national regulatory framework towards the massification of individual, collective and community self-consumption of energy". Finally, Lisbon was selected to join the EU Mission: 100 Climate-neutral and smart cities by 2030 to pursue ambitious goals to slash emissions rapidly and pioneer innovative approaches with citizens and stakeholders (European Commission, 2020).

In this context, European-funded projects, such as the Sun4All project, are breaking ground and sharing experiences with the aim of facilitating access to renewable energy for vulnerable households, which otherwise might be excluded from participating in energy communities, combining the twin goals of decarbonisation and energy poverty mitigation. The Lumiar Parish Council applied to be a member of the Sun4All Community of Practice seeking to closely observe the pilots' implementation in Almada, Barcelona, Cœur de Savoie, and Rome, and to work collaboratively on its own local energy poverty eradication plans.

Lumiar is the most populous civil parish in Lisbon municipality, with 47,000 inhabitants and with persisting and deep-seated socio-economic inequalities in its territory (Figure 1). To support the Lumiar Parish Council in the formulation and implementation of energy poverty mitigation plans, including by capitalising on the Sun4All experience and other collaborations, the Viver Telheiras Association was the selected expert to develop the Sun4All Sustainable Implementation Plan.

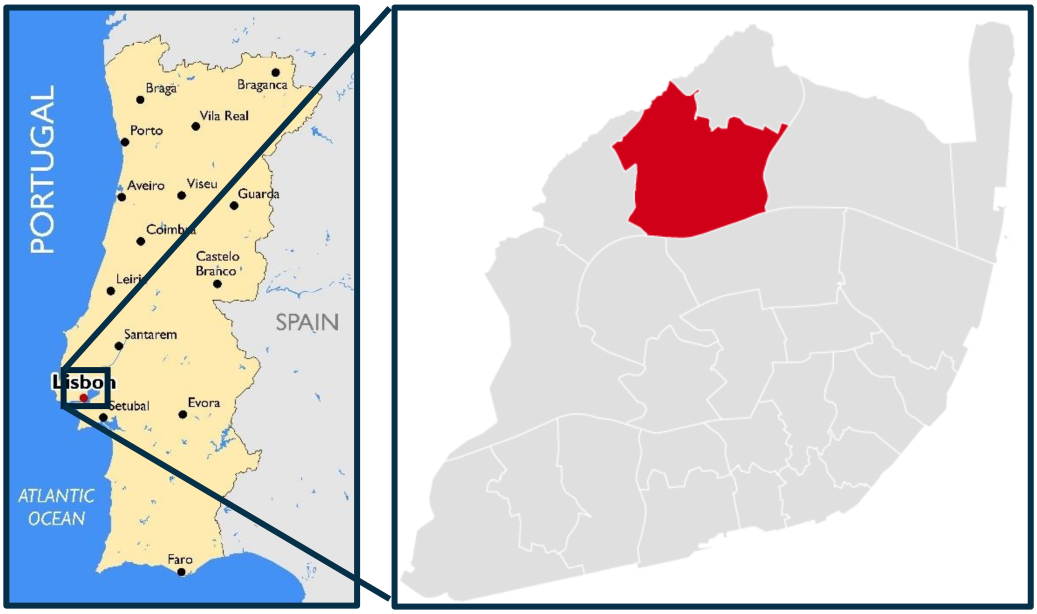

Figure 1 – Location of the Lumiar Civil Parish within Lisbon Municipality, Portugal.

The Lumiar Parish Council is the local government responsible for managing the Lumiar territory within Lisbon Municipality. It seeks to "enhance Lumiar based on its history and geographical location through the entrepreneurial capacity and spirit of initiative of its differentiated and young population", to "build a supportive Parish, which takes care of its own and invests in education as a driver of personal and social development for our children, young people and adults; safe, with urban mobility and investment in infrastructure; that creates its own centralities, cultural and leisure spaces; a clean and well-kept parish, with pleasant green spaces", and to "guarantee a participative and effective Parish, at the service of residents, which involves them in their daily lives and puts these values of service to the community into practice every day" (Lumiar Parish Council, 2024).

Telheiras is a neighbourhood located mostly within the Lumiar Civil Parish in Lisbon. The Viver Telheiras Association coordinates the Local Partnership of Telheiras: a community network with 24 members created in 2013, bringing together local authorities, institutions (social support), associations (parents, cultural, retired, disabled, residents), organizations (scouts, religious groups), local commerce, and informal groups, to share resources and organize events. It seeks to contribute to the urban transformation of the Telheiras neighbourhood in different aspects, such as culture, education, active citizenship, social support, and environment. In 2020, it launched the "network of ideas" process that has actively engaged 300 residents in co-developing sustainability-oriented projects (Sequeira and Mameri, 2022).

In this context, the Local Partnership of Telheiras and the Lumiar Parish Council are promoting a renewable energy community with the direct involvement and empowerment of citizens and local associations in the investment and management of decentralized solar photovoltaic systems, contributing to decarbonisation and energy poverty mitigation in line with European, national, and municipal policies. To exchange experiences on energy communities and learn from the Sun4All pilots approaches, the Lumiar Parish Council joined the Sun4All Community of Practice and herewith presents the Sun4All Sustainable Implementation Plan developed by its expert partner (Viver Telheiras Association).

2. Work Process

The Lumiar Parish Council and the Local Partnership of Telheiras were already developing a renewable energy community in their territory before joining the Sun4All Community of Practice. This energy community project fits the European Union’s definition of renewable energy communities, including by providing social, economic, and environmental benefits to its members or location, instead of financial profits, by being autonomous and effectively controlled by its members, and by having voluntary, open, and transparent participation principles; it is mentioned as a best practice in the Staff Working Document accompanying the European Commission’s latest recommendation on energy poverty (European Commission, 2023b). A key goal of this renewable energy community defined from the on-start was to combat energy poverty in the territory, by establishing specific conditions and procedures for energy-poor households to join the energy community.

The Telheiras Renewable Energy Community (Telheiras REC) in the Lumiar Civil Parish is a local solar energy generation and sharing project, managed by its members (Viver Telheiras, 2024a; Viver Telheiras 2024b). This innovative project aims to contribute to more sustainable, fair, cheap, and democratic energy. In its pilot project, the energy community members jointly invested in the installation of a 7.15 kWp solar photovoltaic (PV) system (13 solar panels) in a public building with the generated electricity being used by the building itself (a community centre managed by the Lumiar Civil Parish) and being shared with 16 local households, of which 3 are energy-poor households (Viver Telheiras, 2024c).

The key area of activity of the energy community is local renewable energy generation and sharing among its members in the proximity. In addition, the energy community raises awareness on energy topics and provides free advice to the general population, while also combating social exclusion and fostering community participation. These advisory services also build on a previous project that focused on improving energy efficiency in the local commerce through the deployment of energy audits and energy efficiency workshops with a community-based approach (Sequeira and Melo, 2020; Sequeira *et al.*, 2021). According to its internal regulations, every energy community member has the right to one vote in general assemblies and membership is reserved for households, local small businesses, and authorities.

The project received technical support from the EU Energy Poverty Advisory Hub from October 2022 to July 2023 (EPAH, 2024). The support was delivered through the expertise of the renewable energy cooperative Coopérnico and of the Centre for Environmental and Sustainability Research of the NOVA School of Science and Technology of NOVA University Lisbon (CENSE NOVA-FCT). This assistance started with a regional analysis of energy poverty based on a multidimensional index and enabled the definition of a financing and operational model, of a legal structure, of an internal regulatory framework, and of a communication campaign for the pilot project. It culminated in the submission of a request for licensing in June 2023 for which preliminary approval was obtained in November 2023.

Thus, the work plan defined in the context of the Sun4All Community of Practice picked up on past and ongoing work, for which the experience and support from the Sun4All consortium, the Community of Practice members, and the contracted expert (Viver Telheiras Association) were highly relevant. Table 1 presents the main actions delivered in the context of the Sun4All workplan.

Table 1 – Work Plan submitted for the Sun4All Community of Practice.

Action no.	Name of action and sub action	Responsibilities
1	Development of the Sun4All Sustainable Implementation Plan	Expert (Viver Telheiras Association)
2	Identification and engagement of energy-poor households	Lumiar Parish Council with the support of the expert (Viver Telheiras Association)
3	Planning of the second project and organisation of a communication campaign (including one public event in the Lumiar Civil Parish)	Expert (Viver Telheiras Association)
4	Development of communication materials	Expert (Viver Telheiras Association)

The work plan included the development of the Sun4All Sustainable Implementation Plan by the Viver Telheiras Association as a key action. It also included support for establishing procedures and criteria for the identification, engagement, and inclusion of energy-poor households to join the pilot project of the energy community. This action was developed by the Lumiar Parish Council with the support from Viver Telheiras Association. In parallel to the work plan, the Telheiras REC installed its pilot solar photovoltaic system and is concluding the final stages of the licensing process.

The work plan included the planning of a second solar photovoltaic project to be installed by the Telheiras REC in the Lumiar Parish. This second project will scale-up the energy community approach, enabling the entry of more members and the support of more energy-poor families. The public launch of this second project in May 2024 was preceded by a technical analysis performed by the Viver Telheiras Association. Also included in the work plan was the organisation of a communication and recruitment campaign for new members to join the energy community and the development of communication materials.

Table 2 presents an overview of the deliverables defined in the work plan. The key deliverable was the Sun4All Sustainable Implementation Plan (*i.e.*, this document is deliverable no. 1 of this work plan). Other deliverables included the establishment of a process and criteria for the identification and engagement of energy-poor households (section 5 of this document), allowing their inclusion in the energy community's renewable energy sharing scheme, and the planning of the second project including technical aspects (section 8.3 of this document) and a communication campaign and communication materials (section 6 of this document). Table 3 presents the timeline for the delivery of the work plan.

Table 2 – Overview of Deliverables defined in the work plan.

No.	Name of action and sub action	Deliverable	Responsibilities
1	Development of the Sun4All Sustainable Implementation Plan	Sun4All Sustainable Implementation Plan	Expert (Viver Telheiras Association)
2	Development of a process of identification and engagement of energy-poor households	Process to identify and engage energy-poor households	Lumiar Parish Council with the support of the expert (Viver Telheiras Association)
3	Planning of the second project and organisation of a communication campaign (including one public event in the Lumiar Parish)	Technical analysis, draft communication campaign, event	Expert (Viver Telheiras Association)
4	Development of communication materials	Communication materials	Expert (Viver Telheiras Association)

Table 3 – Timeline for the delivery of the work plan.

Nº	Name of action and sub action	Year 2024				
		January	*February*	*March*	*April*	*May*
1	Development of the Sun4All Sustainable Implementation Plan		X	X	X	X
2	Process of identification and engagement of energy-poor households	X	X	X		
3	Planning of the second project and organisation of a communication campaign (including one public event in the Lumiar Parish)			X	X	X
4	Communication materials (flyers, posters, etc)				X	X

3. Current State of Energy Poverty Action

In Portugal, energy poverty is a severe and multidimensional problem affecting households' health and well-being. The Portuguese population also presents a hard-to-reach profile for the adoption of energy interventions, such as renewable energy and energy efficiency with existing statistical data from 2022 suggesting that 25% has low-income levels, 24% has low education levels, 47% live in multi-family buildings, 17% being elderly, 12% are migrants, 39% have ill-health, and 22% living in a rented dwelling (Sequeira *et al.*, 2024a).

Energy Social Tariffs for electricity and natural gas are in place to lower the impact of energy costs on vulnerable households. Access to this discount of around 30% on energy bills is carried out through an automatic recognition mechanism, which cross-checks data received from agents in the sector, after verifying the eligibility conditions of customers with the Tax and Customs Authority and with the Social Security. In May 2024, almost 760 thousand consumers benefited from the Electricity Social Tariff while almost 50 thousand benefited from the Natural Gas Social Tariffs (DGEG, 2024). In the Lisbon Municipality, the number of households benefiting from social tariffs was around 35 thousand for electricity and 4.8 thousand for natural gas in May 2024.

To access the Electricity Social Tariff, the consumer must have an electricity supply contract in their name, intended exclusively for domestic use in permanent housing, with a contracted electrical power at normal low voltage equal to or less than 6.9 kVA, and if they are receiving one of the following support from Social Security: solidarity supplement for the elderly, social insertion income, unemployment benefits, family allowance, social disability pension from the special disability protection regime or from the supplement to the social benefit for inclusion, or social old-age pension. Even if they do not receive any social benefit, households can benefit from this social tariff if their total annual income is equal to or less than €6,272.64, plus 50% for each member of the household who does not receive any income up to a maximum of 10 (DGEG, 2024).

To access the Natural Gas Social Tariff, the consumer must have a natural gas supply contract in their name, intended exclusively for domestic use in permanent housing, at low pressure, with annual consumption less than or equal to 500 m3, and be receiving one of the following support from Social Security: solidarity supplement for the elderly, social insertion income, unemployment benefits, family benefit, or social disability pension from the special disability protection regime or from the supplement to the social benefit for inclusion (DGEG, 2024).

More recently, the Portuguese Government launched the "Efficiency Voucher" programme aiming to improve energy performance and mitigate energy poverty. In the first phase of the programme from 2021 to 2023, one voucher worth 1,300 euro plus Value Added Tax was made available for households that receive energy social tariffs and that own their dwelling (it was not made available for renters and for social housing). This programme supported the following types of interventions: replacement of non-efficient windows with efficient windows, application or replacement of thermal insulation in the housing building envelope, replacement of entrance doors, installation of space heating and/or cooling and domestic hot water systems, and installation of photovoltaic panels and other renewable energy generation equipment for self-consumption (Environmental Fund, 2024a). The goal was to deliver 100 thousand "Efficiency Vouchers" until 2025; however, phase one was characterized by a lack of engagement from energy-poor households in the programme with the delivery of vouchers being substantially below expectations.

To boost the uptake of the "Efficiency Voucher" programme, it was reformulated and re-launched as phase two (2023 – ongoing). A key difference between phase one and phase two is the involvement of technical facilitators (*i.e.* local and regional energy and environment agencies) and of administrative facilitators (*i.e.* local authorities at the level of civil parish, such as the Lumiar Parish Council). Furthermore, in phase two, households are entitled to three vouchers, which can bring the total grant amount to 3,900 euro plus Value Added Tax (Environmental Fund, 2024b). In addition to recipients of the electricity social tariff, households in which at least one of the members of is a beneficiary of minimum social benefits are also eligible. Crucially, the phase two of the "Efficiency Voucher" also allows the application of households that privately rent their dwelling (social housing is still excluded from the programme).

Regarding collective self-consumption and renewable energy communities, the Portuguese Government launched from June 2022 to February 2023 a programme to financially support their implementation in residential, commercial, and central administration buildings (local governments were excluded from this support). A total of 30 million euro were made available for this program, of which 10 million euro were allocated for residential buildings (Environmental Fund, 2024c). The results of this programme are not yet published; however, there were no requirements for submitted projects to integrate energy poverty mitigation into their activities. Collective self-consumption and renewable energy communities are also entitled to an exemption in the grid access tariffs paid by energy consumers, namely in the costs of general economic interest of the energy system during the first seven years of operation and in the medium-voltage and high-voltage components (Decree-Law no. 15/2022). Still, scarce policies and funding schemes have been so far deployed to support energy communities' development in Portugal, especially regarding the inclusion of energy-poor households.

Gouveia *et al.* (2019) developed an Energy Poverty Vulnerability Index (EPVI) at the spatial scale of the civil parish in Portugal, as a key tool to inform policymakers at national and local level. It is composed of two main components: i) the calculation of a thermal discomfort gap where theoretical final energy consumption for heating and cooling is compared with actual consumption, and ii) the calculation of adaptive capacity which integrates socioeconomic variables and represents the population's ability to implement measures to avoid thermal discomfort.

In the context of the EU Energy Poverty Advisory Hub technical assistance, Palma and Gouveia (2022) applied the EPVI to assess reginal energy poverty vulnerability in the Lisbon Municipality and all its civil parishes (including the Lumiar Civil Parish) both for winter and summer (Figure 2 and Figure 3).

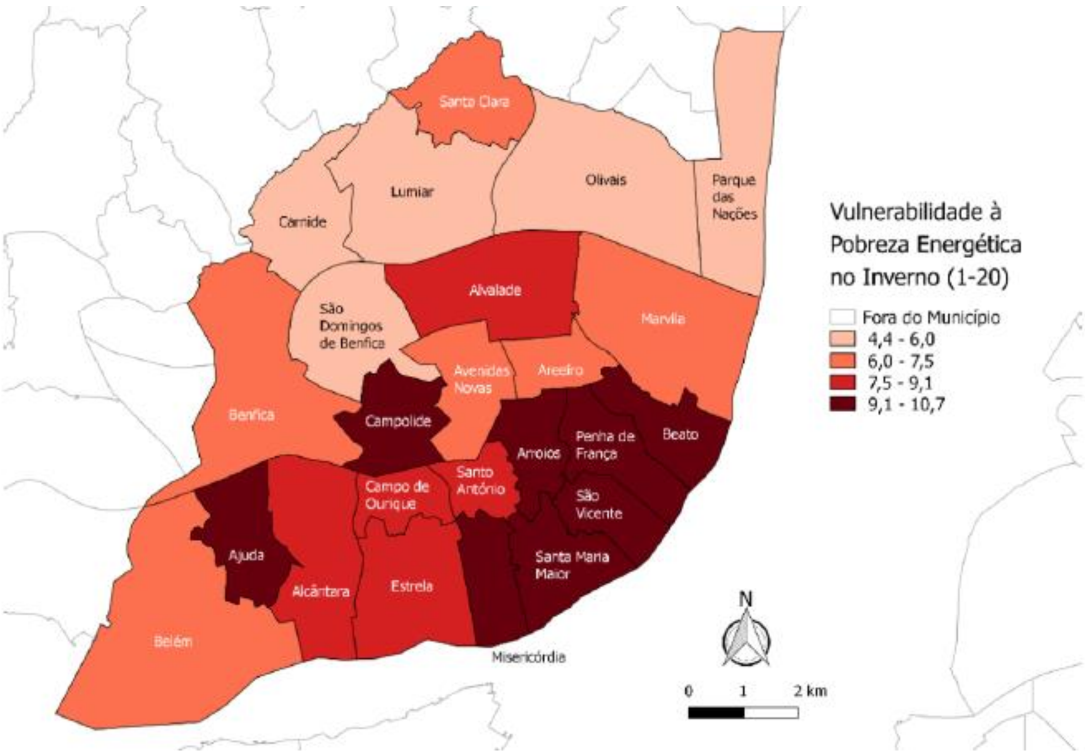

Figure 2 – Winter EPVI in Lisbon Municipality (Palma and Gouveia, 2022).

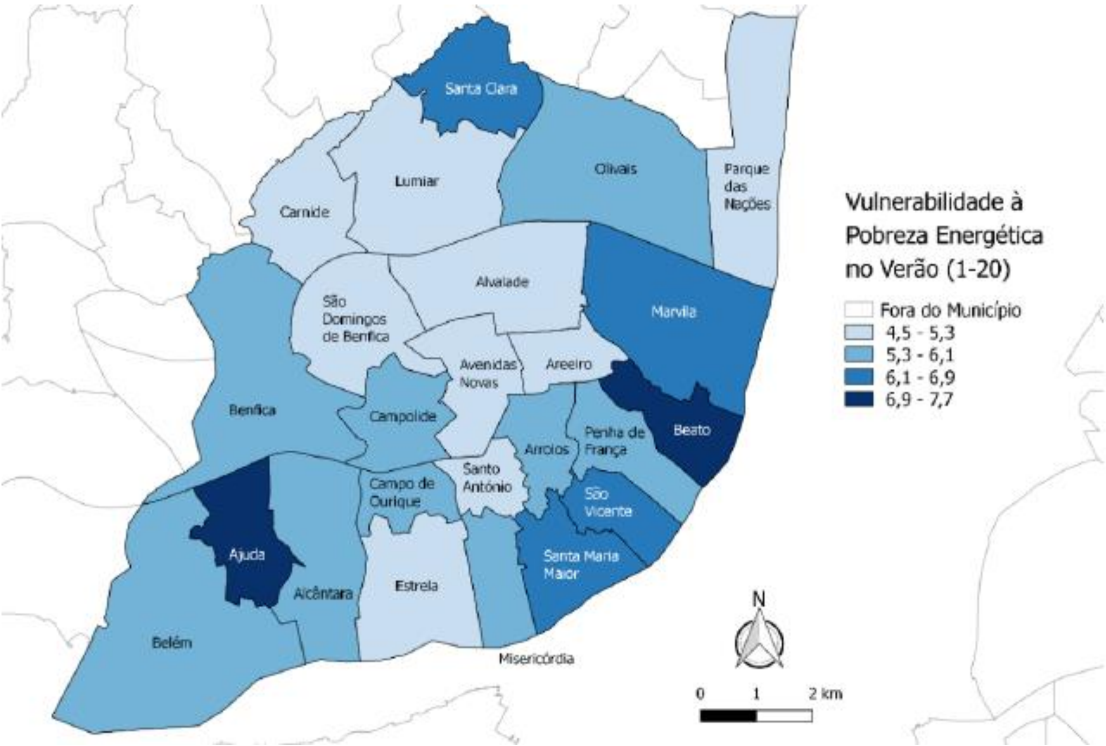

Figure 3 – Summer EPVI in Lisbon Municipality (Palma and Gouveia, 2022).

While Lumiar shows lower EPVI values than other civil parishes in Lisbon, Palma and Gouveia (2022) warn that "a low index value in a parish with a larger population, such as Lumiar, may not be synonymous with a population in reduced energy poverty, compared to a parish with a smaller population and a higher index" and that "the low levels of vulnerability observed in the parish should not constitute sufficient evidence to prevent a more in-depth analysis to investigate the possibility of a significant number of households being in energy poverty in the parish".

In Lumiar, buildings date from before the 80s-90s, when thermal regulations were inexistent in Portugal, suffering from poor construction and thermal discomfort which can impact energy poverty vulnerability. Households in Lumiar come from a broad social stratum, from low to middle class, with areas being social and informal housing. Around 21% of its population is over 65 years old. Migrants are 5% of the population. Unemployment rate is 8% and 35% of the population has only basic education (INE, 2024).

The Lumiar Parish Council provides social support to vulnerable families in its territory in close collaboration with other social support and solidarity organisations. It is also one of the administrative facilitators for the attribution of "Efficiency Vouchers" to energy-poor households. The Telheiras REC promoted by the Lumiar Parish Council and the Local Partnership of Telheiras is seeking to mitigate energy poverty by providing special conditions for energy-poor households to join the energy community and benefit from the generation and sharing of solar energy. To achieve this goal, it was necessary to establish a process and criteria to carefully identify and engage energy-poor households.

4. Stakeholder Mapping and Coordination

The Telheiras REC is being promoted by the Lumiar Parish Council and by the Local Partnership of Telheiras which are the key stakeholders engaged in the process. Since the technical assistance provided by the EU Energy Poverty Advisory Hub, the renewable energy cooperative Coopérnico and the Centre for Environmental and Sustainability Research of the NOVA School of Science and Technology of the NOVA University of Lisbon became key partners contributing with technical and scientific expertise. It should be noted that stakeholder mapping was not a task included in the work plan defined in the context of the Sun4All Community of Practice. Nevertheless, this section provides the key information on the stakeholder environment surrounding the Telheiras REC at local, regional, and national level.

The Local Partnership of Telheiras was formed in 2013 and is currently composed by around 20 local organisations (Figure 4). Some of these organisations are: PSOPortugal – Associação Portuguesa da Psoríase, APRe! – Associação de Aposentados Pensionistas e Reformados, Associação Educativa para o Desenvolvimento da Criatividade, Agrupamento de Escolas Vergílio Ferreira, Agrupamento 683 de Escuteiros de Telheiras, Associação Juvenil de Ensino e Comunicação (AJEC), Associação de Pais do Alto da Faia, Associação de Pais da Escola Básica e Jardim de Infância de Telheiras, Associação de Pais EB Telheiras, Associação de Pais de São Vicente/Telheiras, Associação de Paralisia Cerebral de Lisboa (APCL), Associação para a Promoção e Desenvolvimento da Sociedade da Informação (APDSI), Associação de Residentes de Telheiras (ART), Biblioteca Municipal Orlando Ribeiro – Câmara Municipal de Lisboa, CAJIL – Centro de Apoio a Jovens e Idosos do Lumiar, Centro Comunitário de Telheiras – Santa Casa da Misericórdia de Lisboa, Centro de Convergência de Telheiras, Centro Cultural de Telheiras, Câmara Municipal de Lisboa – Dept. de Desenvolvimento Social, Câmara Municipal de Lisboa – Unidade de Intervenção Territorial Norte, Comunidade Hindu de Portugal, Escola Técnica Psicossocial de Lisboa (ETPL), 19ª Esquadra – Telheiras, Fundação Vox Populi, Julgado de Paz de Lisboa, Junta de Freguesia do Lumiar, Paróquia de Nª Sª da Porta do Céu, Parque Carnide – Telheiras, Associação Ambiental (PACATA), Parque Hortícola de Telheiras, Re-Food 4 Good – Associação, Núcleo de Telheiras, and Voluntários de Protecção Civil de Telheiras. The Viver Telheiras Association is responsible for the management and external communication of the Local Partnership of Telheiras. In addition, the Lumiar Parish Council promotes working groups on social and environmental issues in the Lumiar Civil Parish bringing together multiple local stakeholders.

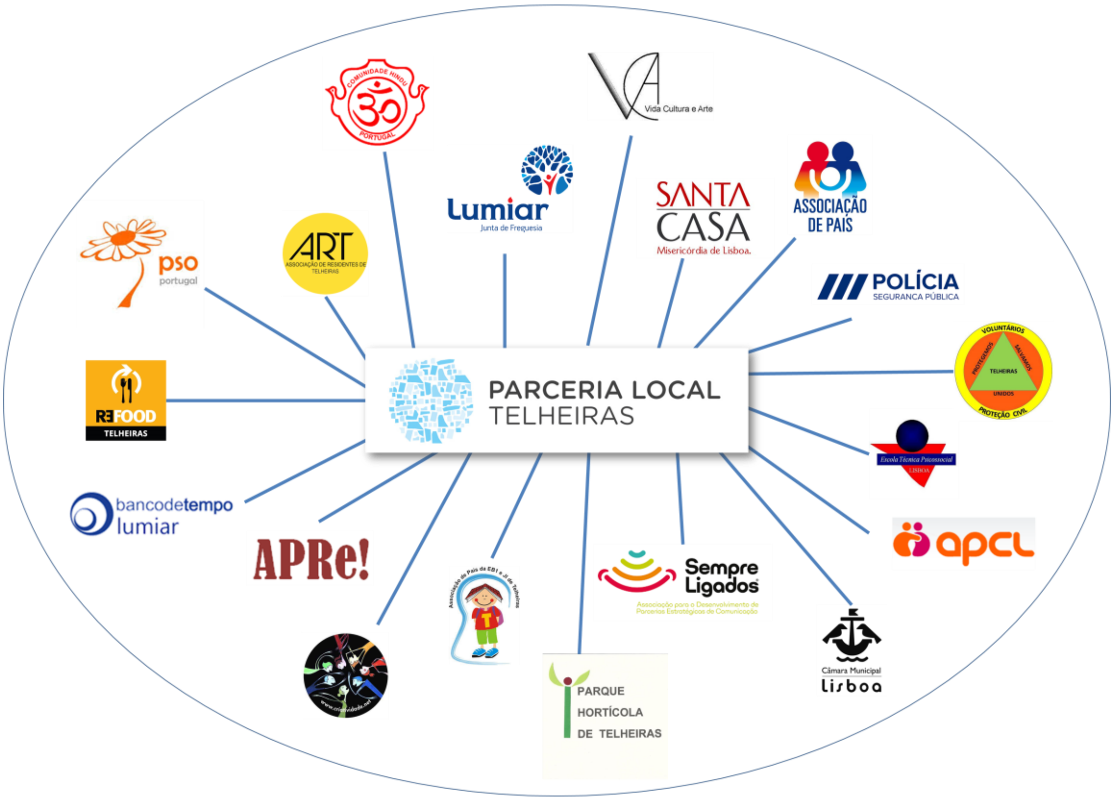

Figure 4 – Some of the local organisations participating in the Local Partnership of Telheiras (Source: Viver Telheiras Association).

At regional level, the Lisbon Municipality is a key stakeholder for the Telheiras REC since it is the formal owner of the buildings managed by the Lumiar Parish Council. Thus, it was necessary to obtain permission from the municipality to install solar PV systems in the rooftop where the pilot project was installed. This permission was obtained from the heritage department of the Lisbon Municipality, through a request submitted by email which was answered with a written approval from the responsible person, and latter from the urban planning department, through a simple procedure of prior notice with documents submitted by email. Furthermore, Lisboa E-Nova – Lisbon's energy and environment agency – is also a relevant stakeholder at the regional level since it congregates knowledge on energy issues and fosters the exchange of experiences between different stakeholders. The Telheiras REC interacted with Lisboa E-Nova especially during its earlier phases.

At national level, the key stakeholders are the Directorate-General for Energy and Geology which is responsible for licensing renewable energy communities and collective self-consumption schemes in Portugal. Communication was mainly performed by e-mail for the licensing of the pilot project, but there is currently an online platform for this purpose which will be used for the second project. It was key to understand and closely meet the licensing requirements. Another essential stakeholder operating at national level is the Portuguese Demand Side Operator (DSO) which in Lisbon (and in 99.9% of the continental territory of Portugal) is the company E-Redes from the EDP Group. E-Redes has the following responsibilities: i) metering the electricity that is generated from the solar PV systems and that is injected into the public grid, ii) applying the energy sharing coefficients defined by energy communities, iii) charging the grid access tariffs to the energy communities, and iv) sharing detailed data on the generation and sharing of renewable energy with the energy community, among other responsibilities. The Telheiras REC interacted with E-Redes through an online meeting to clarify important aspects of the current functioning of energy sharing in Portugal.

Finally, the Lumiar Parish Council, the Viver Telheiras Association, and the Local Partnership of Telheiras have been engaging with multiple other local, regional, national, and international stakeholder to share experiences on energy communities and contribute to break down the barriers in their way.

5. Defining Criteria and Conditions for Participation

Energy communities can be important tools for alleviating energy poverty by facilitating vulnerable households' access to renewable electricity. This section describes the Telheiras REC approach for the identification, selection, and engagement of energy-poor households, as well as the special conditions for these beneficiaries to join the energy community. These were first established during the EU Energy Poverty Advisory Hub technical assistance with the collaboration of Coopérnico and CENSE NOVA-FCT. The procedure and criteria for selection of energy-poor households were defined by the Lumiar Parish Council with the support of the Viver Telheiras Association, as stated in action no. 2 and deliverable no. 2 of the work plan agreed on for the Sun4All Community of Practice

The Telheiras REC aims to be an inclusive project with a strong component of social support for vulnerable families and energy poverty mitigation (Sequeira *et al.*, 2024b). Thus, the project promoters – Local Partnership of Telheiras and Lumiar Parish Council – established that several membership spots should be reserved for energy-poor households. In the pilot project with 17 participants, 3 participants must be vulnerable families. In the second project, at least 10 participants (out of an estimated 60) must be vulnerable families. In total, this means that almost 20% of the energy that is generated by the solar PV system and injected into the grid will go towards mitigating energy poverty in vulnerable households.

Energy-poor households who join the energy community benefit from special conditions (Sequeira *et al.*, 2024b). They join the energy community without needing to contribute to the initial investment since their share is paid by the Lumiar Parish Council and by the remaining energy community members. Furthermore, they benefit from a reduced annual fee which currently is around one-third of the regular annual fee. Excluding these conditions, energy-poor members have the same rights and duties as other members, including the right to vote in general meetings.

In this context, a significant challenge to overcome was identifying, communicating and selecting social beneficiary participants for the energy community. This demanded a specific approach which could not be the same as the recruitment campaign for the general members. Nevertheless, it was considered important by the Lumiar Parish Council that energy-poor households made an informed and proactive decision to join the project. Thus, the following process was defined for identifying and recruiting vulnerable families (Sequeira *et al.*, 2024b):

1. The Lumiar Parish Council identifies vulnerable families to which some type of social support is already provided, in the area covered by the Telheiras REC, and validates this mapping with other entities active in the social sphere.

2. As criteria for identifying and selecting families, it was decided to use the Social Security reference to be considered in a situation of economic insufficiency (entitled to support or subsidies from the State), and to do so it is necessary to belong to a family whose average monthly income does not exceed 1.5 times the value of the Social Support Index (IAS).

3. Social workers contact families and convey information about the project, the benefits of their participation and the special conditions to which they are entitled. This contact is made both directly with the families supported by the Lumiar Parish Council, and through the contact networks of partner entities in the social area.

4. Vulnerable families register for the project using the application form within the applicable deadline, if necessary, with the support from a social assistant.

5. The Lumiar Parish Council and the Local Partnership of Telheiras validate applications and carry out a random draw to allocate available membership spots to social beneficiaries.

While this is the procedure and criteria established for the Lumiar cases, depending on the criteria commonly used in each territory, other approaches may be defined, such as using as a reference the value of the National Minimum Wage for each adult that makes up the household or the Social Emergency Fund calculation table. It will be up to each entity to define the method to be used in its specific case.

Currently, the Lumiar Parish Council is applying this procedure and criteria to identify, select, and engage energy-poor households to join the Telheiras REC pilot project that is already installed and in the final stages of licensing. It will replicate the approach for the second solar PV project of the Telheiras REC and for other subsequent expansions. The data collected will be used by the Viver Telheiras Association and the Lumiar Parish Council the purposes of licensing Telheiras REC with the competent authorities. In all other matters, anonymity and confidentiality will be ensured, these will only be used in aggregate and will not be shared with third parties. Data management procedures follow the Lumiar Parish Council Data Privacy Policy (https://jf-lumiar.pt/politica-de-privacidade/).

6. Planning Citizen Recruitment and Engagement

This section describes the citizen engagement and recruitment approaches of the Telheiras REC promoted by the Lumiar Parish Council and the Local Partnership of

Telheiras. First, an overview of the Telheiras REC's community-driven participatory processes is provided to set the scene of citizen engagement at local-scale. Second, the recruitment process for the pilot project is quickly mentioned; this approach was planned and deployed during EPAH's technical assistance with the support of Coopérnico and CENSE NOVA-FCT. Third, the planning for the recruitment process of the second solar PV project of the Telheiras REC is described in detail; this was the focus of actions 3 and 4 of the work plan defined in the context of the Sun4All Community of Practice, corresponding to delivery no. 3 (planning of the communication campaign and one public event) and 4 (design of communication materials), which were developed by the Viver Telheiras Association.

The Local Partnership of Telheiras has been working closely with citizens and with the Lumiar Parish Council for the promotion of sustainability in the Telheiras neighbourhood and in the Lumiar Civil Parish. In 2020, it launched the "network of ideas" process to collect ideas from local citizens and co-develop sustainability-related projects (Figure 5). These ideas were refined by the Local Partnership and further developed during a community-level brainstorming workshop in 2021 (Sequeira and Mameri, 2022).

Figure 5 – Launch of the "network of ideas" process in a local festival in 2020 (Source: Viver Telheiras Association).

In November 2021, the energy community working group was launched with 12 initial volunteers joining the process. Volunteers mentioned local sustainability and environmental concerns as the most prominent drivers of engagement, followed by social and governance aspects such as participation in the community, influence in local decision-making, and provision of social support to vulnerable families (Sequeira *et al*., 2024c). However, the group also highlighted barriers such as lack of time, other priorities, difficulties matching schedules, and lack of knowledge that could pose an impediment to participation in the energy community working group.

The Telheiras REC always strived for open and transparent participation in its activities and continuous communication with the broader community. Thus, the number of participants in the working group meetings steadily grew to a total of 24 people engaged by the end of 2023. An average of 6 persons participated in the 25 meetings held between November 2021 and December 2023 (Sequeira *et al*., 2024d). These meetings were crucial for the development of the legal, technical, financial, operational, and social aspects of the Telheiras REC, particularly by providing an open forum for discussion and by building momentum for the citizen recruitment process needed to implement the pilot project. Figure 6 shows energy community members participating in a hybrid working group meeting in May 2024.

Figure 6 – Hybrid Telheiras REC working group meeting on the 22nd of May 2024 (Source: Viver Telheiras Association).

In May 2023, the Telheiras REC had already selected the site for the pilot project, sized the solar PV system, defined the financial and operational scheme, established the legal framework, and drafted the internal regulations (Sequeira *et al.*, 2024b). Thus, it launched the recruitment process for its pilot project and opened 13 membership spots for local families to join the energy community. Building on a strong foundation of community engagement, for instance through participation in local festivals and social media publications, the Lumiar Parish Council and the Local Partnership of Telheiras organised a public event titled "Telheiras Renewable Energy Community: What is it? What are the benefits? How can I join?" with the participation of the President of the Lumiar Parish Council Dr. Ricardo Mexia and of speakers from Coopérnico and CENSE NOVA-FCT (Figure 7).

This event explained in detail the pilot project and formally marked the opening of a registration form for people to sign-up to be members of the energy community. The registration form was open for only two weeks and was filled by 22 local households, with 13 being selected as energy community members for the pilot project on a first-come, first-served basis and the remaining households staying on a waiting list for future expansions of the initiative (Sequeira *et al*., 2024c).

Figure 7 – Public event for the recruitment campaign of the pilot project of the Telheiras REC in 2023 (Source: Viver Telheiras Association).

After the successful completion of the recruitment process for the pilot project, the Telheiras REC started the licensing process with national and municipal authorities. As this process is still slow and bureaucratic, only in May 2024 it was possible to install the pilot solar PV system in the Lumiar Parish Council building (Sequeira *et al.*, 2024b). While licensing for the pilot project is still not finished at the moment, the Lumiar Parish Council and the Local Partnership of Telheiras decided to take advantage of the momentum from the installation of the PV system and kick-start the recruitment campaign for the second solar PV project of the Telheiras REC. The Viver Telheiras provided crucial support for this ongoing process, both in the planning of the second solar PV project (described in section 8) and in the launch of a communication campaign with dedicated materials (described in this section).

The first announcement of the launch of a second project was made on the Viver Telheiras social media platforms, taking advantage of a publication about the installation of the first pilot project (Figure 8). In an improvised interview with members of the Telheiras REC coordination team, the pilot project was explained on-site and a teaser about the second project was made available.

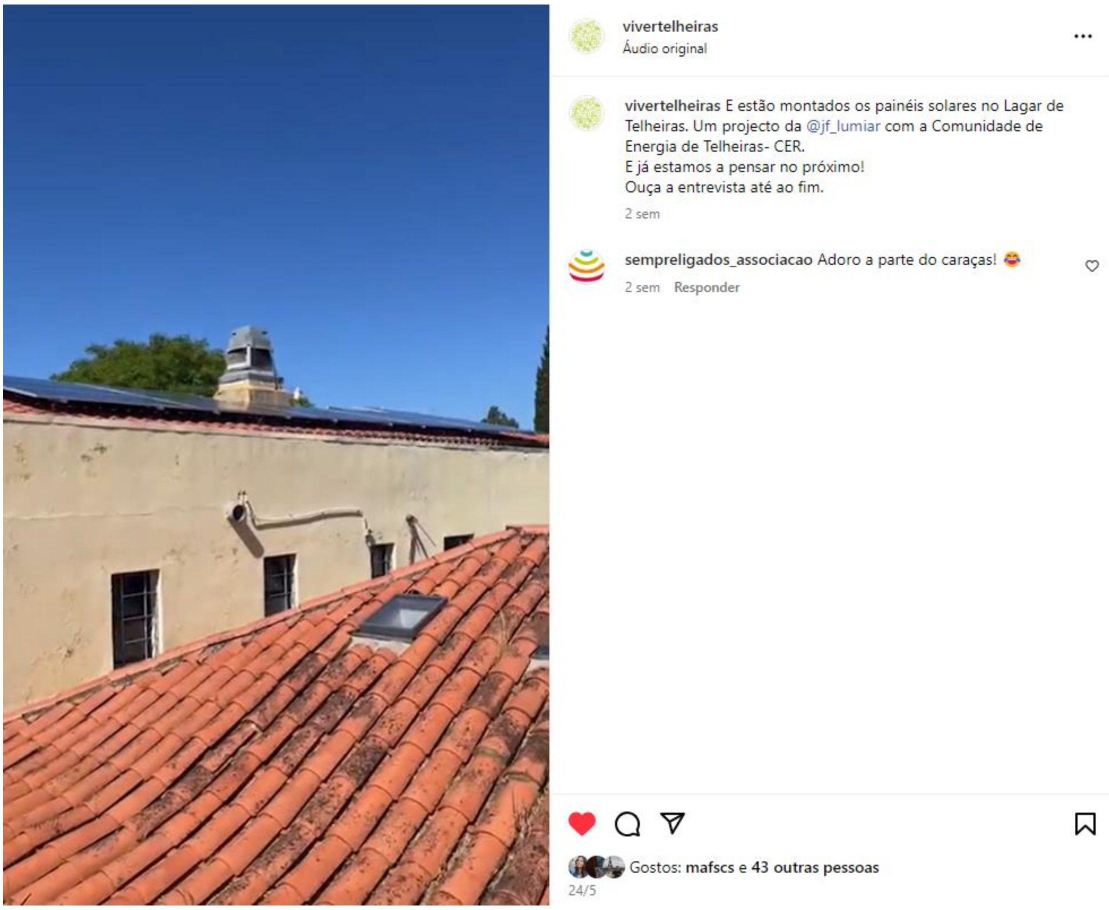

Figure 8 – Social media publication announcing the launch of a recruitment process for the second project (Source: Viver Telheiras Association Instagram profile).

The recruitment campaign for the second solar PV project of the Telheiras REC fittingly coincided with the Telheiras Festival 2024 – the major annual event occurring in the Telheiras neighbourhood which is promoted by the Local Partnership of Telheiras and by the Lumiar Parish Council. The Viver Telheiras Association energy community volunteers participated in the festival through an information stall (Figure 9). Here, hundreds of local citizens, businesses, and associations were engaged to explain the Telheiras REC goals and scope of action and to collect the contact information of those interested in joining the second solar PV project.

Dedicated flyers about the Telheiras REC were designed, printed, and distributed by the Viver Telheiras Association during the festival which already mentioned the planning of a second solar PV project. (Figure 10). On stage during the opening of the main concert, Luís Keel Pereira from the Lumiar Parish Council talked about the Telheiras REC and invited the crowd to join a dedicated energy community session in the following week.

Figure 9 – Some of the Telheiras REC members and volunteers at the Telheiras Festival 2024 (Source: Viver Telheiras Association).

Figure 10 – Front and back of the flyers about the Telheiras REC distributed during the Telheiras Festival 2024 (Source: Viver Telheiras Association).

The Viver Telheiras Association also published a news article in its well-known blog to inform local citizens about the installation of the pilot solar PV project and the launch of a recruitment campaign for a second project (Viver Telheiras, 2024d).This news article was shared widely on Telheiras and Lumiar based social media profiles and by email to over 300 persons which had previously shown interest in receiving information about sustainability and energy related projects. In the social media platform of the Telheiras Festival, managed by the Viver Telheiras Association, the Telheiras REC public session was announced for May 29 in the local public library (Figure 11).

Figure 11 – Social media publication announcing the Telheiras REC public session during the Telheiras Festival (Source: Telheiras Festival Instagram profile).

Furthermore, posters were designed, printed, and placed in the Telheiras neighbourhood and Lumiar Civil Parish to announce the recruitment campaign for the second solar PV project of the Telheiras REC and to invite citizens to join the energy community public session (Figure 12). These posters highlighted the successful installation of the pilot solar PV system and the benefits of joining the Telheiras REC as a member for the second project. A similar approach was used by the Almada pilot of the Sun4All project (Alves, 2022).

Figure 12 – Poster about the recruitment campaign for the second project and the Telheiras REC public session (Source: Viver Telheiras Association).

The Telheiras REC coordinator, Miguel Macias Sequeira, was interviewed for an in-depth news article of the LPP Lisboa Para Pessoas ("LPP Lisbon For People") local newspaper (LPP, 2024). This served as an opportunity to further disseminate the recruitment campaign for the second project, leveraging on an impactful local media outlet. This publication was engaged by around 400 people on the LPP social media platforms (Figure 13).

Figure 13 – Social media publication about the Telheiras REC (Source: LPP Lisboa Para Pessoas Instagram profile).

The Telheiras REC public session was organised by the Viver Telheiras Association in the context of the Telheiras Festival 2024. It was held in the Orlando Ribeiro Public Library Auditorium on May 29 from 9:30 to 11:30 PM. The session started with the formal inauguration of a photography exhibition on energy poverty titled "Powerful Encounters: Picturing an end to energy poverty" promoted by the Friends of the Earth Europe and brought to Portugal by the environmental NGO ZERO (Friends of the Earth Europe, 2024). It was inaugurated by the Lumiar Parish Council Sustainability Officer Mr. Rodrigo Benitez and by the coordinator of the Telheiras REC from the Local Partnership of Telheiras Miguel Macias Sequeira (Figure 14). This exhibition features the Telheiras REC as a pioneer solution to mitigate energy poverty through community energy.

Figure 14 – Inauguration of the photography exhibition "Powerful Encounters: Picturing an end to energy poverty" (Source: Viver Telheiras Association).

Following, the residents' association choir (CoroART) made a brief showing with a musical portfolio based on environmental and sustainability themes. The Lumiar Parish Council Sustainability Officer Mr. Rodrigo Benitez kick-started the session reaffirming the Lumiar Parish Council commitment with the promotion of a just energy transition in its territory including through the Telheiras REC (Figure 15). Luís Keel Pereira from the Lumiar Parish Council communicated the origins of the Telheiras REC embedded in the Local Partnership of Telheiras and the Lumiar Parish Council dynamics. Bartolomeu Bernardes, Helena Martins, and Miguel Macias Sequeira – members of the Telheiras REC coordination team – presented the details of the pilot project and of the second project. Finally, the speakers explained how citizens, small businesses, and associations can sign up as members of the Telheiras REC and answered questions from the audience. Around 50 persons were present during this public event.

Figure 15 – Telheiras REC public session during the Telheiras Festival 2024 (Source: Viver Telheiras Association).

Following the public session, the Viver Telheiras Association updated its website with detailed information about the second solar PV project of the Telheiras REC (Viver Telheiras, 2024e). An informative guide with 31 pages was made publicly available for open consultation by those interested in joining the Telheiras REC. A registration from was opened on May 29 for people to officially sign up to join the energy community. This form intends to gather all the data needed for the licensing process while also collecting relevant information for scientific research. The data collected will be used by the Viver Telheiras Association and the Lumiar Parish Council the purposes of licensing Telheiras REC with the competent authorities. In all other matters, the anonymity and confidentiality of responses will be ensured, these will only be used in aggregate and will not be shared with third parties. Data management procedures follow the Lumiar Parish Council Data Privacy Policy (https://jf-lumiar.pt/politica-de-privacidade/). The form will be open for registration of new Telheiras REC members until the 25th of June 2024. The communication campaign will continue using the communication materials developed and through word-of-mouth in the community.

Finally, the Viver Telheiras Association supported the Lumiar Parish Council in disseminating the recruitment campaign in its own social media platforms. For instance, on the world environment day (5th of June) the Lumiar Parish Council highlighted the Telheiras REC project as a lighthouse of sustainable development in its territory (Figure 16). The Viver Telheiras Association provided the images and suggested the original text for this social media publication.

Figure 16 – Social media publication about the second project of the Telheiras REC (Source: Lumiar Parish Council Instagram profile).

7. Community Building and Energy Awareness

In addition to extensive citizen recruitment and engagement campaigns, including for the purpose of recruiting new member for the second project, the Telheiras REC also fosters community buildings and energy awareness activities both at the local scale (Lumiar Civil Parish) and at a national level. This section describes some of the actions undertaken by the Viver Telheiras Association to raise energy literacy and build knowledge about energy communities. It should be noted that this task was not the focus of the work plan defined in the context of the Sun4All Community of Practice. The Lumiar Parish Council and the Viver Telheiras Association participated in two field visits in the context of the Sun4All project (to the Almada and Cœur de Savoie pilots) which enriched their experience and provided valuable insights for the scale-up and replication of the Telheiras REC.

Since the beginning, the Telheiras REC was built on a strong foundation of capacity building and empowerment through the active involvement of local volunteers and of the broader community. This is exemplified by the organisation of a public session in February 2022 to inform the community about the project and to foster local knowledge on the topic of renewable energy generation and sharing (Figure 17). This session was titled "Renewable Energy Communities: Why? How? And in Telheiras?" and counted with the participation of the President of the Lumiar Parish

Council Dr. Ricardo Mexia, members of CENSE NOVA-FCT and Coopérnico, and volunteers from the Telheiras REC working group. Another example of local-scale capacity building was the organisation of a workshop about energy bills in September 2023 in the context of the first edition of a monthly circular economy event. In subsequent editions, Telheiras REC volunteers were present to advise citizens on their energy bills and provide general support on energy issues.

Figure 17 – Telheiras REC public capacity building session in 2022 (Source: Viver Telheiras Association).

At local level, members of the Telheiras REC participated in the Lumiar Sustainability Days (May 10 and 11, 2024) to raise awareness about the energy community. Members of the Telheiras REC participated in the session ""Lumiar + Sustainable – perspectives for the future of sustainability and environment at Lumiar" where ideas for future development of energy-related project were discussed (Figure 18). The Telheiras REC had a stall during the Sustainability Fair and Bartolomeu Bernardes – member of the Telheiras REC coordination team – participated as a speaker in the Sustainability Forum (Figure 19). The Viver Telheiras Association contributed for the local dissemination of this event.

Figure 18 – Telheiras REC members in the session ""Lumiar + Sustainable – perspectives for the future of sustainability and environment at Lumiar" (Source: Lumiar Parish Council).

Figure 19 – Bartolomeu Bernandes of the Telheiras REC presenting at the Sustainability Forum (Source: Viver Telheiras Association).

With the solar panels installed in May 2024, the Telheiras REC organised visits to this pilot solar system to raise awareness and build capacity in the community. First, some of the founding members of the Telheiras REC visited the solar PV system from a nearby balcony (Figure 20). At the request of the Social Science Institute of the University of Lisbon (ICS), a field visit was organised for the consortium of the European Interreg Atlatic Area project Satcomm (Figure 21). This included an in-depth presentation of the project and a visit to the solar panels, which is an approach to be replicated in future occasions.

Figure 20 – Members of the Telheiras REC visiting the solar PV pilot project (Source: Viver Telheiras Association).

Figure 21 – Visit of the Satcomm European project to the Telheiras REC requested by ICS (Source: Viver Telheiras Association).

At national level, the Telheiras REC continued its work to promote capacity building on energy communities across different municipalities of Portugal. For instance, Helena Martins and Evandro Ferreira – members of the Telheiras REC coordination team – participated in one public workshop in Famalicão and in one public talk in Lisbon (Figure 22). These are just two examples of the engagement of the Telheiras REC and of the Viver Telheiras Association in national and international initiatives on energy communities.

Figure 22 – Public events on energy communities in Famalicão (left) and Lisbon (right) with speakers from the Telheiras REC (Sources: Famalicão em Transição Association and Regador Association).

As a key outcome of the participation in the Sun4All Community of Practice, members from the Lumiar Parish Council and from the Viver Telheiras Association participated in field visits to the pilots of Almada (27/02/2024) and Cœur de Savoie (19/03/2024. The President of the Lumiar Parish Council, Dr. Ricardo Mexia, and the Sustainability Officer, Mr. Rodrigo Benitez, were present in Almada to learn first-hand from the experiences of the collective self-consumption scheme in social housing being deployed by the Almada Municipality with the support of the AGENEAL energy agency (Figure 23). Luís Keel Pereira from the Lumiar Parish Council pitched the Telheiras REC being developed by the Lumiar Parish Council and by the Local Partnership of Telheiras during this event. A short film documenting the project was also showcased. In addition to the Lumiar Parish Council and the Almada hosts, were present the Braga Municipality (Portugal, the Ayuntamiento of València (Spain), the Energía Bonita project (La Palma, Spain) and the Unité des Communes Valdôtaines Grand-Paradis (Italy).

Figure 23 – Participation of the Lumiar Parish Council and of the Viver Telheiras Association in the field visit to the Almada pilot of the Sun4All project (Source: Lumiar Parish Council).

The Lumiar Parish Council Sustainability Officer, Mr. Rodrigo Benitez, and the technician Luís Keel Pereira participated in the field visit to Cœur de Savoie (Figure 24). The event allowed the Lumiar Parish Council to learn more in depth about some of the initiatives being developed at European level within the scope of the Sun4All project, with space for the exchange of experiences between the various participants. This enriching sharing allowed to bring learnings from other territories to Lumiar and strengthen our commitment to developing Energy Communities. In the afternoon, there was a visit to the laboratories of the Institut National de l'Energie Solaire, where cutting-edge research is carried out in solar energy production, which allowed broadening horizons regarding this topic. In addition to the Lumiar Parish Council and the hosts at the Communauté de communes de Cœur De Savoie (France), were also present the Institut National de l'Energie Solaire (France), the intermunicipal community of Grand Chambéry (France), the Commune La Plagne Tarentaisea (France), the Unité des Communes Valdôtaines Grand-Paradis (Italy), and the Comune di Sezze (Italy).

Figure 24 – Participation of the Lumiar Parish Council in the field visit to the Cœur de Savoie pilot of the Sun4All project (Source: Lumiar Parish Council).

8. Technical Adoption Planning

This section describes the process of planning the technical aspects of the Telheiras REC, including i) the technical sizing and modelling of solar photovoltaic systems performed by Ferreira *et al.* (2024), ii) the actual installation and initial performance of the pilot PV system, and iii) the planning of the second PV project of the Telheiras REC. The latter answers directly to action no. 3 of the work plan agreed in the context of the Community of Practice of the Sun4All project and it is an integrant part of deliverable no. 3 provided by the Viver Telheiras Association. This action was performed in collaboration with CENSE NOVA-FCT.

8.1. Sizing of solar photovoltaic systems

The first step for defining the technical characteristics of the PV system of a renewable energy community, as the project in Telheiras, is to analyse how the energy can be shared between members according to the national legislation. In Portugal, all the generated energy through a distributed generation system must be locally self-consumed by the building before being shared between other members, based on 15-minute analysis. In addition, if this system is connected to a low-voltage installation, all the members that will benefit from the generated energy must be located within a 2km radius of the generation site or associated with the same distribution transformer (from Decree-Law no. 15/2022). These two important aspects result in important considerations in selecting the buildings and sizing the PV systems of the community:

- The selected buildings for PV generation need not just an adequate available roof area without representative shading influence, but also low electricity consumption profiles during the day hours to maximize the amount of shared electricity between members.
- The selected buildings need to have a strategic location in the community to maximize the possible number of members within the 2km radius. New systems must be installed in buildings that maximize the total radius for energy share as much as possible.

Another important technical point for the viability of the project is the already wide implementation of smart metering facilities in the country, needed for the share of electricity inside a renewable energy community – in December of 2023, around 80% of all the low-voltage consumers already have smart meters (E-REDES, 2024). In larger cities, such as Lisbon and Porto, this percentage of smart metering implementation is almost 100%.

Since the defined operational structure of the Telheiras REC is based on PV systems installed in public buildings, the building selected for the pilot project was a local community centre that already had the approval of the Lumiar Civil Parish for the system's installation. Nevertheless, other local public buildings were analysed for the next PV systems, such as the local government headquarters, a gymnasium, and a local primary school. The electricity consumption profile, roof area availability, and shading impact were analysed for each of the selected public buildings (Ferreira, 2023).

As a result, it was proved that the community centre ("Antigo Lagar da Quinta de São Vicente") is adequate for the pilot project since it combines a roof area without considerable shading effects, a considerably low electricity consumption profile during day hours (the building is used more for periodic festivals and community events), and a reasonable central location in the neighbourhood. In addition, it was obtained that the local gymnasium ("Pavilhão Gimnodesportivo do Alto da Faia") has a high potential for receiving the second PV system of the Telheiras REC, combining low daily electricity consumption, a large available roof area without shading impacts, and a location that considerably enhances the total radius of the project (Ferreira, *et al.*, 2024).

The next step was defining the PV panel technology most adapted to the project. With the main goal of maximizing the cost-benefit results along with a highly efficient system with wide market availability and easiness of possible future repairs and substitution of panels, a module with first-generation monocrystalline solar cells was selected (Dambhare *et al.*, 2021). Second-generation thin film solar cells, such as amorphous silicon and cadmium telluride ones, are associated with lower generation efficiencies and higher difficulties regarding market availability at reasonable prices than the monocrystalline ones (Efaz *et al*., 2021), and third and fourth generation solar cell, such as organic and perovskite cells, still represents a future trend and needs advances for reaching market-scale (Singh, Goyal and Kumar, 2021). Therefore, a high-peak nominal power monocrystalline was selected (500Wp).

For the sizing of the pilot project system in the community centre, the main goal was to maximize the installed capacity according to the available roof area along with providing a high global generation efficiency and performance ratio. The south portion of the roof was selected for receiving the modules in order to enhance the amount of incident direct solar radiation during the year, locating them with the focus to avoid possible shading scenarios caused by a chimney in that portion of the roof. The northern portion was completely avoided also due to intense shading caused by a higher building located in this area. Since the selected roof is covered with ceramic tiles filled with concrete fixed to the rafter, the selected fixation structure was based on structural screws fixed directly to the tiles (hook structures were not utilized since the tiles are filled with concrete), where the aluminium profiles and clamps were installed for fixing the PV modules.

Utilizing the software PVSyst for the simulation of the system and HelioScope for visualization of the 3D model, an 8.0kWp system was simulated for the community centre (16 modules of 500Wp each), resulting in a PV generation of 12,126kWh/year and a global performance ratio of 83.5% (Ferreira *et al.*, 2024). The selected inverter was an 8kW string inverter with two maximum power point trackers (MPPTs) connections. The system was divided into two strings with eight PV modules each, each of them connected to one MPPT connection, where the modules that are more likely to face shading scenarios caused by the chimney were connected to the same string, to minimize the impacts of the shading effect in both strings. Figure 25 provides a view of the sized PV system and presents the monthly generation results.

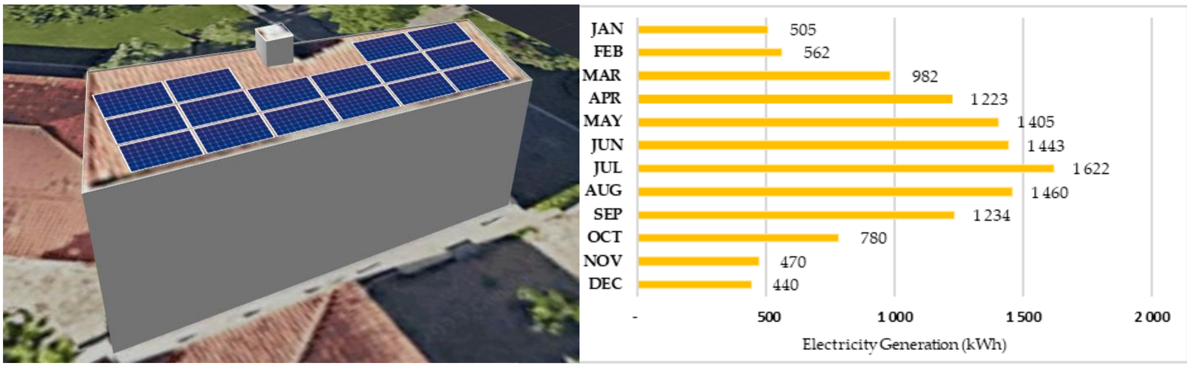

Figure 25 – Sized PV system of the pilot project (left) and Respective monthly generation results (right) (Source: Ferreira et al., 2024).

The final step was the analysis of the energy share associated with the pilot project. To do so, the consumption profile (15-minute measurements for each day for the entire year of 2023) of the community centre was obtained through an online platform of the entity responsible for electricity distribution in Portugal (E-REDES) and analysed. In addition, the consumption profile of eight members of REC Telheiras was also obtained, where an average household consumption profile was calculated. Then, the energy compensation (surplus generation minus consumption) was calculated for each 15-minute period of an entire year, based on the consumption of the community centre and the one for the average household member and according to a fixed coefficient for the share between members Ferreira *et al.*, 2024. The monthly average consumption values for the average member of the Telheiras REC are shown in Figure 26.

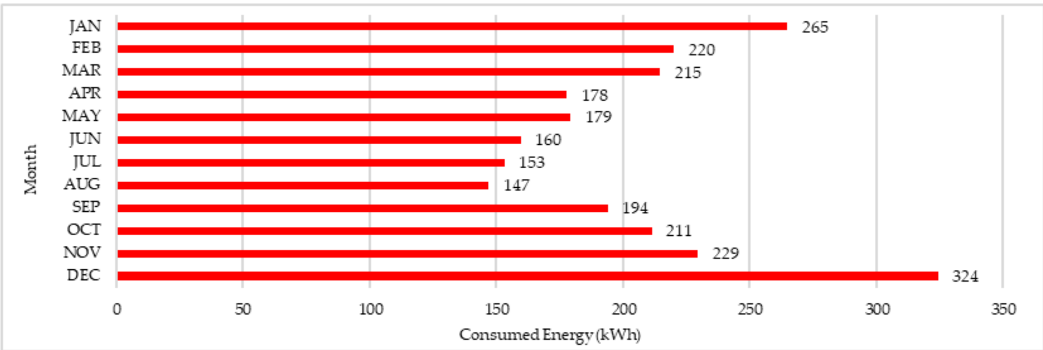

Figure 26 – Monthly consumption average member (Source: Ferreira et al., 2024).

In analysis of self-consumption and energy surplus, two indexes are important for quantifying and understanding the generation scenario: the self-consumption index (SCI), defined as the ratio between self-consumed electricity and locally generated energy; and the self-sufficiency index (SSI), defined as the ratio between the self-consumed electricity and the total electricity consumption of the installation (Luthander *et al*., 2015). In the context of the Telheiras REC where the main goal is to provide as much as possible surplus energy for sharing between members, it is important that the selected public building where the PV system is installed provides a low value of SCI, meaning that more energy will be available for the families. The obtained results for the pilot project show that only 31% of the generated electricity is being locally self-consumed (SCI = 31%), proving the adequacy of this public building for participating in the energy community. In addition, a value of SSI = 50% is also satisfactory, proving that, even though a considerable portion of the generated energy is going to the families, the community centre is still 50% self-sufficient in its electricity needs. Figure 27 brings the results of the SCI and SSI indexes and shows the surplus energy profile of the building for a typical day for specific months.

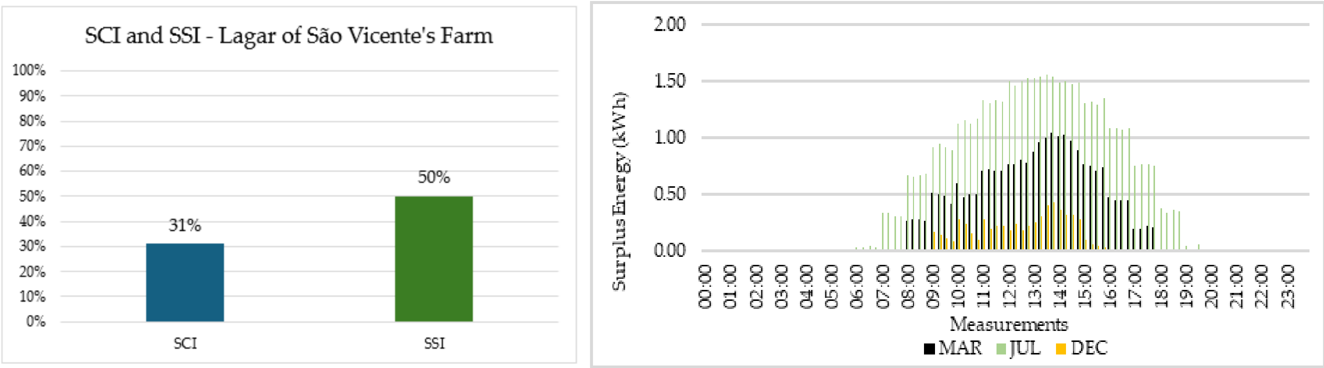

Figure 27 – SCI and SSI values for the pilot project (left) and associated daily consumption profile of specific months (right) (Source: Ferreira et al., 2024).

A similar procedure was followed for sizing the second solar PV installation of the Telheiras REC with a local gymnasium managed by the Lumiar Parish Council being the selected rooftop. Utilizing the software PVSyst for the simulation of the system and HelioScope for visualization of the 3D model, a 78.0kWp system was simulated for the gimnasium (156 modules of 500Wp each), resulting in a PV generation of 109,263 kWh/year and a global performance ratio of 84.4% (*Ferreira et al., 2024*). Figure 28 provides a view of the PV system and shows the monthly generation results.

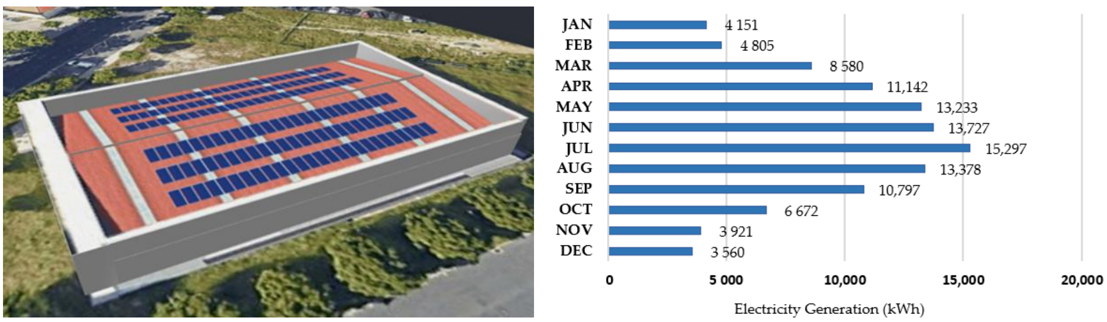

Figure 28 – Sized PV system for the second project (left) and respective monthly generation results (right) (Source: Ferreira et al., 2024).

Furthermore, the obtained results for the second project show that only 9% of the generated electricity is being locally self-consumed (SCI = 9%), proving the adequacy of this public building for participating in the energy community. In addition, a value of SSI = 49% is also satisfactory, proving that, even though a considerable portion of the generated energy is going to the families, the gymnasium is still 49% self-sufficient in its electricity needs. Figure 29 brings the results of the SCI and SSI indexes and shows the surplus energy profile of the building for a typical day for specific months.

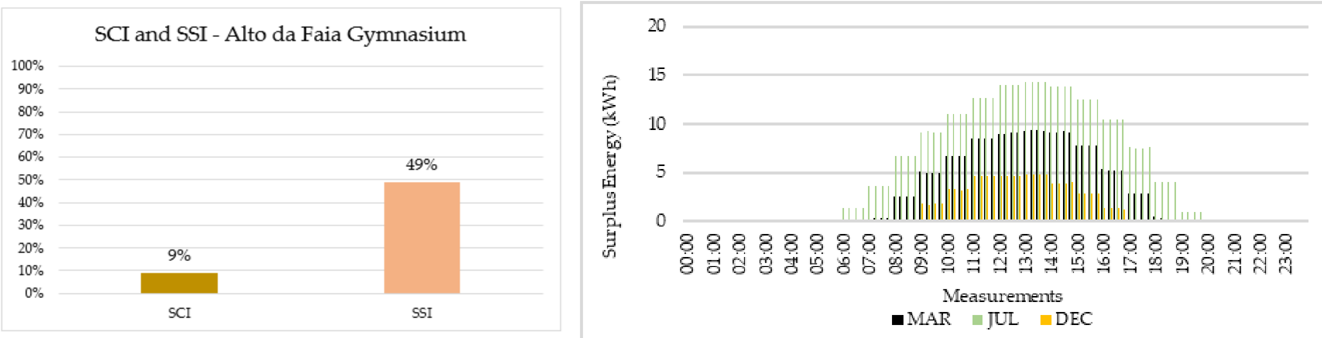

Figure 29 – SCI and SSI values for the second project (left) and associated daily consumption profile of specific months (right) (Source: Ferreira et al., 2024).

8.2. Installation of the pilot project

The technical sizing of PV systems performed by Ferreira *et al.* (2024) from CENSE NOVA-FCT in direct collaboration with the Viver Telheiras Association was fundamental for the selection of rooftops, the definition of number of members and respective sharing coefficients, and overall modelling of the Telheiras REC. Nevertheless, as perhaps expected, the actual installation of the pilot project slightly differed from the sized PV system due to the availability of modules and other equipment from the installer. The pilot PV system was only installed after the initial phase of licensing with the Directorate-General of Energy and Geology was completed and a "viable" outcome was ensured. In addition, permission was also granted by the Lisbon Municipality for the installation of the PV system.

The pilot PV system of the Telheiras REC was installed in May 2024. Figure 30 and Figure 31 show the installed PV system from two different viewpoints. In total, 13 PV modules were installed of 550 Wp each, comprising 7.15 kWp for the PV system. An inverter with rated power of 6 kW was installed in the pilot system. A production meter was installed to communicate the total generation of the PV system to E-Redes, for which a M2M (machine-to-machine) SIM card is needed. The Viver Telheiras contracted civil liability insurance and multi-risk insurance for the pilot PV system on behalf of the Lumiar Parish Council and of the Telheiras REC members.

Figure 30 – Pilot PV system seen from a nearby balcony (Source: Viver Telheiras Association).

Figure 31 – Pilot PV system seen from a drone (Source: Solcor Portugal).

Currently, the PV system is only being used for self-consumption within the Lumiar Parish Council community centre since the final licensing steps with the Directorate-General for Energy and Geology and with E-Redes are still being concluded. Available PV generation and self-consumption data confirms the suitability of this building for the Telheiras REC. In a sunny day in June with few activities in the building, around 90% of the PV generation was available for sharing with the local families (Figure 32). Furthermore, in the same day 86% of the total electricity consumed in the building came from the PV system, translating into significant energy bills savings for the Lumiar Parish Council.

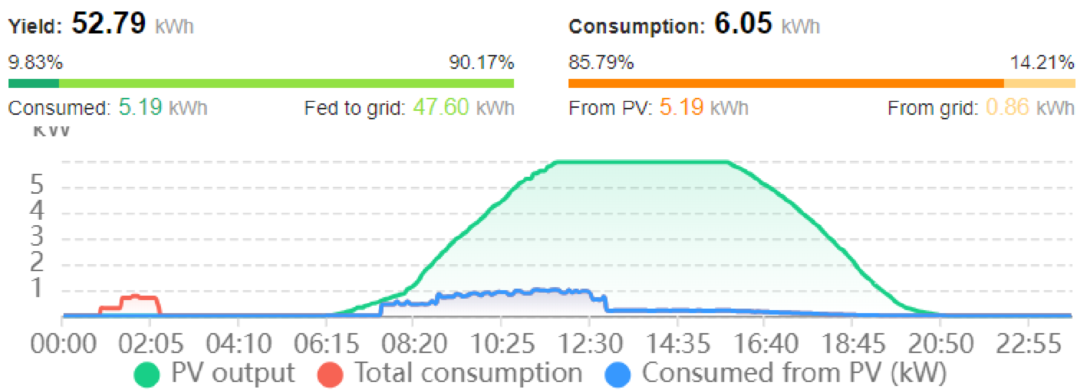

Figure 32 – PV generation and self-consumption of the pilot project in a sunny June day with few activities in the community centre (Source: Fusion Solar).

On the other hand, in a cloudy and rainy day in June with a market taking place within the building during the day, less than 20% of the PV generation was available for sharing while 76% of the total electricity consumed in the building came from the PV system (Figure 33); these are, however, rare occasions since the monthly market is the most energy intensive use of the building.

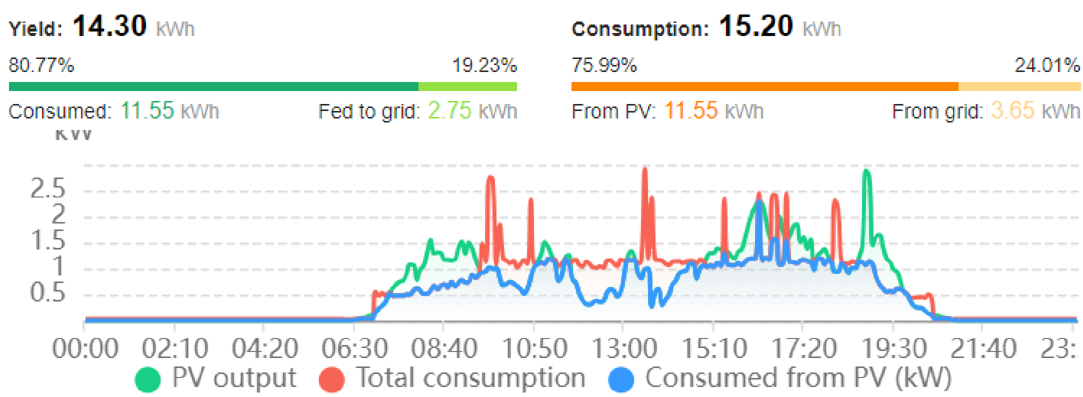

Figure 33 – PV generation and self-consumption of the pilot project in a cloudy and rainy June day with a market in the community centre (Source: Fusion Solar).

Nevertheless, more energy could be available for sharing if it was not mandatory for the electricity to be considered as self-consumed before being shared with the other members. For instance, if the Lumiar Parish Council building itself was subjected to a fixed sharing coefficient, it would be possible to always share a fixed percentage of the generation with the members. This would reaffirm the confidence of the members on the return of their investment in the solar PV system while also contributing to further lowering energy bills for energy-poor households.

8.3. Planning of the second project

The technical sizing performed by Ferreira *et al*. (2024) pointed out that the gymnasium managed by the Lumiar Parish Council would be the ideal location for the scale-up of the Telheiras REC with a second PV project. However, the total capacity of 78 kWp was considered as too large and expensive, particularly since project above 30 kWn are subjected to more complex licensing procedures in Portugal. Thus, the planning of the second project, as agreed by the Lumiar Parish Council and the Local Partnership of Telheiras, considered a total capacity of around 34 kWp or 30 kWn (around 60 solar panels). Based on the modelling by Ferreira *et al*. (2024), the Lumiar Parish Council is expected to consumer around 20% of the electricity generated by this 34 kWp PV system, with around 80% of the electricity being available for sharing. The remaining capacity that is available in the gymnasium’s rooftop can be installed at a later date. Figure 34 presents the sizing of the PV system to be installed in the gymnasium.

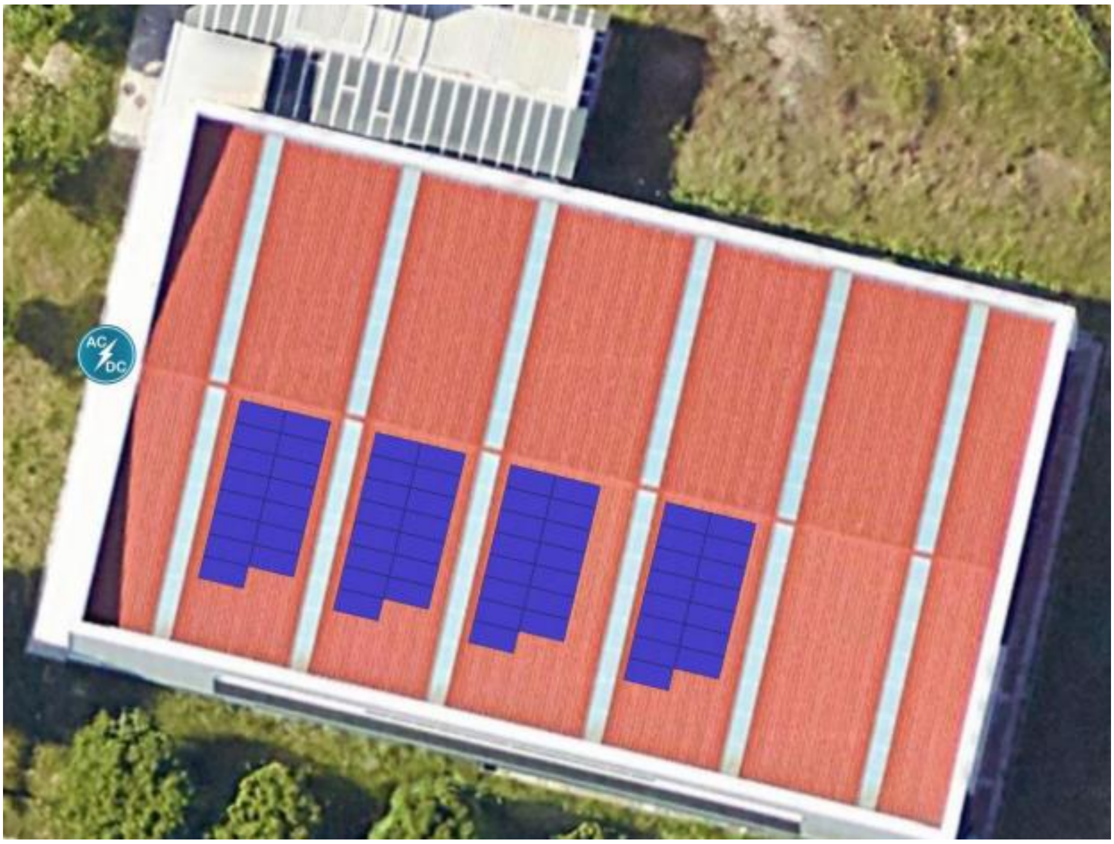

Figure 34 – Sizing of the second PV system (Source: Solcor Portugal).

The Viver Telheiras Association established the key criteria for this second project, following the approach tested in the pilot project but with a few innovations and adaptations. First, in this second project, membership spots are available not only for local families but also for local small businesses and for local associations. Second, members can select between three different packages with varying levels of initial investment and with corresponding fixed energy sharing coefficients. Third, while in the pilot project membership spots were given on a first-come-first-served basis, in the second project a random lottery is to be conducted in case there are more people signed up than membership spots available (an estimate of 60 new membership spots was provided by the Viver Telheiras Association, considering the average package of investment and energy sharing coefficient). Considering the legal limitation of a maximum distance of 2 km from the PV system for the prospective members, Figure 35 presents the area encompassed by this second project which mostly includes the Lumiar Civil Parish.

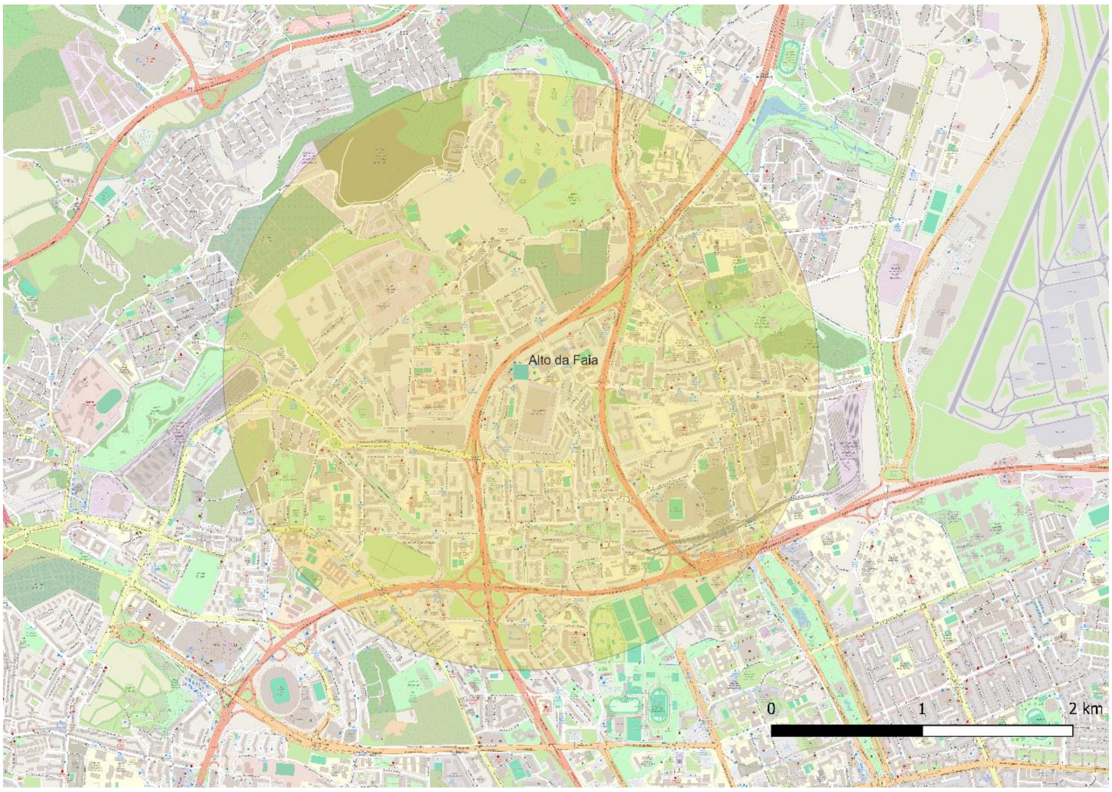

Figure 35 – Radius of action of the second PV system of the Telheiras REC (Source: Bartolomeu Bernardes, Telheiras REC member).

Continuing the Lumiar Parish Council commitment with energy poverty mitigation, the second PV project of the Telheiras REC will also include energy-poor households which join the energy community on the special conditions and criteria outlined before. Similar to the pilot project where 3 out of 16 participating households were energy-poor households (around 18% of the electricity injected into the grid goes to energy-poor households), in this second project a minimum of 10 energy-poor households will join the energy community and benefit from reduced energy bills and enhanced social inclusion. This corresponds to around 17% of the electricity injected into the grid by the second PV system going to energy-poor households. Considering the lessons learnt from the Almada pilot of the Sun4All project, the Telheiras REC may distribute this electricity between energy-poor households according to the family size, the typology of the dwelling, or other socio-economic criteria and following the three different packages mentioned above.

9. Legal Adoption Planning

In Portugal, a renewable energy community must be established as a legal entity, for instance as a non-profit legal entity of the social economy such as an association, a cooperative or a foundation (ADENE and DGEG, 2022). Relevant lessons and insights were exchanged between the Lumiar Parish Council, the Municipality of Braga (member of the Community of Practice of the Sun4All project), and the Municipality of Almada (pilot of the Sun4All project) regarding the legal aspects of renewable energy communities in Portugal. The Telheiras REC is formally established as an energy community managed democratically by its own members while the others are predominantly municipality driven and managed. It should be noted that the current legal status of the energy community, its internal regulations, and the protocol established between the Lumiar Parish Council and the Viver Telheiras Association pre-date the participation in the Sun4All Community of Practice and were not the focus of the work plan outlined in this report. This task was developed during the technical assistance of the EU Energy Poverty Advisory Hub with the collaboration of Coopérnico and CENSE NOVA-FCT.

In the case of the Telheiras REC, promoted by the Local Partnership of Telheiras and by the Lumiar Parish Council, it was decided to use and adapt an already existing local non-profit association (*i.e.* the Viver Telheiras Association, Figure 36) to house the renewable energy community project. This avoided the costs and administrative burden of creating a novel legal entity and capitalised on the long-term community building work of this association (Sequeira *et al.*, 2024b). All members of the Telheiras REC automatically become associates of the Viver Telheiras Associations with voting rights on all energy community-related issues.

ASSOCIAÇÃO
VIVER TELHEIRAS

Figure 36 – Viver Telheiras Association (Source: Viver Telheiras Association).

In the context of the Telheiras REC, the Viver Telheiras Association has the following responsibilities: i) to carry out licensing for the renewable energy community, ii) to collect the initial investment among members and install the photovoltaic system, iii) to define and collect the annual fees paid by members, iv) to pay network access fees and other applicable fees, v) to carry out preventive maintenance of the photovoltaic system, vi) to contract civil liability insurance and multi-risk insurance for the photovoltaic systems, vii) to inform members about the production and sharing of solar energy, viii) to organize general assemblies with members including the energy-poor members, ix) to sell surplus production not consumed by members, and x) to disseminate the project and coordinate partnerships with external organizations (Sequeira *et al.*, 2024b).

For the pilot project, the Viver Telheiras Association consulted the solar PV market in Portugal, obtaining three proposals before selecting the installer together with the Lumiar Parish Council and the other Telheiras REC members. A similar procedure is being followed for the second solar PV project with initial proposals already received from three solar PV installers. The selection of civil liability insurance and of multi-risk insurance was also based on a market consultation with more than three insurance companies. The acquisition of a M2M SIM card was also the subject of a market consultation with three of the main telecommunication companies in Portugal. All matters are communicated to the Telheiras REC members in a fully open and transparent manner with room for feedback before the final decision is made by the Telheiras REC's coordination team.

The Telheiras REC is managed through its internal regulations, which were developed based on the existing template provided by the Portuguese Energy Agency (ADENE, 2023). These internal regulations were approved in the first general assembly of the Telheiras REC with the participation of the founding members of the energy community – *i.e.*, the families that signed up for the pilot project (Figure 37). All participants signed a registration form to officially join the energy community, which was also developed based on the existing template provided by the Portuguese Energy Agency (ADENE, 2023).


REGULAMENTO INTERNO DA
COMUNIDADE DE ENERGIA
RENOVÁVEL DE TELHEIRAS

Figure 37 – First general assembly of the Telheiras REC (left) and cover of the internal regulations of the Telheiras REC (right) (Source: Viver Telheiras Association).

The Telheiras REC internal regulations start by stating their object, scope, and duration, followed by detailing the rights and duties of all members of the energy community (namely, the Lumiar Parish Council as the producer of renewable energy, the local households as investors and beneficiaries of the energy sharing, and the energy-poor households as beneficiaries of the energy sharing). Specific procedures are defined for the entry of new members in the energy community and for the departure of existing members. It establishes the need for general assemblies with all members at least on an annual basis, with equal voting rights for all members (including energy-poor households).

The regulations also clearly establish the rights and responsibilities of the Viver Telheiras Association as the current manager of the energy community. Importantly, the internal regulations and its annexes clearly state the energy sharing coefficients for all members of the energy community, as well as the right of the Viver Telheiras Association to sell any surplus. Finally, there are specific regulations for participation of disasters and accidents and for civil and criminal liability. The modification of the internal regulations is subject to a majority approval in a general assembly. Participants in the second solar PV project of the Telheiras REC must approve the internal regulations before joining; nevertheless, modifications can be suggested for the next general assembly.

The participation of the Lumiar Parish Council in REC Telheiras, as one of the 17 members of the pilot project, is enshrined through a specific protocol signed with the Viver Telheiras Association, establishing the rights and duties of each partner. This solution made it easier to overcome the challenge of including the Parish Council as an associate of the Association. The participation of local authorities through a protocol is allowed by the Telheiras REC's internal regulations. A similar approach is planned for the second solar PV project of the Telheiras REC which is also going to be installed in a building managed by the Lumiar Parish Council.

10. Financial Scheme Adoption Planning

This section describes the financial scheme adopted at the local level by the Telheiras REC. It is subdivided in two sections: i) installation phase, and ii) operation phase. This financial scheme was defined for the pilot project (Sequeira *et al*., 2024b). It is also currently being replicated for the second solar PV project of the Telheiras REC.

There are sharp differences between the Telheiras REC financial model – formal renewable energy community financed by its own members including the local government and providing special conditions for the participation of energy-poor households – and the financial model of the Almada pilot – collective self-consumption scheme fully funded by the local government and mostly focused on families living in social housing. Still, relevant lessons can be learned from the other projects participating as pilots and members of the Community of Practice of the Sun4All particularly as the Telheiras REC scales-up and promotes the replication of its approach for energy poverty mitigation.

It should be noted that financial model of the Telheiras REC pre-dates the participation in the Sun4All Community of Practice and was not the focus of the work plan outlined in this report. This task was developed during the technical assistance of the EU Energy Poverty Advisory Hub with the collaboration of Coopérnico and CENSE NOVA-FCT.

10.1. Installation phase

Figure 38 shows the financial model for the installation phase of solar PV systems in the Telheiras REC (adapted from Sequeira *et al.*, 2024c). The first step is the licensing of the renewable energy community project with the Directorate-General of Energy and Geology which requires the provision of the energy generation data of the solar PV system and the full list of participating members. If the project receives a "viable" license, the Viver Telheiras Association collects the initial investment from the members (local households and the Lumiar Parish Council in the case of the pilot project) and uses it to install the solar PV system. A safety margin is applied to ensure that enough funds are available.

*Figure 38 – Financial model: installation phase (*adapted from Sequeira *et al.*, 2024c*).*

Energy-poor households join without the need for initial investment with their share being covered by the Lumiar Parish Council and the other energy community members. In the pilot project, three spots were reserved for energy-poor households with the Lumiar Parish Council covering the initial investment of two energy-poor households and the other energy community members covering the initial investment of one energy-poor household. For the second project, at least 10 spots are reserved for energy-poor households with the initial investment to be covered by the Lumiar Parish Council for six energy-poor households and by the other new energy community members for four energy-poor households.

This financing model enables energy-poor households to join the energy community by removing the barriers of lack of upfront cash. It can be considered a direct grant provided by the energy community members themselves (a local government and other local energy consumers) since this initial investment is not paid back to the members. The Lumiar Parish Council and the other energy community members receive their return on investment from the savings on energy bills that they obtain by taking part in the generation and sharing of renewable energy. The fact that they are supporting energy-poor households means that the break-even of the investment is delayed by a few years in the case of the Lumiar Parish Council and by a few months in the case of the other energy community members.

10.2. Operation phase

Figure 39 shows the financial model for the operation phase of solar PV systems in the Telheiras REC (adapted from Sequeira *et al*., 2024c). At this point, the PV system is considered as installed, operational, and fully licensed with the generated electricity being consumed by the energy community members according to the defined energy sharing coefficients. The electricity that is generated and injected into the grid (*i.e.*, the surplus after the self-consumption of the building where the solar PV panels are installed) is shared without billing since the energy community members already paid for their right to use this energy. The consumption of electricity from the energy community is discounted from the members' electricity bills with their conventional electricity supplier. The Viver Telheiras Association as the management entity of the Telheiras REC must periodically inform the members about the energy generation and sharing data.

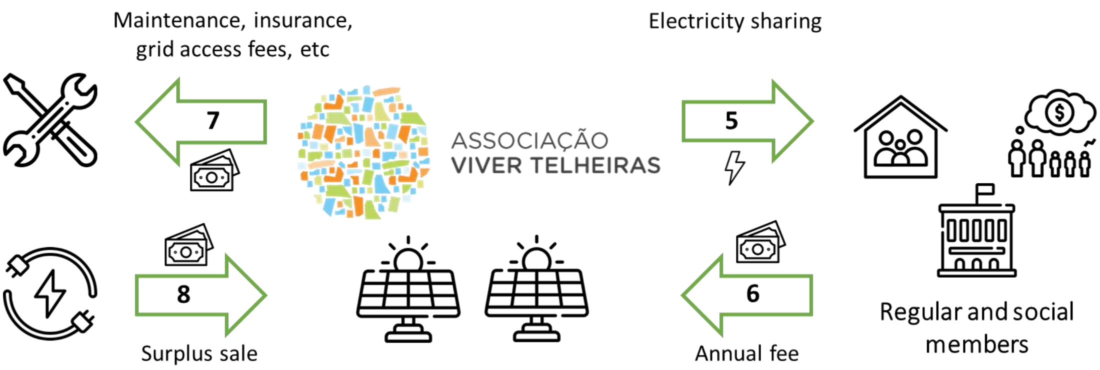

Figure 39 – Financial model: operation phase (adapted from Sequeira et al., 2024c).

To cover operational and management costs, such as maintenance, insurance, grid access fees, M2M SIM card, among others, the Telheiras REC members pay an annual fee to the Viver Telheiras Association. On the one hand, this payment allows the Telheiras REC to meet its regulatory requirements and operational costs. On the other hand, this annual fee is also a way for the Telheiras REC members to renovate their commitment and membership status with the energy community. The annual fee is determined annually and approved by the members in a general assembly, according to the internal regulations. Currently, social members benefit from a reduced annual fee to facilitate their participation and further contribute to reducing their energy poverty situation.

As stated before, the Viver Telheiras Association can sell the surplus that is generated by the solar PV systems and that is not consumed by the members. Since the PV systems and membership spots are designed to maximize local self-consumption and minimize the surplus, it is not expected that this surplus sale will be significant. Nevertheless, the results from selling the surplus will only be used in the benefit of the energy community or, if decided in a general assembly, in the benefit of the neighbourhood or the civil parish. As a non-profit energy community, all the funds collected through the initial investment, annual fees, and surplus sale are used for the Telheiras REC's activities.

11. Replication and Scalability Potential

This Sun4All Sustainable Implementation Plan focused on the Telheiras REC being promoted by the Lumiar Parish Council and the Local Partnership of Telheiras. It has successfully installed its pilot solar PV system and is in the planning stage of a second solar PV project. Hopefully, this second project shows that it is possible to scale-up the approach of the Telheiras REC within the Lumiar Civil Parish. The Lumiar Parish Council manages a portfolio of public buildings with rooftops suitable for solar PV systems, providing many opportunities for the future scale-up of energy communities in this territory. Key goals of the Telheiras energy community are renewable energy generation and sharing and energy poverty mitigation.

In the long term, the Lumiar Parish Council hopes to achieve energy self-sufficiency for its various public buildings, while at the same time increasing the number of local households, business, associations, and energy-poor households participating in the energy community. The Viver Telheiras Association will continue its management of the Telheiras REC and support the Lumiar Parish Council in achieving its goals, namely by monitoring the evolution of key performance indicators, such as installed capacity (kWp), electricity generated (MWh/year), greenhouse gas emissions mitigated (tCO2/year), number of energy community members, number of energy-poor energy community members, number of participants in other activities, and number of events and media appearances.

The Lumiar Parish Council joined the Community of Practice of the Sun4All project to exchange knowledge on energy communities with other European cases and to get inspiration for the scale-up and replication of its pilot project. The corresponding workplan focused on the establishment of a process and criteria to identify, select, and engage energy-poor households in the Lumiar Civil Parish, on the planning of the second solar PV project and respective communication campaign, and on the development of communication materials. Other aspects included in this Plan had already been developed by the Viver Telheiras Association in collaboration with Coopérnico and CENSE NOVA-FCT in the scope of EPAH's technical assistance.

Some of the challenges encountered during this work were already reported on by Ferreira (2023), Ferreira *et al.* (2023), and Sequeira *et al*. (2023). One of the main challenges encountered during the phase of planning at the Telheiras REC were the lack of knowledge by local authorities and citizens which was solved through partnerships with experts and through a well-structured communication plan adapted to different target audiences. In addition, maintaining volunteer engagement was also arduous since the planning stage of the project was long and motivation levels varied during the process. This was solved through open and participatory processes, short-term successes and accomplishments, and active leadership. It would be beneficial if a technical support scheme was available in Portugal to support citizens, associations, and local governments in the development of their energy community projects.

The permission to install solar PV panels in the rooftops of public buildings also proved challenging since it was a novel process for the Lumiar Parish Council and the Lisbon Municipality. The intermediation of the Lumiar Parish Council in this licensing process was fundamental to break down the barriers. Licensing with national authorities was also slow and bureaucratic since energy communities are a recent concept and the competent authorities are still adapting their internal processes. Similar barriers were mentioned by some of the Sun4All pilots and other members of the Community of Practice. Finally, defining a financing scheme that manages to incorporate energy-poor families was also a challenge and it was solved through an energy solidarity approach by leveraging funds from the local government and from the other members of the energy community; however, it would be beneficial for more public funds to be available to support the participation of energy-poor households in energy communities (Sequeira *et al*., 2023).

Since energy communities are relatively novel in Portugal and in the European Union, the Telheiras REC is developing a replication guide for other citizens, associations, and local governments that may want to follow in its footsteps. This practical guide will describe the process from the ideation to the installation of the Telheiras REC pilot project and can be described in 10 steps (Sequeira *et al.*, 2024b): 1) launching the idea and building momentum, 2) searching for reliable partners with complementary roles, 3) building capacity in the community about energy-sharing regulations, 4) selecting buildings and sizing solar PV systems, 5) finding a legal structure to house the project, 6) designing internal regulations, 7) developing an inclusive financing and operational model, 8) communicating with the local community and recruiting members, 9) identifying and integrating energy-poor families, and 10) licensing with national authorities. These steps are highly replicable, but the right conditions regarding technical expertise, community engagement, and financial availability must be met. The participation of the Telheiras REC in multiple local, national, and international events proves the interest from multiple stakeholders in replicating this approach.

The project is well-aligned with the goals of European Directives on energy efficiency and renewable energy, and with the latest European Commission recommendations on energy poverty. Finally, it is directly and indirectly contributing for the accomplishment of the Portuguese National Energy and Climate Plan 2030, the Portuguese Long-term Energy Poverty Combat Strategy 2023-2050, and Lisbon’s Energy and Climate Action Plan 2030.

12. References

ADENE (2023). Regulamento interno tipo ["Template internal regulations"]. Available on https://poupaenergia.pt/energia-verde/

ADENE and DGEG (2022). Autoconsumo e Comunidade de Energia Renovável – Guia Legislativo ["Self-consumption and Renewable Energy Community – Legislation Guide"]. Available on https://www.adene.pt/adene-e-dgeg-elaboram-manual-digital-autoconsumo-e-comunidade-de-energia-renovavel-guia-legislativo/

Alves, C. (2022). Implementation Plan of Sun4All Programme. Sun4All D2.3. August 2022. Retrieved from https://sunforall.eu/

CML- DMAEVCE, CML-DAEAC, and Lisboa E-Nova (2021). (2021). Plano de Ação Climática Lisboa 2030 ["Lisbon Climate Action Plan 2030"]. Lisbon Municipality Division of Environment, Green Infrastructure, Climate and Energy, Lisbon Municipality Department of Environment, Energy and Climate Change, and Lisboa E-Nova Retrieved from https://amensagem.pt/wp-content/uploads/2021/08/PAC_LISBOA_2030_Relatorio.pdf

Decreto-Lei nº 162/2019, 25 de Outubro–Aprova o Regime Jurídico Aplicável ao Autoconsumo de Energia Renovável, Transpondo Parcialmente a Diretiva 2018/2001. Presidência do Conselho de Ministros, Portugal. ["Decree-Law No. 162/2019, October 25th – Approves the Legal Regime Applicable to Self-Consumption of Renewable Energy, Partially Transposing Directive 2018/2001. Presidency of the Council of Ministers, Portugal"]. Retrieved from https://diariodarepublica.pt/dr/detalhe/decreto-lei/162-2019-125692189

Decreto-Lei nº 15/2022, 14 de Janeiro–Estabelece a Organização e o Funcionamento do Sistema Elétrico Nacional, Transpondo a Diretiva (EU) 2019/944 e a Diretiva (EU) 2018/2001. Presidência do Conselho de Ministros, Portugal. ["Decree-Law No. 15/2022, January 14th – Establishes the Organization and Functioning of the National Electrical System, Transposing Directive (EU) 2019/944 and Directive (EU) 2018/2001. Presidency of the Council of Ministers, Portugal."] Retrieved from https://diariodarepublica.pt/dr/detalhe/decreto-lei/15-2022-177634016

DGEG (2024). Tarifa Social de Energia ("Energy Social Tariffs"). Directorate-General for Energy and Geology, Portugal. Consulted in June 2024. Available on https://www.dgeg.gov.pt/pt/areas-transversais/politicas-de-protecao-ao-consumidor-de-energia/tarifa-social-de-energia/

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 (recast). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC

Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast). Official Journal of the European Union, L231, 1-111. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766

Dambhare, M.V., Butey, B., and Moharil, S.V. (2021). Solar photovoltaic technology: A review of different types of solar cells and its future trends. Journal of physics. Conference series, 1913(1), 012053. https://doi.org/10.1088/1742-6596/1913/1/012053

Efaz, E.T., Rhaman, M.M., Imam, S.A., Bashar, K.L., Kabir, F., Mourtaza, M.D.E., Sakib, S.N., and Mozahid, F.A. (2021). A review of primary technologies of thin-film solar cells. Engineering Research Express, 3(3), 032001. https://doi.org/10.1088/2631-8695/ac2353

Environmental Fund (2024a). 02/C13-i01 - Programa Vale Eficiência ["02/C13-i01 – Efficiency Voucher Programme"]. Consulted in June 2024. Available on https://www.fundoambiental.pt/apoios-prr/c13-eficiencia-energetica-em-edificios/02c13-i01-programa-vale-eficiencia.aspx

Environmental Fund (2024b). 06/C13-i01 Programa Vale Eficiência II ["06/C13-i01 Efficiency Voucher Programme II"]. Consulted in June 2024. Available on https://www.fundoambiental.pt/apoios-prr/c13-eficiencia-energetica-em-edificios/06c13-i01-programa-vale-eficiencia-ii.aspx

Environmental Fund (2024c). C13-i01; 02; 03 - Apoio à concretização de Comunidades de Energia Renovável e Autoconsumo Coletivo ["C13-i01; 02; 03 – Support for the implementation of Renewable Energy Communities and Collective Self-Consumption"]. Consulted in June 2024. Available on https://www.fundoambiental.pt/apoios-prr/c13-eficiencia-energetica-em-edificios/c13-i01-02-03-apoio-a-concretizacao-de-comunidades-de-energia-renovavel-e-autoconsumo-coletivo.aspx

EPAH (2024). Energy Poverty Advisory Hub – Technical Assistance. Available on https://energy-poverty.ec.europa.eu/get-support/technical-assistance_en

European Commission (2020). Proposed Mission: 100 Climate-neutral Cities by 2030 – by and for the Citizens. Report of the Mission Board for climate-neutral and smart cities. Luxembourg: Publications Office of the European Union, 2020. ISBN 978-92-76-21542-4. https://doi.org/10.2777/46063

European Commission (2023a). Commission Recommendation (EU) 2023/2407 of 20 October 2023 on energy poverty. Official Journal of the European Union, L series. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302407

European Commission (2023b). Commission Staff Working Document (SWD/2003/647): EU guidance on energy poverty (accompanying the Commission Recommendation on energy poverty (C/2023/4080). Retrieved from https://energy.ec.europa.eu/publications/commission-staff-working-document-eu-guidance-energy-poverty_en

Eurostat (2024a). Inability to Keep Home Adequately Warm - EU-SILC Survey. Data last updated on 12/06/2024. Retrieved in June 2024. Available on: https://doi.org/10.2908/ILC_MDES01

Eurostat (2024b). Share of Total Population Living in a Dwelling with a Leaking Roof, Damp Walls, Floors or Foundation, or rot in Window Frames of Floor - EU-SILC Survey. Data last updated on 12/06/2024. Retrieved in June 2024. Available on: https://doi.org/10.2908/ILC_MDHO01

E-REDES (2024). Contadores Inteligentes ["Smart meters"]. Consulted in May 2024. Available om https://www.eredes.pt/pt-pt/transicao-energetica/redes-do-futuro/contadores-inteligentes

Ferreira, E. (2023). Renewable Energy Communities: Concepts, Approaches and the Case Study of Telheiras Neighborhood in Lisbon. Masters' thesis, FCT-NOVA, Portugal. http://hdl.handle.net/10362/166719

Ferreira, E, Sequeira, M.M., and Gouveia, J.P. (2023). Renewable energy communities: concepts, approaches, and the case study of the Telheiras neighborhood in Lisbon. Proceedings of the 8th Meeting on Energy and Environmental Economics. Aveiro University, Portugal. https://doi.org/10.48528/v3b3-fk78

Ferreira, E, Sequeira, M.M., and Gouveia, J.P. (2024). Sharing Is Caring: Exploring Distributed Solar Photovoltaics and Local Electricity Consumption through a Renewable Energy Community. Sustainability, 16, 2777. https://doi.org/10.3390/su16072777

Friends of the Earth Europe (2024). Powerful Encounters: Picturing an end to energy poverty. Available on https://friendsoftheearth.eu/powerful-encounters/exhibit/community-energy-for-everyone/

Gouveia, J. P., Palma, P., and Simões, S. G. (2019). Energy poverty vulnerability index: A multidimensional tool to identify hotspots for local action. Energy Reports, 5, 187-201. https://doi.org/10.1016/j.egyr.2018.12.004

Gouveia, J.P., Palma, P., Bessa, S., Mahoney, K., and Sequeira, M. (2022). Energy Poverty National Indicators: Insights for a more effective measuring. Energy Poverty Advisory Hub. Directorate General for Energy. European Commission. Retrieved from https://energy-poverty.ec.europa.eu/discover/publications/publications/energy-poverty-national-indicators-insights-more-effective-measuring_en

Gouveia, J.P., Palma, P., Bessa, S., Mahoney, K., and Sequeira, M. (2023). Energy Poverty National Indicators: Uncovering New Possibilities Expanded Knowledge. Energy Poverty Advisory Hub. Directorate General for Energy. European Commission.

INE (2024). Portugal Statistics. Available on: https://www.ine.pt

LPP (2024). Em Telheiras, há vizinhos a produzir a sua própria energia e a partilhá-la entre si ["In Telheiras, there are neighbors producing their own energy and sharing it among themselves"]. LPP Lisboa Para Pessoas neswspaper. Available on https://lisboaparapessoas.pt/2024/05/31/comunidade-de-energia-renovavel-telheiras/

Lumiar Parish Council (2024). Mensagem do Presidente da Junta ["Message from the President of the Parish Council"]. Retrieved from https://jf-lumiar.pt/mensagem-do-presidente/

Luthander, R., Widén, J., Nilsson, D., and Palm, J. (2015). Photovoltaic self-consumption in buildings: A review. Applied Energy, 142, 80–94. https://doi.org/10.1016/j.apenergy.2014.12.028

Palma, P., and Gouveia, J.P. (2022). Diagnóstico da Vulnerabilidade à Pobreza Energética da Freguesia do Lumiar, Lisboa ["Diagnosis of the energy poverty vulnerability of the Lumiar Civil Parish, Lisbon"]. EU Energy Poverty Advisory Hub.

Portuguese Government (2024). Resolução do Conselho de Ministros n.º 11/2024 de 8 de Janeiro – Estratégia Nacional de Longo Prazo para o Combate à Pobreza Energética 2023-2050 ["Resolution of the Council of Ministers no. 11/2024 of January 8 – National Long-term Strategy for Energy Poverty Mitigation 2023-2050"]. Diário da República, 1.ª série, 5. Retrieved from https://diariodarepublica.pt/dr/detalhe/resolucao-conselho-ministros/11-2024-836222486

Sequeira, M., and Melo, J.J. (2020). Energy saving potential in the small business service sector: case study Telheiras neighborhood, Portugal. Energy Efficiency, 13, 551-569. https://doi.org/10.1007/s12053-020-09842-y

Sequeira, M.M., Gouveia, J.P., and Palma, P. (2021). Subtask 2: Case Study Analysis – Portugal. UsersTCP Task on Hard-to-Reach Energy Users, International Energy Agency Technology Collaboration Programme. HTR Task: Lisbon, Portugal. https://doi.org/10.47568/3XR115

Sequeira, M.M., and Mameri, D. (2022). Can communities lead the way for socio-ecological urban transformations? The empiric experience of the "network of ideas" process in the Telheiras neighborhood, Portugal. Proceedings of the International Sustainable Development Research Society Conference 2022. Retrieved from https://isdrs.org/conference-proceedings-2022/

Sequeira, M.M., Ferreira, E., and Gouveia, J.P. (2023). Comunidade de Energia Renovável de Telheiras: uma iniciativa colaborativa de cidadãos, associações e governo local ["Telheiras Renewable Energy Community: a collaborative initiative of citizens, associations, and local government"]. In Desafios Societais e a Investigação em Direito – 05 Comunidades de Energia ["Social Challenges and Research in Law – 05 Energy Communities"]. https://doi.org/https://doi.org/10.47907/DesafiosSocietais5/2024

Sequeira, M.M., Gouveia, J.P., and Melo, J.J. (2024a). (Dis)comfortably numb in energy transitions: Gauging residential hard-to-reach energy users in the European Union. Accepted for publication in Energy Research & Social Science.

Sequeira, M.M., Ferreira, E., Pereira, L.K., Cachinho, L., Martins, H., Gouveia, J.P., Antunes, A.R., Boucinha, A., and Bernardes, B. (2024b). Practical guide: Development of renewable energy communities by citizens, associations, and local governments – The example of the Telheiras Renewable Energy Community. Forthcoming at https://vivertelheiras.pt/certelheiras/en

Sequeira, M.M., Ferreira, E., and Gouveia, J.P. (2024c). From the bottom-up: The development process and participants of the Telheiras Renewable Energy Community, Portugal. Powercoop seminar proceedings (forthcoming).

Sequeira, M.M., Ferreira, E., and Gouveia, J.P. (2024d). Promovendo a produção e partilha local de eletricidade: Uma análise detalhada da experiência da Comunidade de Energia Renovável de Telheiras em Portugal ["Promoting renewable energy generation and sharing: A detailed analysis of the Telheiras Renewable Energy Community experience in Portugal"]. Livro Comunidades de Energia ["Book Energy Communities"]. Editora Almedina, Portugal (forthcoming).

Viver Telheiras (2024a). Telheiras Renewable Energy Community. Available on https://vivertelheiras.pt/certelheiras/en/

Viver Telheiras (2024b). Comunidade de Energia Renovável de Telheiras ["Telheiras Renewable Energy Community"]. Available on http://vivertelheiras.pt/certelheiras/

Viver Telheiras (2024c). CER Telheiras – Projeto piloto ["Telheiras REC – Pilot project"]. Available on https://vivertelheiras.pt/certelheiras/piloto/

Viver Telheiras (2024d). CER Telheiras já instalou os primeiros painéis solares e anuncia o 2º projeto em sessão na Biblioteca a 29 de Maio ["The Telheiras REC has already installed the first solar panels and announces the 2nd project in a session at the Library on May 29th"]. Available on https://vivertelheiras.pt/cer-festival/

Viver Telheiras (2024e). CER Telheiras – 2º Projecto ["Telheiras REC – 2nd project"]. Available on http://vivertelheiras.pt/certelheiras/pavilhao/

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Annex 6

Sun4All Sustainable Implementation Plan for the Local Energy of Osona (Regional Council)

Sun4All Sustainable Implementation Plan

Regional Council of Osona

La Tonenca Sccl

Balenyà Sostenible

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
Work Package	**WP2** "Business Model. From "Solar for all" programme to Eurosola to all (Sun4ALL) designing the scheme in an European context" **WP5** "Sustaining Transferability and Upscaling"
Dissemination Level	Public
Author(s)	Pau Pañella Vilamú, Regional Council of Osona Ramón Roig Solé, Balenyà Sostenible Sccl
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Executive summary

Executive summary – textual element
In Osona, 28 energy communities are committed to leading the change toward a more democratic and inclusive energy model. While these communities are rich in social capital and enthusiasm, they often lack the needed economic resources. Conversely, municipalities possess financial means but may lack the grassroots involvement, crucial for successful community initiatives. Moreover, despite the presence of five public administrations with Social Services departments dedicated to addressing energy poverty, there is minimal interaction and collaboration between energy communities, municipalities, and social services departments. The primary aim of the Sun4All implementation plan is to forge a groundbreaking model of collaboration among energy communities, social services, and municipalities. To kickstart this initiative, the energy community La Tonenca has been selected as the pilot for a specific project targeting energy poverty. This project involves the construction of a 10 kWp collective PV self-consumption installation, and aims to provide free of charge, with the generated energy to vulnerable families. The ultimate objective is to reduce the energy bills of these families by harnessing renewable and locally produced electricity. In the Sun4All implementation plan we have developed an innovative vulnerability assessment criteria. These criteria are designed to utilise PV energy as a means of uplifting vulnerable families socially and economically. Additionally, the Sun4All implementation plan allowed the creation of legal agreement templates, outlining the collaboration between social services and energy communities. Once the model and legal templates are established, the Energy Agency of the Regional Council of Osona and Osona Energia Cooperativa will oversee the replication of this model across all energy communities in Osona and potentially beyond.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
EC	Energy Community
DSO	Distribution System Operator
OECoop	Osona Energia Cooperativa
CAPEX	Capital Expenditure
OPEX	Operating Expenses
ALEO	Local Energy Agency of Osona

1. Introduction

Introduction – textual element

In Osona, there is a high interest in community energy. Currently, there are 28 energy communities under the form of non-profit cooperatives and basically focused on their respective municipalities. There is also a second level cooperative (Osona Energia Cooperativa - OECoop) who is delivering technical support to those energy communities.

All those energy communities are willing to have an impact also in the social side of energy transition. They are willing to tackle energy poverty in their municipalities, but they lack knowledge on energy poverty, as well as (economic) resources.

In Osona there are 5 public administrations with a Social Services department addressing energy poverty. Three of which correspond to the biggest cities of the region of Osona (Vic, Manlleu and Torelló) and two supramunicipal administrations (Regional Council of Osona and Mancomunitat La Plana). There is little interaction or collaboration between energy communities, municipalities, and social services departments related to energy poverty.

The main objective of this community of practice is to start working on the topic all together: energy communities, municipalities, and social services departments; with the goal of developing a model for energy communities to address energy poverty in collaboration with social services.

This model needs to consider that energy communities are active communities willing to have social impact, so they can provide mobilisation and human resources, but they lack economic resources. In contrast, municipalities have the resources but not the capacity nor the grassroots involvement to successfully deliver such a project. Hence, the main goal of the model is to provide knowledge and (local) best practices to the energy communities of Osona.

The community of practice in Osona is focused on the energy community of La Tonenca, which is in Tona and has a specific energy poverty project ongoing. The project is focused on a 10 kWp collective self-consumption PV installation. La Tonenca would like to share the generated energy with vulnerable families, who will also become common members of the energy community. In this case, the involved social services department (Mancomunitat La Plana) is already collaborating with La Tonenca. They highlighted the number of 42 people with energy poverty in the municipality of Tona.

As a Regional Council of Osona we are also running a pilot project on inclusive governance of the energy communities. In this pilot project, we are collaborating with FITES and Som Comunitats to set up a guide on how energy communities can become more inclusive for groups, such as vulnerable families, who are currently less represented and involved in energy communities.

2. Work Process

Table 1 Work Plan: An Overview of Actions

Nº	Name of action and sub action	Responsibilities	Accomplished action
1	Energy poverty state of the art and stakeholders mapping and coordination. Explain basic concepts of energy poverty and the local context to the involved partners. Meeting with: La Tonenca, ALEO, Ecoserveis, City Council and Mancomunitat La Plana.	ALEO explains the basics of the project. Ecoserveis provides context on the energy poverty concept. Mancomunitat La Plana provides local context of energy poverty in Tona.	Yes
2	Discuss how to overcome the economic barrier of becoming a member of La Tonenca for people who are under energy poverty. To design and implement a solidarity fund in the energy community based on the economic resources of the agreement.	Mancomunitat La Plana / Balenyà Sostenible / La Tonenca	Yes
3	Eligibility criteria definition. Definition of who can be eligible for participating in this PV collective self-consumption project.	Mancomunitat La Plana / Balenyà Sostenible	Yes
4	General Data Protection Regulation protocols and procedures	Balenyà Sostenible	Yes
5	Creating the legal templates. Elaboration of the agreement model between the City Council, La Mancomunitat La Plana and La Tonenca	Balenyà Sostenible	Yes
6	Engagement and recruitment of citizens under energy poverty.	Mancomunitat La Plana and La Tonenca	Planned for June/July
7	Shared self-consumption installation implementation	La Tonenca	Planned for June 2024
8	Technical support on collective self-consumption Including the necessary support to citizens to deal with energy retailers.	Balenyà Sostenible / Mancomunitat La Plana	Planned for June 2024

9	Creating an Implementation Plan for energy communities (including the agreement model as an annex).	Balenyà Sostenible	June 2024
10	Two public presentations of the results to: 1) Tona's citizens and 2) energy communities of Osona	ALEO, Ecoserveis, city council, Mancomunitat La Plana	September/October 2024

The following table outlines the main deliverables:

Table 2 Work Plan: An Overview of Deliverables

Nº	Name of action and sub action	Deliverable	Responsibilities
1	Sun4All Sustainable Implementation Plan and approach of Energy Poverty in Osona	Sun4All Sustainable Implementation Plan	Balenyà Sostenible
2	Roll-ups and brochures (if any)	Dissemination materials	Balenyà Sostenible

The following table indicates the budget allocation:

Table 3 Work Plan: An Overview of Budget Allocation

Nº	Unit	Item description	Amount	Cost per unit (€)	Total (€)	Responsibilities
1	1	Implementation Plan and approach of Energy Poverty in Osona (Action 2, 3, 4, 5, 7, 8 and 9)	1	7.200	7.208	Balenyà Sostenible
2	1	Kick-off meeting with all stakeholders (Action 1)	1	300	300	Balenyà Sostenible / La Tonenca
3	1	Engage and recruitment of citizens with Energy Poverty (Action 6)	1	200	200	Balenyà Sostenible / La Tonenca
4	2	Public presentation of the results to: 1) Tona's citizens and 2) energy communities of Osona (Action 10)	2	250	500	Balenyà Sostenible / La Tonenca
5	1	Roll-up	1	100	100	La Tonenca
					TOTAL	**€ 8.308,00**
		VAT (if applicable)		21 %		€ 1.744,68
		TOTAL with VAT included				**€ 10.052,68**

The following tables outline the initially planned timeline for the defined actions.

Table 4 Work Plan: Gantt Chart

Nº	Name of action and sub action	Year 2023									Year 2024				
Please use numeral for identification	*Please name and briefly describe the action and sub action*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*	*January*	*February*	*March*	*April*	*May*
1	Kick-off meeting: Energy poverty state of the art and stakeholders mapping and coordination.														
2	Discuss how to bridge economic barrier of becoming a member of La Tonenca for people who have EP.														
3	Eligibility criteria definition of people who may participate.														
4	GDPR - General Data Protection Regulation protocols and procedures														
5	Creating the legal templates. The agreement model between the City Council, La Manocomunitat La Plana and La Tonenca														
6	Citizen with energy poverty engagement and recruitment.														
7	Shared self-consumption installation implementation														
8	Technical support on collective self-consumption														
9	Creating the guide/manual for energy communities														
10	Two public presentations of the results to: 1) Tona's citizens and 2) energy communities of Osona														

As you could see in table 1, action 6 to 10 are a bit delayed. The delay is related to the difficulties encountered in signing the agreement between the social services (Mancomunitat La Plana), the City Council and the Energy Community. Even though the template has already been agreed since the end of January 2024, the signing process has been delayed.

Nonetheless, actions 6, 7 and 8 are planned for June 2024. And the actions 9 and 10 will probably be carried out in September/October 2024.

3. Current State of Energy Poverty Action

Current State of Energy Poverty Action – combination of textual and visual elements

The current state of energy poverty in the municipality of Tona was quantified by the social services of the La Mancomunitat La Plana. They identified 43 families in Tona who need their support in order to pay for the energy bills. So, at least this is the minimum number of target families.

The social services are currently providing the following supports to vulnerable families:

- Social services elaborate a vulnerability report and send it to supply companies. Thanks to that supply cuts are avoided.
- Social emergency grants are also processed to cover expenses linked to energy supplies in those families that meet the conditions of the call, making full or partial payment of invoices.
- Social services also provide support with advice and considerations to reduce the amount of bills.

The project is defined as a 10 kWp self-consumption installation, where 7 families will be able to benefit from the photovoltaic energy (1 kWp for each family). Not all the generated energy will be shared with the vulnerable families because of two reasons:

1) The agreement with the owner of the roof defines that in exchange of letting La Tonenca to use the roof, 15% of the generated energy will be shared with him. So, there is no economic payment for the roof usage but an in-kind payment instead.

2) In the municipality there is the Volunteers Association which also collaborates with the social services to distribute food for free within the vulnerable families. This association has high electricity bills because of the fridges and freezers they use to conserve the food. La Tonenca also decided to share 15% of the generated energy with this association, to align two citizen-lead poverty actions.

As indicated in the previous section, even though there has been a draft document since January 2024 for the agreement between La Mancomunitat la Plana (social services), the City Council and La Tonenca, the signing process has been delayed. This needs to be taken as a learning for followers and replicators, as relationships with public authorities can delay the process.

The agreement will contextualise the relationship between social services and the energy community. It also provides financial support in order to cover the cost of becoming a member of the energy community (membership share of the cooperative). So, the participants will become a common member of the community, and so, will also be able to participate in other energy related services and decision-making processes.

Except for action 5, all the actions described in table 1 had been performed as defined in the Gantt chart (table 4). So, the planned actions are running in the right direction and only have a couple of months of delay, due to the previously outlined delays on signing the agreement.

4. Stakeholder Mapping and Coordination

Stakeholder Mapping and Coordination – combination of textual and visual elements

In Osona there are two main entities providing services to energy communities. The Local Energy Agency of the Regional Council of Osona and the second level cooperative Osona Energia Cooperativa. The role of OECoop is to provide 360º support to energy communities during their everyday life. One of the aspects they address is to help energy communities to become more inclusive. So, we identify OECoop as a key actor in this project. Specially for the smooth running of the project in La Tonenca (as a pilot community) but also for the replication of the initiative.

Since the beginning La Tonenca board of members understood that they cannot reach vulnerable families and offer them support without the support of the City Council and the relative social services. In the area of the city of Tona, the social services are gathered in another entity named Mancomunitat La Plana. This is why both the City Council and Social Services (Mancomunitat La Plana) have been identified as key stakeholders of the project.

So, we concluded there are 4 key actors in this energy poverty implementation plan.

1) Energy Community

   The energy community is the main actor of the action. The EC led the implementation plan. The EC is the owner of the PV collective self-consumption installation. The participants will become common members of the community, so they can also participate in the decision-making processes, as well as, in the other related energy services (such as collective purchase of firewood at reduced price).

   The EC is set up as a non-profit cooperative. So, to become a regular member of the cooperative, members need to provide the membership fee (100 €). This membership fee will be paid back if a member leaves the cooperatives.

2) Social services (La Mancomunitat La Plana)

   The social services department is the one incharge of selecting the possible participants. They have the technical criteria and capacity to apply the defined criteria in order to reach and select the project participants.

   It also provides the economic resources in order to break the economic barrier of becoming a member of the energy community for vulnerable citizens.

3) City Council

   The City Council provides the context as the main public authority in the municipality. It also ensures the right relationship between the social services department and the EC.

4) Osona Energy Cooperativa (OECoop) as a second level cooperative

   The EC La Tonenca is a member of a second level cooperative called OECoop. OECoop provides technical and administrative support to La Tonenca in order to run their projects, including the energy poverty implementation plan. OECoop is also a key partner for the replication and the upscaling of the project in other ECs.

5. Defining Criteria and Conditions for Participation

Defining Criteria and Conditions for Participation – combination of textual and visual elements

In Tona there are much more vulnerable families (42 families) than the number of families that will be able to participate in the implementation plan (7 families). For that reason, together with the social services we have defined a vulnerability assessment criteria. So, we can prioritise among the applications.

The vulnerability assessment criteria that will be considered by the Basic Social Services are described below table 5. It was built thanks to 3 participatory workshops where all the social services technicians of the La Mancomunitat la Plana have participated.

The vulnerability assessment criteria specify the minimum requirements (mandatory) that owners of vulnerable households should fulfil to become beneficiaries. The scorable criteria add up and it is what will help break the tie and prioritise the level of vulnerability of households.

This criteria has been defined in order to target those vulnerable families that need the social services support, even with a little help will be able to become self-sufficient. The objective is that this project makes a meaningful impact on their lives. The objective is that the energy poverty project of the EC becomes a kind of social lifter.

This group of vulnerable families usually tends to avoid asking for social services' support, many times because of embarrassment they may feel stigmatised.

The criteria has been created to avoid selecting those families who have a strong need of social services support in order to pay for the energy bills. The economic impact of this project (1 kWp of PV energy per family) won't be enough to be self-sufficient, so they will keep using the social services support to pay the energy bill.

The criteria defined in table 5 is part of the agreement between social services and the EC. You can find the agreement template in Annex 1.

Table 5. Eligibility Criteria to prioritise participants

	Criteria	Quantification of the criteria	Verification document
1	Accept becoming member of the EC	Mandatory	Document from La Tonenca as that person is a member
2	Be registered as a resident of the municipality of Tona. Leave in a place less than 2 km away from the PV installation	Mandatory	Registering document Electricity bill
3	Be the holder of the electricity supply contract	Mandatory	Energy bill

	Criteria	Quantification of the criteria	Verification document
4	Comply with the "IRER[1]" Residential Exclusion Risk criteria (housing zone C)	Mandatory	Financial documentation of the family unit (payslips, income statement, INSS certificate, SEPE, sworn statement, etc.) Certificate of disability, if applicable Certificate of dependency, if applicable
5	Table with IRER data zone C with low threshold for the Social Benefit	10 points	Check that they are within the limits defined by annex table 1 The same information is necessary to know whether they have IRER or not
6	Receive a pension equal to or less than the Income Sufficiency Indicator for the year 2023 (IRSC) €614.65 per month and €8,605.15 per year	10 points	National Social Security Institute (NSSI) income certificate
7	Have a recognized degree of dependency and/or disability and show that care services are needed	5 points	Certificate of recognition of disability and/or dependency Invoice or report of the specialised service
8	Have a regulatory separation or divorce agreement stating the payment of alimony for sons and daughters and this payment is not being made	2 points	Complaint made about non-payment of alimony
9	Have the status of a single-parent family recognized	5 points	Single parent card
10	Have an intervention improvement plan with basic social services	3 points	Work plan

6. Planning Citizen Recruitment and Engagement

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
Once the formal agreement between La Mancomunitat La Plana (social services), the City Council and the EC gets signed, the social services technicians will start selecting the

[1] Residential Exclusion Risk Report. https://habitatge.gencat.cat/ca/ambits/preus-ingressos-i-zones/taules-dingressos-de-referencia-en-materia-dhabitatge-/Taules_ingressos_ajuts_i_serveis/index.html

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
possible participants to the project based on the eligibility criteria defined in table 5. At least the mandatory criteria should be accomplished by the selected people. For this initial stage they will provide basic information about the project. See Figure 1 below. Once a group of possible participants is ready, the EC will explain the details of the energy poverty project. What is in for them, and which are their rights and duties. From those willing to participate the social services will apply the scoring criteria in order to prioritise them. Once we have the final list of participants, the EC will collect the needed documentation (like the energy meter number…) and proceed with the legalisation of the installation. Which means linking their energy meters to the PV production.

Figure 1 - Supporting document for explaining the project to the participants

7. Community Building and Energy Awareness

Community Building and Energy Awareness – combination of textual and visual elements
The energy community of La Tonenca since the foundation has defined energy democracy and inclusivity as one of the main pillars of the community. Even though it is true that there are some groups such as women, young people or vulnerable families which are under-represented in the community or in the board of members. The main objective of this project is to include those vulnerable families as regular members of the energy community. So, they can participate as the other members do. As a first step, this means that the energy poverty project participants will become regular members of the community and they will be invited to take part in the everyday social activities of the community. We identified the membership fee (100 €) as an economic barrier for this group. We addressed this issue by including economic support in the agreement with the social services. This economic support is going to create an EC internal budget for covering this cost for those families. If one of the participants leaves the community the membership fee comes back to the internal budget, so it can be used for another person. Becoming a regular member means that, at least at the theoretical level, vulnerable members of the community can engage in the community by participating in the decision-making processes, in the commissions or even in the board of members. Obviously, this is not going to happen if the community does not provide the right context. Probably this means paying attention to the timeslots of the meetings, paying attention to the used jargon and some training sessions to the overall community. Also, by becoming a regular member of the community, vulnerable families will be able to participate in the other energy related services the EC offers to their members. For instance, to the collective purchases of firewood. So, they will have access to local and cheaper firewood for heating their homes in winter. Finally, as indicated by the action 10 in Table 4, we will carry out two workshops to ensure the dissemination of the initiative in town and among the neighbouring communities.

8. Technical Adoption Planning

Technical Adoption Planning – combination of textual and visual elements
The technical aspects of the collective PV installation have been worked out by collaborating with the SUD Renovables company. SUD Renovable is one of the most experienced companies in Spain in the field of photovoltaic energy.

Technical Adoption Planning – combination of textual and visual elements

We contextualised this collaboration in the SUD Cooperació award which last year was given to La Tonenca. This award comes with an economic budget of 12.000 € and with the engineering support to build the PV plant.

Together with SUD Renovables we have analysed 3 roofs in the city of Tona:

- Nursery "Pa amb Xocolata". This is a public roof. The City Council already gave the rights to use the roofs to La Tonenca. This was the reason to select this roof in the first step. However, the roof has been dismissed for two reasons. It is a big roof, so it better suits for a bigger installation (> 100 kWp).
- Most importantly the roof was dismissed because of the DSO. In Tona there is one local DSO in most of the city, but this connection point is in another DSO area. Having two DSOs involved in the collective self-consumption was considered difficult. Moreover, it is relatively easy to communicate with the local DSO but not with the other one.
- Building block of flats in Josep Ventura street. This is a special block because the owner's community is already members of La Tonenca, so it is easy to work and achieve agreements with them. However, after analysing the roof it is not easy to install the PV panels on the roof. It is not impossible but expensive, so also that roof was dismissed.
- Bishopric roof. Osona Energia Cooperativa (OECoop) is a second level cooperative who offer technical and administrative services to EC. La Tonenca is a member of OECoop. OECoop has a signed agreement with the Bishopric of Vic, so all the roofs of the bishopric (and they have roofs in every municipality) can be used by the EC in exchange of 15% of the produced energy.

  La Tonenca has identified one roof owned by the bishopric which fits this PV project (10 kWp). We analysed the roof together with SUD Renovable and agreed it is the best option. Figure 2 shows how this PV installation is planned facing east-west orientation on that roof. This setting fits very well with the typical domestic electricity consumption profile.

  Annex 2 is the engineering project for that roof, where estimated production and other KPIs are presented.

The PV installation has 9,79 kWp. As agreed with the bishopric 15% of the energy is for their needs, which means 1,47 kW. So, the distribution of the PV plant will be as follows:

- 7 vulnerable families with 1 kWp each
- 1,47 kWp for the bishopric
- 1,32 for the local Volunteers Association

The volunteer's association of Tona is a non-profit organisation who delivers food to vulnerable families in Tona. They closely collaborate with the social services for that task. They have high electricity bills as they have fridges and a freezer to keep the food they later distribute.

Technical Adoption Planning – combination of textual and visual elements
As long as the objectives of La Tonenca and the Volunteers Association are well aligned, La Tonenca board of members decided to share part of the energy with them. This is also a way to mutual corporate and generate synergies with other entities in Tona.

Figure 2. Collective PV installation on the bishopric roof

9. Legal Adoption Planning

Legal Adoption Planning – combination of textual and visual elements
Overall, there are three legal items that have been studied. 1) Collective self-consumption The Royal Decree 244/2019 allows the sharing of the energy generated by a PV plant with metering points which are not farther than 2000 m. This is not a limitation in the municipality of Tona. The engineering project has been defined in order fulfil all the requirements to legalise the PV project as collective self-consumption with surplus compensation. Which means that the non-used energy will be compensated in the energy bills of each participant. 2) Cooperative membership fee

Legal Adoption Planning – combination of textual and visual elements
As a non-profit cooperative every single member of La Tonenca should pay for the entry membership fee (100 %). As we identified this as a barrier, we developed an internal budget covered by the agreement with the social services. Thanks to the agreement, we break the economic barrier, and we are not losing money every time a vulnerable participant leaves the cooperative as it works as a permanent wallet. There is a second option, which was dismissed for this implementation plan. As described in the Catalan Cooperative law (12/2015), a new member can pay in an initial step only for the 25% of the membership fee (so 25 out of 100 €) to become a member of the cooperative. The internal regulation of the cooperative should indicate how to pay for the remaining part. The key part is that the EC could just not specify it in the case of vulnerable members. So, the vulnerable member cannot pay it. With this strategy we could lower the economic barrier down to 25 € but participants would not be 100% rightful members until the 100 € were covered. 3) GDPR Fulfilling the GDPR requirements is a mandatory step for any project. In this case, that was one of the tasks foreseen in the work plan (see table 1) and the outcome is included in the article number 8 of agreement temple (see annex 1).

10. Financial Scheme Adoption Planning

Financial Adoption Planning – combination of textual and visual elements
The financial scheme of this energy poverty project is based on two economic items. Both are key for the success of the project: 1) SUD Coopera award (www.sudrenovables.com/cooperation) valued at 12.000 €. La Tonenca was awarded with the SUD Coopera award last year. This award allowed La Tonenca to cover the CAPEX costs of the PV installation. In this context La Tonenca is able to share the generated energy for free with the vulnerable families. 2) Agreement with the social services. It comes with the economic support needed to break the economic barrier of becoming a member of La Tonenca Sccl. See article 3 of the agreement in Annex 1. La Tonenca is going to create a specific budget for vulnerable families participating in that project so it can cover the membership fee with it. The economic resource is not lost when a vulnerable member leaves the EC. The membership fee is recovered by La Tonenca and can be used for another future member. La Tonenca is taking the OPEX (i.e. PV installation insurance) cost of this installation as it is not getting paid for the produced energy. This is a financial risk for the EC.

Figure 3. Members of La Tonenca during the SUD Coopera award event

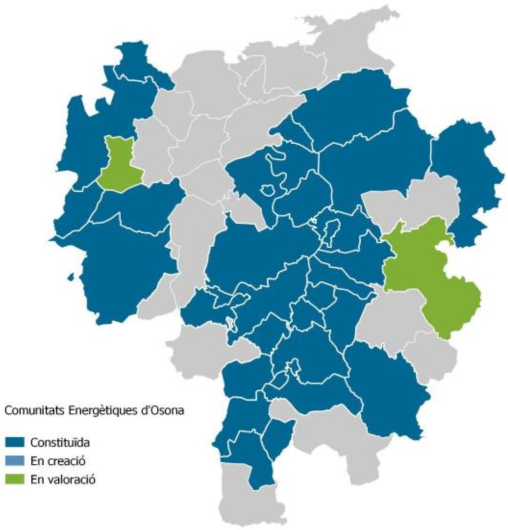
11. Replication and Scalability Potential

The Sun4All implementation plan sets the basis for further replication of the model. The agreement template is an outcome of the Sun4All implementation plan which facilitates the replication of the project in other ECs and municipalities. It describes the relationship model and provides a clarifying legal context, which is very important for City Councils and social services departments. It also provides an innovative vulnerability assessment criteria.

However, this energy poverty initiative is financially possible thanks to the SUD Coopera award. In that sense we adapted the energy poverty initiative into the existing collective PV installation framework for EC in Osona.

In Osona there are 28 ECs. All of them start their energy transition activities within the framework of collective self-consumption. All of them are building their first installation on public roofs. They get an agreement with the corresponding city council, so they can use those roofs in exchange for 10% of the generated energy. As the Energy Agency of the Regional Council of Osona, we provided the legal template for this framework. Our proposal is that, for instance, 5% of this generated energy could be distributed to vulnerable families instead of public buildings. The agreement template developed in the Sun4All implementation plan can be used in this new framework in the 28 ECs of Osona.

Figure 4. Energy communities of Osona distribution map



Moreover, OECoop as a second level cooperative, who has been involved in the Sun4All implementation plan, is also going to take an important role in dissemination and replication of the Sun4All implementation plan among their members. Currently OECoop has 35 EC members, some of them from outside of the Osona region. So, the scalability potential is high.

12. References

Annex 1: Agreement template

This document is an agreement template that can be used for other energy communities and social services in order to establish the basis of their energy poverty collaboration.

The agreement template is written in Catalan.

Annex 2: Collective PV installation engineering project

Annex 1: Agreement template

CONVENI DE COL.LABORACIÓ ENTRE L'AJUNTAMENT DE __________, LA COMUNITAT ENERGÈTICA ________________ I LA MANCOMUNITAT INTERMUNICIPAL VOLUNTÀRIA LA PLANA PER LA REDUCCIÓ DE LA POBRESA ENERGÈTICA EN FAMÍLIES VULNERABLES

REUNITS

D'una part el Sr. _________________, que actua en nom i representació de l'ajuntament de__________________, domiciliat a amb CIF núm. ____________, com a alcalde/essa facultat per aquest acte per acord de la Junta de Govern Local/Ple de data ___________________.

Per altre part la Sr./a. ___________________, que actua en nom i representació de la Comunitat Energètica _____________________, amb domicili a _________________________ amb CIF núm. _____________ com a President/a de la mateixa.

Per altre part el Sr. Pere Medina Serahima, President de la Mancomunitat Intermunicipal Voluntària La Plana, amb NIF núm. P-0800024-B, en nom i representació d'aquesta, assistida del Secretari de la Mancomunitat que dona fe de l'acte.

MANIFESTEN

I.- Que la comunitat energètica XXXX, és una entitat en forma de [cooperativa de consumidors[LAM1] sense ànim de lucre], que té pe objectiu avançar en la transició energètica del municipi de XXXXXX, ja sigui produint energia, compartint-la, o establint mecanismes de gestió i estalvi energètic.

Concretament aquesta comunitat té per objecte, d'acord amb l'article [X[LAM2]] dels seus estatuts vigents:

[- La producció i generació d'energia amb tot tipus de fonts renovables, principalment en base a l'autoconsum compartit tal i com defineix el RD 244/2019, com a la seva comercialització

- Donar suport i col·laborar en iniciatives (principalment públiques) complementàries o sinergètiques a la Transició Energètica en aspectes socials com ara la formació i reciclatge professional, la pobresa energètica, inserció laboral de col·lectius vulnerables en els projectes, canalització de l'estalvi familiar o corporatiu envers projectes de TE, emprenedoria, etc

II.- Que l'ajuntament de XXXXXX ha cedit a la comunitat energètica XXXXXXXXXXXXXXXX la teulada de [DESCRIPCIÓ DEL TIPUS D'EQUIPAMENT I L'EMPLAÇAMENT DEL TEULAT CEDIT] per tal que sigui gestionada per la comunitat energètica amb la finalitat de produir i generar energia renovable d'origen solar per a ser destinada al consum de les persones sòcies de la comunitat i a les llars del municipi amb vulnerabilitat energètica. Com a contraprestació a la cessió demanial per a ús privatiu de la coberta municipal, la comunitat ha d'assignar XX % de l'energia a equipaments municipals.

III.- Que la comunitat energètica i l'ajuntament de XXXXXXX han arribat a un acord per tal que la primera cedeixi energia elèctrica fotovoltaica a X llars amb vulnerabilitat energètica del municipi de XXXX, les quals hauran estat seleccionades a través de l'Àrea Bàsica de Serveis Socials de la Mancomunitat La Plana. Aquesta energia cedida forma part del XX % que rep l'ajuntament com a contraprestació de la cessió demanial per a ús privatiu de la coberta municipal.

IV.- Que la Mancomunitat Intermunicipal Voluntària La Plana, en endavant, Mancomunitat La Plana, és reconeguda per la Generalitat de Catalunya com a Àrea Bàsica de Serveis Socials i presta els serveis socials als municipis mancomunats com l'ajuntament de XXXXX, de conformitat amb l'article 5 del seus Estatuts que estableix com a finalitat, entre d'altres, l'avaluació i informació de situacions de necessitat social i l'atenció a persones en situació o risc d'exclusió social.

V.- Que la Mancomunitat La Plana amb la finalitat de reduir la pobresa energètica en llars vulnerables del municipi de XXXXX, vol realitzar una aportació econòmica a la comunitat energètica XXXXXX d'import XXXXX per tal que es destini a l'accés de X llars vulnerables del municipi de XXXX passant a formar part de la comunitat energètica i siguin beneficiàries de l'energia compartida per tal de reduir la seva vulnerabilitat, així com per promoure la transició energètica del municipi.

En conseqüència, de conformitat amb l'establert en les disposicions antecedents i atenent les voluntats coincidents de totes les parts, aquestes acorden subscriure el present conveni de col·laboració, el qual es regirà per les següents:

CLÀUSULES

PRIMERA.- L'objecte d'aquest conveni és establir els termes de la col·laboració entre l'ajuntament de XXXXXXXXXXX; la comunitat energètica XXXXXXXXXXX i la Mancomunitat Intermunicipal Voluntària La Plana, per a promoure que llars vulnerables amb pobresa energètica del municipi de XXXXX siguin beneficiàries d'energia renovable provinent de la comunitat energètica XXXXX per tal de reduir la seva vulnerabilitat, així com per promoure la transició energètica del municipi.

SEGONA.- Actuacions

Amb aquesta finalitat, s'adoptaran les mesures següents:

La Mancomunitat La Plana realitzarà una avaluació de les persones del municipi de XXXXX ateses pels serveis socials bàsics per determinar si compleixen criteris de pobresa energètica als efectes de poder ser beneficiaris d'energia compartida provinent de la comunitat energètica XXXXXXXXX.

Aquesta avaluació es realitzarà mitjançant el criteris d'avaluació de la vulnerabilitat per accedir a ser beneficiaris d'energia compartida establerts a la clàusula Cinquena del present conveni.

L'avaluació es realitzarà de forma continuada de manera que el llistat de llars susceptibles de ser beneficiàries de l'energia compartida anirà variant al llarg de la vigència del present conveni.

La Mancomunitat facilitarà a al comunitat energètica XXX les dades de les X llars que resultin ser més vulnerables d'acord amb els criteris d'avaluació de la clàusula Cinquena.

La comunitat energètica XXX procedirà a formalitzar la inscripció de les persones que li hagi comunicat la Mancomunitat La Plana, com a membres de la comunitat energètica als efectes de compartir-hi energia i realitzar-los l'acompanyament necessari en termes d'estalvi energètic i bon ús de l'energia solar fotovoltaica.

TERCERA.- Compromisos de les parts

Per tal de dur a terme l'objecte i actuacions enunciades, les parts implicades aportaran els recursos següents:

La comunitat energètica XXXXXXXX es compromet a:

a) Formalitzar la inscripció com a membres de la comunitat energètica als efectes de compartir-hi energia a X llars vulnerables que li siguin assignades per part dels serveis socials bàsics la Mancomunitat La Plana.

b) Realitzar l'acompanyament en termes d'estalvi energètic i de recomanacions de bon ús de l'energia solar fotovoltaica a les llars descrites al punt a).

c) Comunicar a la Mancomunitat La Plana tots els aspectes que provoquin un canvi de llar beneficiària de l'energia compartida.

d) Comunicar a la Mancomunitat La Plana els increments d'energia fotovoltaica a compartir per tal que la Mancomunitat informi de noves llars vulnerables susceptibles de beneficiar-se'n.

e) Transferir a la Mancomunitat La Pana en el moment de la finalització del conveni present conveni l'import de XX € corresponent a l'aportació econòmica percebuda inicialment.

L'Ajuntament de XXXX es compromet a:

a) Vetllar pel compliment de la obligació de la comunitat energètica XXXXXXXXXXXX per tal que comparteixi energia renovable a les llars vulnerables energèticament que hagin proposat els serveis socials de la Mancomunitat La Plana.

b) Realitzar una aportació econòmica a la Mancomunitat La Plana per import de XXXX en concepte de reducció de la pobresa energètica en llars vulnerables del municipi de XXXX.

c) Compromís de mantenir la cessió de la teulada descrita en el manifestant II per la que la comunitat energètica la gestioni.

La Mancomunitat Intermunicipal Voluntària La Plana es compromet a:

a) Realitzar una **aportació econòmica** a la comunitat energètica XXXX d'import XXXXX € per tal que es destini a formalitzar la inscripció com a membres de la comunitat energètica a X llars vulnerables del municipi de

XXXXXXX que li hauran estat comunicades per part dels serveis socials bàsics la Mancomunitat La Plana, amb la finalitat de compartir-hi energia.

A la finalització del present conveni l'import de l'aportació econòmica realitzada haurà de revertir novament a la Mancomunitat La Plana.

b) Realitzar una avaluació contínua d'acord amb els criteris establerts a la clàusula X de les persones del municipi de XXXXX ateses pels serveis socials bàsics per determinar si compleixen criteris de pobresa energètica als efectes de poder ser beneficiaris d'energia compartida provinent de la comunitat energètica XXXXXXXXX.

c) Comunicar a la comunitat energètica XXXXX les llars i les persones/famílies proposades per a ser beneficiàries d'energia compartida.

d) Mantenir informat l'ajuntament de XXXX de les llars i persones/famílies beneficiàries d'energia compartida provinent de la comunitat energètica XXXXXXXXX.

e) Els Serveis Socials Bàsics de la Mancomunitat La Plana faran el seguiment i establiran els corresponents recursos a les persones proposades per ser beneficiàries de l'energia compartida durant tot el temps que en gaudeixin per tal que millorin la seva situació personal.

f) Fer públic el present conveni en el Portal de Transparència de la Mancomunitat.

CINQUENA.- Criteris d'avaluació de la vulnerabilitat per accedir a ser beneficiaris d'energia compartida

Els criteris d'avaluació de la vulnerabilitat que tindran en compte els Serveis Socials Bàsics es descriuen a la taula següent:

	Criteris	Quantificació	Verificació
1	Acceptar ser membre de la comunitat energètica	Requisit mínim	Document d'acceptació Document amb número de soci de la comunitat energètica
2	Estar empadronat/da al municipi de XXX i residir en un habitatge situat a menys de 2 km de la instal·lació d'autoconsum situada a xxx	Requisit mínim	Volant d'empadronament Factura de subministrament (en cas que no coincideixi el domicili de residència i empadronament)
3	Ser titular del contracte de subministrament elèctric	Requisit mínim	Factura o contracte de subministrament elèctric

	Criteris	Quantificació	Verificació
4	Complir criteris de Risc d'Exclusió residencial "IRER" (zona d'habitatge C)	Requisit mínim	Documentació econòmica de la unitat familiar (nòmines, declaració de renta, certificat INSS, SEPE, declaració jurada, etc.) Certificat de discapacitat, si s'escau Certificat de dependència, si s'escau
5	Taula amb dades IRER zona C amb llindar baix pel Bo Social	10 punts	Comprovar que estan dins els límits definits per la taula annexa 1. És necessària la mateixa informació per saber si tenen IRER o no.
6	Rebre una pensió igual o inferior a l'Indicador de renda de suficiència de l'any 2023 (IRSC) 614,65€ mensuals i 8.605,15€ anuals	10 punts	Certificat d'ingressos INSS
7	Tenir un reconeixement de grau de dependència i/o discapacitat i que es necessitin serveis per l'atenció	5 punts	Certificat de reconeixement de discapacitat i/o dependència Factura o informe del servei especialitzat
8	Disposar d'un conveni regulador de separació o divorci on consti el pagament de pensió d'aliments per a fills i filles i aquest pagament no s'estigui efectuant.	2 punts	Denúncia efectuada sobre impagament de pensió d'aliments
9	Tenir reconeguda la condició de família monoparental	5 punts	Carnet monoparental
10	Tenir un pla de millora d'intervenció amb serveis socials bàsics	3 punts	Pla de treball

La taula especifica quins són els requisits mínims que ha de tenir els titulars de les llars vulnerables susceptibles de ser beneficiaris de l'energia compartida. Els criteris puntuables sumen i és el que ajudarà a desempatar i prioritzar la vulnerabilitat de les llars.

SISENA. - Vigència

El present conveni entra en vigor a partir de la data de l'última signatura i serà vigent durant 4 anys.

Abans de la finalització prevista a l'apartat anterior, les parts signants poden acordar la pròrroga del conveni per un període total màxim de quatre anys. La pròrroga quedarà formalitzada mitjançant una addenda i es produirà amb notificació prèvia a la finalització de la vigència del conveni i per acord de totes les parts.

SETENA. - Causes de resolució del conveni

Són causes de resolució d'aquest conveni:

- Transcurs del termini previst.
- Per mutu acord de les parts manifestat per escrit.
- Per incompliment dels pactes que s'hi estableixen.
- Per la denúncia d'una de les parts feta amb un mínim de dos mesos, sense perjudici de finalitzar els encàrrecs iniciats.
- Per les causes generals establertes en la legislació vigent.
- La finalització/extinció de l'objecte del conveni.

VUITENA. - Protecció de dades i confidencialitat de la informació.

En virtut de la normativa de protecció de dades vigent (RGPD 2016/679 (UE) i Llei 3/2018, de 5 de desembre, de protecció de dades personal is garantia dels drets digitals, les entitats signatàries donaran compliment a les següents obligacions:

a) Utilitzar les dades personals objecte de tractament, o les que reculli per a la seva inclusió, només per a la finalitat objecte d'aquest conveni. En cap cas pot utilitzar les dades per a finalitats pròpies.

b) Tractar les dades d'acord amb confidencialitat i secret.

c) No comunicar les dades a terceres persones, tret que tingui l'autorització expressa de l'interessat o en els supòsits legalment admissibles.

d) Per subcontractar els serveis amb tercers, s'haurà de comunicar prèviament a l'altra part, identificant de manera clara i inequívoca l'empresa subcontractista o el tercer, i les seves dades de contacte.

e) Mantenir el deure de secret respecte de les dades personals a les quals s'hagi tingut accés en virtut d'aquest encàrrec, fins i tot després que en finalitzi l'objecte.

f) Garantir que les persones autoritzades per tractar dades personals es comprometen, de forma expressa i per escrit, a respectar la confidencialitat i a complir les mesures de seguretat corresponents, de les quals cal informar-los convenientment.

g) Garantir la formació necessària en matèria de protecció de dades personals de les persones autoritzades per tractar aquestes dades personals d'especial protecció i de col·lectius vulnerables.

Quan les persones afectades exerceixin els drets d'accés, rectificació, supressió i oposició, limitació del tractament, portabilitat de dades i a no ser objecte de decisions individualitzades automatitzades, davant la comunitat energètica XXXXXX, aquesta entitat ho ha de comunicar per correu electrònic a l'adreça dpd@mancoplana.cat. La comunicació s'ha de fer de forma immediata i en cap cas més enllà de l'endemà del dia laborable en què s'ha rebut la sol·licitud, juntament, si escau, amb altres informacions que puguin ser rellevants per resoldre la sol·licitud.

h) Les dades podran ser cedides a les entitats i organismes que siguin legalment exigibles per a la prestació del servei (Hisenda, Seguretat Social, altres) o a les Administracions públiques que pertoqui.

i) Les dades es conservaran durant el termini legalment previst en cada normativa sectorial d'aplicació.

j) Es podran exercir els drets d'accés, rectificació, supressió, portabilitat, limitació i oposició al tractament de les dades davant MANCOMUNITAT INTERMUNICIPAL VOLUNTARIA LA PLANA, amb domicili social a Sector El Quadro 08522 MALLA per correu postal o per email a dpd@mancoplana.cat

k) Notificació de violacions de la seguretat de les dades.

La comunitat energètica XXXXXX informarà a MANCOMUNITAT LA PLANA, sense dilació indeguda i en qualsevol cas abans del termini màxim de 24 hores, i a través d'email o altre mitjà fefaent, de les violacions de la seguretat de les dades personals al seu càrrec de les quals tingui coneixement, juntament amb tota la informació rellevant per documentar i comunicar la incidència en aquells casos seguretat constitueixi un risc per als drets i les llibertats de les persones físiques. MANCOMUNITAT LA PLANA serà qui en faci la comunicació a l'Autoritat de Control, en cas que sigui pertinent.

l) En cas que s'utilitzin suport informàtics per al tractament de les dades dels interessats s'Implantaran les mesures de seguretat necessàries per:

• Garantir la confidencialitat, integritat, disponibilitat i resiliència permanents dels sistemes i serveis de tractament.

• Restaurar la disponibilitat i l'accés a les dades personals de forma ràpida, en cas d'incident físic o tècnic.

• Verificar, avaluar i valorar, de forma regular, l'eficàcia de les mesures tècniques i organitzatives implantades per garantir la seguretat del tractament.

•Seudonimitzar i xifrar les dades personals, quan els accessos siguin per xarxa.

m) Destí de les dades: es retornarà al responsable del tractament les dades personals i, si escau, els suports on constin, una vegada complerta l'objecte d'aquets Conveni. La devolució comportarà l'esborrat total de les dades existents en els equips informàtics utilitzats per la comunitat energètica XXXXXX. No obstant això, la comunitat energètica XXXX podrà conservar-ne una còpia, amb les dades degudament bloquejades, mentre es puguin derivar responsabilitats de l'execució de la prestació.

NOVENA. - Règim jurídic.

El present conveni tindrà caràcter administratiu i obligarà a les entitats signatàries de conformitat amb les previsions acordades i, en allò no previst específicament, es regirà per les previsions sobre relacions interadministratives, per les normes comunes de la llei 26/2010, de 3 d'agost de règim jurídic i de procediment de les administracions públiques de Catalunya, i per la resta de la normativa que sigui materialment aplicable a l'objecte del conveni.

D'acord amb el previst a l'article 6.1 de la Llei 9/2017, de 8 de novembre, de Contractes dels Sector Públic, el present conveni queda exclòs del seu àmbit d'aplicació.

DESENA. - Jurisdicció competent.

Totes les qüestions que puguin sorgir en ordre a la interpretació i execució d'aquest conveni, seran resoltes de mutu acord. Les qüestions litigioses que puguin derivar-se del present conveni seran sotmeses a l'ordre jurisdiccional contenciós administratiu.

I en prova de conformitat, les parts signen el present conveni electrònicament.

Annex 2: Collective PV installation engineering project

SUD Renovables
POWERED BY SOLTECH

Condicions Particulars Instal·lació fotovoltaica d'autoconsum per a LA TONENCA COOPERATIVA ENERGÈTICA SCCL

24/4/2024, Tona

Número de pressupost: 13301

Qui som

- El Grup SUD està format per empreses amb una contrastada experiència en el sector industrial, energètic i mediambiental.
    - Enginyeria pròpia (SUD Renovables).
    - **Instal·ladora** pròpia (Instal SUD).
    - ISO 9001, ISO 14001 i OHSAS 18001.
- Fundat al **2005.**
- Projectes **claus en mà.**
- Especialitzats en fotovoltaica sobre coberta, per autoconsum.

Els nostres treballs

- Més de 7.000 instal·lacions domèstiques.
- Més de 500 instal·lacions industrials.
- Més de 65.000 kWp instal·lats.

Presència

- Instal·lacions a tota Espanya.
- Representants d'UNEF a Catalunya i membres de la Junta Directiva durant 8 anys.
- Membres de la taula d'Impuls a l'autoconsum i de l'Observatori de l'Energia de l'ICAEN.

Nom: **LA TONENCA COOPERATIVA ENERGÈTICA**

NIF: **F10771640**

Direcció: **Carrer Barcelona 4. Tona, 08551, Barcelona.**

Sistema proposat

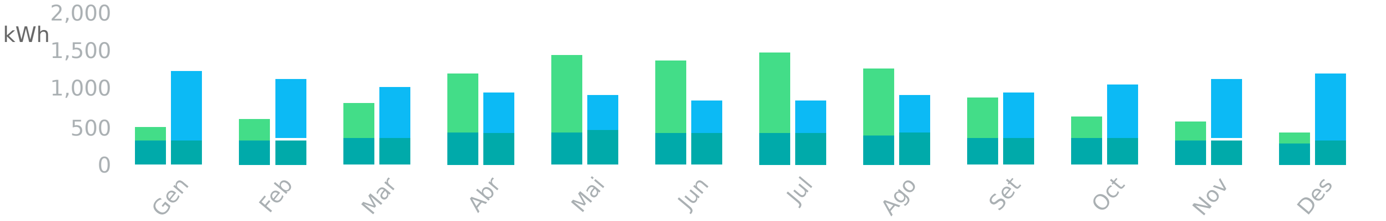
Potència instal·lada:	**9,79 kWp**
Emmagatzematge:	**Sense bateries**
Mòduls:	**22**
Orientació/Inclinació:	**96° O/18° 84° E/18°**
Producció anual:	**1.132 kWh/kWp**

Balanç energètic

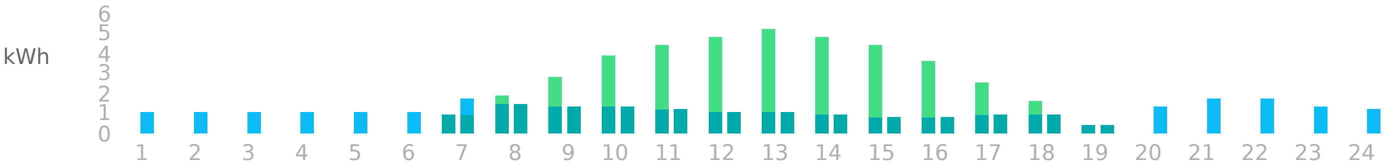
Energia generada: **11.085 kWh**

Energia consumida: **12.000 kWh**

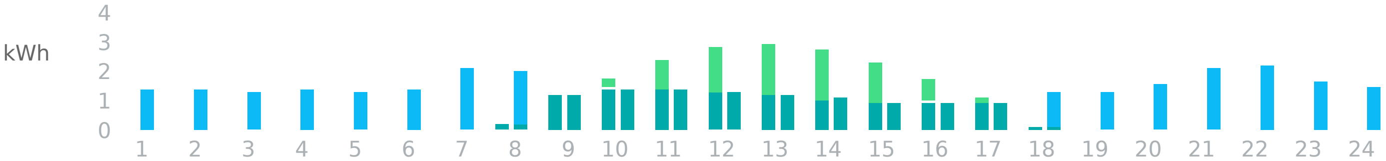
Anàlisi mensual



Anàlisi horari d'un dia d'estiu



Anàlisi horari d'un dia d'hivern



Excedents · Autoconsum · Energia de xarxa

Energia total generada

Total generada
11.085 kWh/any

Autoconsumida	Abocada a xarxa
4.471 kWh/any	**6.613** kWh/any

Consum total elèctric

Total consum
12.000 kWh/any

Autoproduït	Comprat a xarxa
4.471 kWh/any	**7.528** kWh/any

Amb aquesta instal·lació **estarà cobert el 37% del meu consum** elèctric

Balanç econòmic

Inversió total

11.517 €*

1,18 €/Wp

Finança-ho a 10 anys: 127,69€ al mes**

Estalvi anual previst (mitjana 25 anys)

1.294 €*

Autoconsum 906 €

Excedents 388 €

Estalvi acumulat 25 anys

32.346 €*

*Els imports inclouen l'IVA del 21%
**Subjecte a aprovació bancària. També es pot finançar a terminis més curts, consulta'ns.

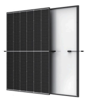
Inclou

- Subministrament i muntatge de la instal·lació fotovoltaica proposada.
- Control de qualitat i posada en servei.
- Gestió dels tràmits administratius.
- Inclou Mitjans d'elevació per fer baixant de cablejat
- Inclou muntatge IGM i Sobretensions a instal·lació d'enllç

No inclou

- Altres impostos, taxes i/o tributs.
- Autotransformador, necessari en habitatges amb tensions trifàsiques a 220V.
- Inspeccions inicials i/o periòdiques per organismes certificats en casos de >25 kWn

Materials



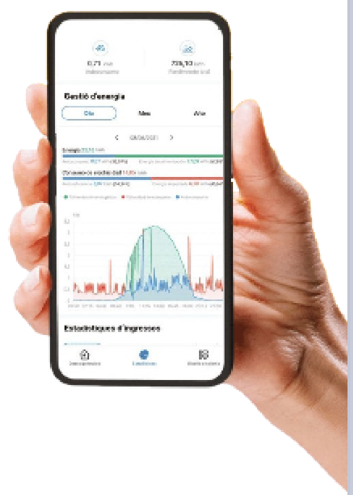
22 panells

Panell Trina de 445Wp de potència, amb 25 anys de garantia de producte i 30 anys de garantía de producció.

1 inversor

Inversor híbrid trifàsic de la marca Huawei, líder en electrònica, amb 10 anys de garantia i 10 kW de potència. L'inversor ens permet passar de corrent contínua que produeix la placa a corrent alterna per utilitzar a casa teva.

Pròxims passos després d'acceptar el pressupost



- Un tècnic vindrà a casa per veure de primera mà la ubicació final dels panells i l'inversor.
- Començarem les gestions administratives i de proveïment per començar l'obra.
- Finalment quadrarem dia i hora per fer la instal·lació i posar-la en marxa, així podràs gaudir dels avantatges de produir la teva pròpia energia.
- Oferta supeditada a que les característiques i l'estat de conservació de la coberta permetin fer la instal·lació proposada sense posar en risc la mateixa instal·lació ni la seguretat dels treballadors. Sud Energies Renovables no es fa responsable de les actuacions que siguin necessàries per condicionar la coberta, com per exemple un reforç estructural o reparació de la mateixa.
- Validesa de l'oferta: 15 dies.
- Mètode de pagament: 50% a la signatura del contracte i 50% a la posada en marxa.
- Molts municipis bonifiquen l'IBI a qui inverteix en autoconsum fotovoltaic – consulta-ho i et facilitarem els documents tècnics que et demanin.

SUD
Renovables
POWERED BY SOLTECH

SUD Energies Renovables SL
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Annex 7

Sun4All Sustainable Implementation Plan for the Municipality of Braga

Sun4All Sustainable Implementation Plan

Braga Municipality (Município de Braga)

July 2024

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
Work Package	**WP2** "Business Model. From "Solar for all" programme to Eurosola to all (Sun4ALL) designing the scheme in an European context" **WP5** "Sustaining Transferability and Upscaling"
Dissemination Level	Public
Author(s)	João Lopes e Luís Cachinho, Coopérnico
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Contributor(s)	-
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Status	Final
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Annex 1 – Flyers made for Braga’s Climate Week 2023

Annex 2 – Flyer promoting the OSS

Executive summary

Executive summary – textual element
This implementation plan focuses on creating policies that attempt to lessen energy poverty in Braga, considering the conclusions and experiences learned from the 2023 Braga Climate Week. Some of the work was carried out by BragaHabit - Braga Municipal Housing Company, and the municipality itself (through several energy efficiency promotion programs). During the SUN4ALL program, Coopérnico and the municipality of Braga collaborated with many stakeholders, including teachers, social home neighborhood associations, and technicians, to establish a number of workshops to raise awareness about energy poverty and energy communities. With that knowledge transferred, Braga municipality aimed to open a local "Balcão Único de Energia, BUE" - Braga's One Stop Shop (OSS), to provide information, and assistance to citizens who wish to improve house thermal comfort and reduce electricity costs. This pilot OSS will operate for 30 hours each month, with a team of three technicians. The project will also be replicated in other 12 public spaces in several parishes. Finally, Braga is willing to implement an energy community including some public buildings and social housing.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
ADENE	Agência para a Energia (National Energy Agency)
ACC	CSC (Collective Self-Consumption)
AdEPorto	Agência de Energia do Porto (Energy Agency of Oporto)
BragaHabit	Empresa Municipal de Habitação de Braga (Braga Municipal Housing Company)
BUE	Balcão Único de Energia (Braga's One Stop Shop)
CER	REC (Renewable Energy Comunity)
DECO	National Association for Consumer Defense
EAPN	European Anti-Poverty Network
ERSE	Entidade Reguladora dos Serviços Energéticos (Energy Services Regulatory Authority)
ETICS	External Thermal Insulation Composite System
FAQ	Frequently Asked Questions
OSS	One Stop Shop
GDPR	General Data Protection Regulation

1. Introduction

Introduction – textual element
Energy poverty has been debated at national and global levels and it´s a high object of study by researchers. According to Eurostat, in 2023, Portugal was the 2nd country in Europe with the highest proportion of the population (20.8%) in households unable to keep the house adequately warm. Given that energy literacy is one of the main obstacles to eradicating energy poverty, as well as people not having access to resources to structurally end its causes, the focus of the Implementation Plan will be to capacitate the municipality and prepare the development of a decentralized energy poverty alleviation support office (one-stop shop), which was brainstormed during training for technicians done in 2023. The Braga municipality addressed those barriers by promoting sessions with several stakeholders, that were involved directly and indirectly in energy poverty at a local level. The target groups were the municipality technicians/public enterprises, neighbouring associations, and teachers. In the sessions, the main goals were to provide information and insights regarding energy poverty, how energy is consumed and produced, how it is related to climate change and social challenges, and the several solutions to mitigate energy poverty in which energy communities are included.

During the last week of September 2023, within Braga's Climate Week, Braga municipality organized the following sessions with Coopérnico's collaboration:

- 1 Session for energy poverty mitigation for municipality technicians.
- 1 Session for energy communities for municipality technicians.
- 2 Sessions for energy poverty mitigation at local neighbouring associations.
- 2 Sessions for teachers regarding climate change, how energy is produced, and what measures can be adopted to mitigate energy poverty.

Adding to these sessions, visits were conducted to some houses identified by Braga's public enterprise, BragaHabit. The aim was to evaluate house conditions and provide the householders with information on how to save energy.

(**Annex 1** - Flyers made for Braga's Climate Week 2023).

After Climate Week, Braga municipality was part of the ADENE (National Energy Agency) program "Rota de Energia", which mainly focused on raising public school awareness about climate change, energy, renewable energy, energy cycles, and sustainable mobility. These sessions were held in 6 eco-schools, for 646 students, in April 2024.

To continue the capacity building for all citizens within Braga's municipality, and to have a space where anyone can get information about energy poverty mitigation, energy invoices, house renovations, and public subsidies, the "Balcão Único de Energia - BUE" - OSS, will be developed at Braga's municipality main building.

It will be open to the public in the morning/afternoon, once per week and there will be 3 technicians attending. The promotional flyer is being developed with the collaboration of ADENE, DECO, and AdEPorto. This model will be tested and replicated in other parishes within Braga's municipality.

Another solution that Braga's municipality is conceiving to address energy poverty is to procure/install photovoltaic panels for collective self-consumption at some of the municipalities' buildings.

The next stage would be to involve the surrounding social housing buildings so they could lower their bills by consuming the surplus energy produced. To gather these entities, an energy community will be created.

2. Work Process

Work Process – combination of textual and visual elements

1. Coopérnico has been in Braga to develop training and awareness-raising sessions during "Braga Climate's Week 2023":

- Training municipal technicians on energy poverty.

- Training municipal technicians on collective self-consumption and energy communities, including how to use it to combat energy poverty.
- Awareness raising to inhabitants of neighbourhoods where BragaHabit owns houses (namely Bairro das Andorinhas, Praça da Sena de Freitas).
- Home visits to dozens of BragaHabit houses to offer energy boxes and share practical advice and tips.
- Training teachers, to disseminate knowledge in the classroom. Also by teaching them how to play a card game about energy with the students, cards were given to be used in schools.

2. Braga municipality will pilot the introduction of energy poverty mitigation services in the 'Balcão Único Energia', which already exists in the town hall of the city, defining what kind of services will be provided (examples: helping citizens with bills, applying to national funding programs and municipal funding programs, etc). Promotional material was already developed with the collaboration of ADENE, DECO, and AdEPorto, including the OSS flyer. There will be 3 technicians being part of the OSS team, with the support of 2 technicians of the Energy Department of Braga Municipality. To carry out the planned activities for the OSS, the team will be trained in 2 distinctive moments:
   - A day of training promoted by an energy agency partner (AdEPorto)
   - The rest of the technicians involved (Braga municipality, BragaHabit) will receive training in 2024's Braga's Climate Week, with ADENE. The team will dedicate 30 hours per month to the OSS.

Deliverable: Flyer promoting the OSS. Find the **Annex 2**, with communication materials.

3. In a second phase, Braga municipality will expand this service to other one-stop shops (Lojas do Cidadão) that already exist in some parishes of the city. To operationalize the 12 local OSS, the technicians will receive training during the 2024 Braga's Climate Week. There will be 1 technician for each OSS, working 5 hours per month (link: https://www.cm-braga.pt/pt/0101/municipio/camara-municipal/apoio-ao-cidadao/atendimento-presencial-espacos-cidadao)

List of Parishes that will have an OSS:

- Tadim
- Sequeira
- Adaúfe
- Real, Dume e Semelhe
- Sobreposta
- Figueiredo

- São Vicente
- Gualtar
- Palmeira
- Tenões e Nogueiró
- Arentim e Cunha
- Celeirós, Aveleda e Vimieiro
- Padim da Graça

3. Current State of Energy Poverty Action

Current State of Energy Poverty Action – combination of textual and visual elements

According to data from 2022, almost 1.7 million people in Portugal struggled to keep their houses warm during the winter. Additionally, statistics reveal that over one-third of the population—the second worst in the EU—lives in homes that are not kept at a reasonable temperature during the summer. Furthermore, 70% of houses are classified as energy inefficient.

The municipality of Braga carried out research, within the scope of a curricular internship in the field of Sociology, to understand and diagnose energy poverty in vulnerable families living in two social neighbourhoods in the city of Braga. According to the study (2022), out of the 27 interviewees, 70.37% responded that they had been colder that winter, and had paid a higher price for energy, 81.48% answered that they have health problems associated with the extreme heat/cold to which they are exposed, and 83.33% reveal that they were unable to pay the energy bill, due to the high cost of it.

The municipality of Braga has developed initiatives, programs, and incentives to encourage residents to use less energy and make their houses more comfortable. So, a program was developed in which Braga residents can receive half of the costs spent on LED lightbulbs. Homeowners can spend up to 50 euros on brand-new LED lightbulbs and receive a 50% refund when they return the old ones. (https://www.cm-braga.pt/pt/0201/comunicacao/noticias/item/item-117494?q=l%C3%A2mpadas+LED).

Also, Braga's municipality developed a local plan for energy poverty mitigation, in which BragaHabit helped 197 families that are private homeowners. One of the measures was to offer vouchers so they could afford energy efficiency measures, like:

- replacing inefficient windows for Class A ones
- make roof, wall, and facade insulation
- improve heating and cooling equipment

Current State of Energy Poverty Action – combination of textual and visual elements
– install photovoltaic systems for self-consumption. In this program, 419 people demonstrated interest, and after visits from BragaHabit, 206 applied. Finally, BragaHabit provided 197 vouchers for renovations. The total amount finance was around 482.000 euros (https://www.cm-braga.pt/pt/0201/comunicacao/noticias/item/item-1-17235?q=pobreza+energ%C3%A9tica) Additionally, Braga municipality will renovate other apartments and social housing, as BragaHabit requested funding from the Recovery and Resilience Funds to pay for these improvements. The scheme will renovate about 285 fractions/houses until December 2026. The following modifications will be done: ETICS application in the facades; roof replacement with metal plates with insulation; window replacement (window frames and glassing) and water piping replacement.

4. Stakeholder Mapping and Coordination

Stakeholder Mapping and Coordination – combination of textual and visual elements
Main stakeholders: Municipality (Divisão de Coesão Social e Solidariedade - Social Cohesion and Solidarity Department), BragaHabit, (Braga's municipal enterprise that is dedicated to social support in three main areas: housing, social care, and inclusion), local civil parishes, ADENE, AdEPorto, condominiums, eco-schools, neighbourhood associations, Coopérnico, AGENEAL, possible funders (e.g.: Crédito Agricola, Coopérnico, Goparity, etc.), local photovoltaic installers. DECO, Núcleo Distrital de Braga da EAPN Portugal/Rede Europeia Anti-Pobreza and Associação Zero (NGO). The public entities are working together, coordinating the renovation activities and raising awareness to mitigate energy poverty in Braga. Also, Braga's municipality coordinates social care within the local parishes, so naturally the OSS will carry out the lessons learned in the first place. Local energy agencies like AdEPorto are assisting the municipality and public enterprises on the field, providing capacity training and assistance on pilot projects. ADENE and DECO are also involved since Braga is included in a program that enables raising awareness in schools. Municipalities and state-run businesses are receiving support from regional energy organizations such as AdEPorto in the form of capacity building and help with pilot projects. DECO and ADENE are also involved because Braga is part of a program that makes awareness-raising possible in schools. Also "Portal da Construção Sustentável", a company that gives training regarding sustainable building construction, will provide 3 hours of capacity building during

Stakeholder Mapping and Coordination – combination of textual and visual elements
2024's Climate Energy Week. There will be conducted internal and public sessions.

5. Defining Criteria and Conditions for Participation

Defining Criteria and Conditions for Participation – combination of textual and visual elements
The support will be given to any citizens who wish to be in contact with the BUE. The beneficiary can schedule the counselling or appear spontaneously on the BUE. The main questions will be answered by the BUE technicians. Detailed questions will be analysed and answered by technicians of Electrical, Public Lighting and Energy departments. For any detailed services (renovations, photovoltaic equipment, or other), the criteria for participation, will be mainly regarding the social situation of the citizens, i.e., if they have social tariff, social integration income, and if they are included in the social services list. However, the eligibility criteria for this support will be different from BragaHabit.

6. Planning Citizen Recruitment and Engagement

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
In the context of 2023 Braga's Climate Week, events to citizens were communicated with posters and word of mouth, and technicians were recruited through e-mail. Sessions for teachers were done at two different moments of the day to be able to engage more of them. For the visits, BragaHabit contacted tenants available for a visit. In addition, a flyer with energy efficiency and thermal comfort was created and distributed. Schools will be involved in the upcoming Braga Climate Week (2024) (via the teachers who attended the similar event in 2023), as well as some members of the Braga Logistics Association and small businesses. Regarding the citizens, online sessions will be accessible for them to engage in through an online application.

7. Community Building and Energy Awareness

Community Building and Energy Awareness – combination of textual and visual elements
Coopérnico raised awareness regarding some energy-related topics, such as: • The best tariff simulator available online (ERSE Simulator) • The regulated gas market (which is less expensive than unregulated offers) • Social Tariff (economically vulnerable consumers are entitled to the social tariff discount on electricity and natural gas supplies) • Practical tips for the energy efficiency of a home • How to make the best use of the equipment • What is the best equipment • Tips on the best behaviours to save money and be more comfortable The flyer/brochure that will be available when the Braga municipality opens its BUE will include important details about every organization that has agreed to cooperate on this project. Additionally, the brochure will include links to the BUEs' dissemination activities. The public market can be used for multiple capacity-building or information-sharing sessions, and the BUE will encourage parishes in the area to host these events (probably 1-2 times a year while the program is still in its pilot phase).

8. Technical Adoption Planning

Technical Adoption Planning – combination of textual and visual elements
Braga’s BUE will have the following services: • Information and counselling on energy consumption habits • Help the citizens reduce their contracted power or change to the best energy supplier (using ERSE simulator) • House visits – this will have the support of the energy department of Braga municipality and also a technician of BragaHabit • Support eligible citizens in their application for the “Vale Eficiência" (Efficiency Voucher – this governmental program will allocate 100,000 "efficiency vouchers", with an average value of €1,300/Voucher, to economically vulnerable families in energy poverty as a direct support mechanism that can be used in building rehabilitation and renovation interventions, specialized technical support, and the adoption and/or replacement of energy-efficient systems and equipment)

Technical Adoption Planning – combination of textual and visual elements
• A presentation of the nearby solar installers and contractors, allowing the beneficiaries to get in contact and ask for quotes The municipality of Braga will create an online survey to gather input and make ongoing service improvements. This will be accessible by scanning a QR code locally at the BUE/OSS. In the future, a FAQ will be made available, along with a report that includes some quantitative and qualitative indicators (such as information about the number of people assisted, visits, and overall beneficiary satisfaction). The survey will also be available on paper so that people can complete it at the BUE. This model will then be replicated in other 12 BUEs in the 12 parishes in Braga´s metropolitan area. This will be implemented in already established places for public services. The service will occur through scheduled meetings.

9. Legal Adoption Planning

Legal Adoption Planning – combination of textual and visual elements
Braga’s municipality will ask for individual data of the beneficiaries who wish to have house audits or help them apply for public funds. The data needed will be gathered within RGPD procedures and always with the beneficiaries' consent. This implementation plan complements Braga's plan to mitigate energy poverty, which complements the city's goal to mitigate climate change. Furthermore, this approach is considerably more in line with the Long-Term National Strategy to Combat Energy Poverty approach, which establishes the goal of implementing 50 OSS at a national level, in 2025.

10. Financial Scheme Adoption Planning

Financial Adoption Planning – combination of textual and visual elements
Braga's BUE will be implemented with all human resources paid for by the municipality itself. Three technicians are expected to be mobilized, with assistance from two each from the departments of energy, public lighting, and electromechanics. They will commit a total of thirty hours a month. For the funding of the energy community, the municipality will issue in 2024 a public tender for the procurement, and installation of the photovoltaic systems at the pilot project. These will be first funded by third party entities, but the goal is to create a sustainable business model that also enables the entrance of social housing buildings.

11. Replication and Scalability Potential

Aside from the initiatives mentioned in the previous topics, Braga municipality will continue raising awareness for energy poverty in schools and social neighbourhoods, using the tools that either Coopérnico or ADENE provided (slides, tools, practical activities).

The main challenges to replicate these measures are:

- communicate effectively so it can reach everyone in the community (the elder people, social housing, and the people who are not willing to be involved in the first phase)
- how to reach the most vulnerable families
- how to create a trusting relationship

12. References

- "Energia Comunitária: Um guia prático para recuperar o poder" de Friends of the Earth Europe, REScoop e Energy Cities. Outubro de 2020: https://www.rescoop.eu/toolbox/community-energy-a-practical-guide-to-reclaiming-power
- Biblioteca Online POWERPOOR: http://powerpoor.eu/library
- Climate KIC. Climate Innovation tools: https://transitionshub.climate-kic.org/
- COMPILE COOLKit - um guia para a criação de comunidades de energia: https://www.compile-project.eu/products/coolkit/
- DL 15/2022: https://diariodarepublica.pt/dr/detalhe/decreto-lei/15-2022-177634016
- EPOV. 2019. Designing effective energy poverty policies in municipalities. https://www.energypoverty.eu/sites/default/files/downloads/publications/18-07/guidance_-_energy_poverty_policies_in_cities.pdf
- EU Covenant of Mayors. https://www.eumayors.eu/support/energy-poverty.html
- Eurostat (2023). Inability to keep home adequately warm - EU-SILC survey. Eurostat Database: https://ec.europa.eu/eurostat/databrowser/view/ilc_mdes01/default/table?lang=en
- Guia Prático para Comunidade de Energia (traduzido para PT): https://bit.ly/guiaCER

- Long-Term National Strategy to Combat Energy Poverty 2021-2050: https://participa.pt/contents/consultationdocument/Estrate%CC%81gia%20Nacional%20de%20Longo%20Prazo%20para%20o%20Combate%20a%CC%80%20Pobreza%20Energe%CC%81tica_VConsultaPu%CC%81b_2852.pdf
- Manual LIGAR: https://ligar.adene.pt/passar-a-accao/
- Menu Renovação Verde: https://www.menurenovacaoverde.pt/
- Observatório da Energia: https://www.observatoriodaenergia.pt/pt/
- Observatório da Pobreza Energética: https://www.energypoverty.eu
- Portal Poupa Energia: https://poupaenergia.pt/
- POWERPOOR Biblioteca Online: http://powerpoor.eu/library
- Projeto STEP: https://www.stepenergy.eu
- Regulamento 373/2021: https://dre.pt/dre/detalhe/regulamento/373-2021-162753427
- Relatório do EPAH Indicadores Nacionais de Pobreza Energética: https://energy-poverty.ec.europa.eu/observing-energy-poverty/national-indicators_en
- STEP IN project Interim Report – Urban Labs: https://www.step-in-project.eu/wp-content/uploads/D2.2_Urban-LL-Interim-Report_final.pdf
- UMA NOVA FORMA DE COMBATER A POBREZA ENERGÉTICA: APRENDIZAGENS DA 'ONE-STOP SHOP' DO PONTO DE TRANSIÇÃO: https://cdn.gulbenkian.pt/wp-content/uploads/2024/06/FCG-Ponto-de-Transicao-%E2%80%94-Relatorio-de-Impacto-PT-Digital.pdf

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Annex 8

Sun4All Sustainable Implementation Plan for the Unité des Communes valdôtaines Grand-Paradis

Sun4All Sustainable Implementation Plan

UNITE' DES COMMUNES VALDÔTAINES GRAND-PARADIS

May 2024

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
Work Package	**WP2** "Business Model. From "Solar for all" programme to Eurosola to all (Sun4ALL) designing the scheme in an European context" **WP5** "Sustaining Transferability and Upscaling"
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Executive summary

Executive summary
In a **mountain context**, such as the Unité des Communes Grand-Paradis one, **energy communities** are a useful tool to counter energy poverty and progressive depopulation. It is an **opportunity for families and businesses to cope with the extra costs of living and working in the "highlands"**. The declination of the instrument must here consider specific factors: high housing dispersion, fragility of the local entrepreneurial fabric. To begin with, the project conducted a comprehensive **analysis of the current state of energy poverty** by reviewing national and regional documents and collecting data from relevant institutions. This initial step was crucial in understanding the extent and specifics of energy poverty in the region. Next, we **identified and mapped key stakeholders** from various sectors, including institutions, the third sector, and civil society, focusing on themes of energy, poverty, and inclusion. This stakeholder mapping ensured that all relevant parties were involved and that their perspectives were considered in the project's development. Defining **eligibility criteria** for participation in the project was another important step. By analyzing existing tools and engaging in dialogue with stakeholders, we were able to establish clear parameters and criteria to identify those most in need. This process was conducted in compliance with GDPR, ensuring that all data were handled collectively without identifying individual households. Local operators played a key role in reaching out to the target audience. Engaging and recruiting citizens was facilitated through the **identification of key actors** such as local social workers, associations, and communes. These intermediaries were essential in disseminating information and ensuring that it reached the intended targets. Additionally, we participated **in study visits and webinars, exchanging good practices with other regions** that share similar characteristics, such as Coeur de Savoie. This exchange of knowledge helped us learn from their experiences and apply best practices to our project. The project also placed a strong emphasis on **building community awareness** about energy issues and the benefits of participating in energy communities. **A Workshops and was organized to inform citizens** about energy management, available support measures, and the advantages of renewable energy. From a technical, legal, and financial perspective, **two detailed plans were developed to support the adoption of the Sun4All model locally**. These plans ensured compliance with relevant regulations, secured necessary funding, and established the required technical infrastructure. Importantly, the Sun4All project's approach was designed to be **replicable and scalable**, allowing other Unités and communes in the Region to adopt similar models to effectively contrast energy poverty. By creating a framework that can be transferred and expanded, the project aims to support a fair energy transition on a broader scale. In summary, the **Sun4All project is a comprehensive and innovative initiative aimed at reducing energy poverty in the Unité des Communes Grand-Paradis territory** through the elaboration of technical and financial schemes such as energy communities. By involving a wide range of stakeholders, defining clear eligibility criteria, engaging citizens, and sharing best practices, **the project seeks to build a sustainable and inclusive energy future for the region**.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
ANCI	National Association of Italian Communes
ARERA	Italian Regulatory Authority for Energy, Networks and Environment
CACER	Stand for Configurazioni di Autoconsumo per la Condivisione di Energia Rinnovabile -> Selfconsumption Configurations for Renewable Energy Sharing
COA Energia – Finaosta SpA	Centro Osservazione e Attività sull'Energia – Regional energy agency
CVA Group	CVA Group - Compagnia Valdostana delle Acque. Based in Aosta Valley is one of the most important Italian companies in the green energy sector, the only integrated producer operating exclusively on renewable sources: water, wind and sun.
CVd'A - Energy Communities for the Aosta Valley	Feasibility pre-study aimed at identifying the potential of "municipalities-centred" energy communities in the region.
GSE	National Energy Services Management Company
MASE	Ministry of the Environment and Energy Security
NRPP (PNRR)	National Recovery and Resilience Plan Piano Nazionale di Ripresa e Resilienza
OIPE	Italian Observatory on Energy Poverty
PA	Public Administration (Regions, Unités, Communes)
POD	Point-of-Delivery: the connection point within the perimeter of the primary substation operated by the Energy Community (REC), identified by a unique code corresponding to a specific location on the consumer's territory.
PV	Photovoltaic
RES	Renewable Energy Source
REC	Renewable Energy Community
SECAP	Sustainable Energy and Climate Action Plan - Covenant of Mayors for Climate and Energy - Europe
SME	Small Medium Enterprises
UCGP	Unité des Communes Valdôtaines Grand-Paradis

1. Introduction

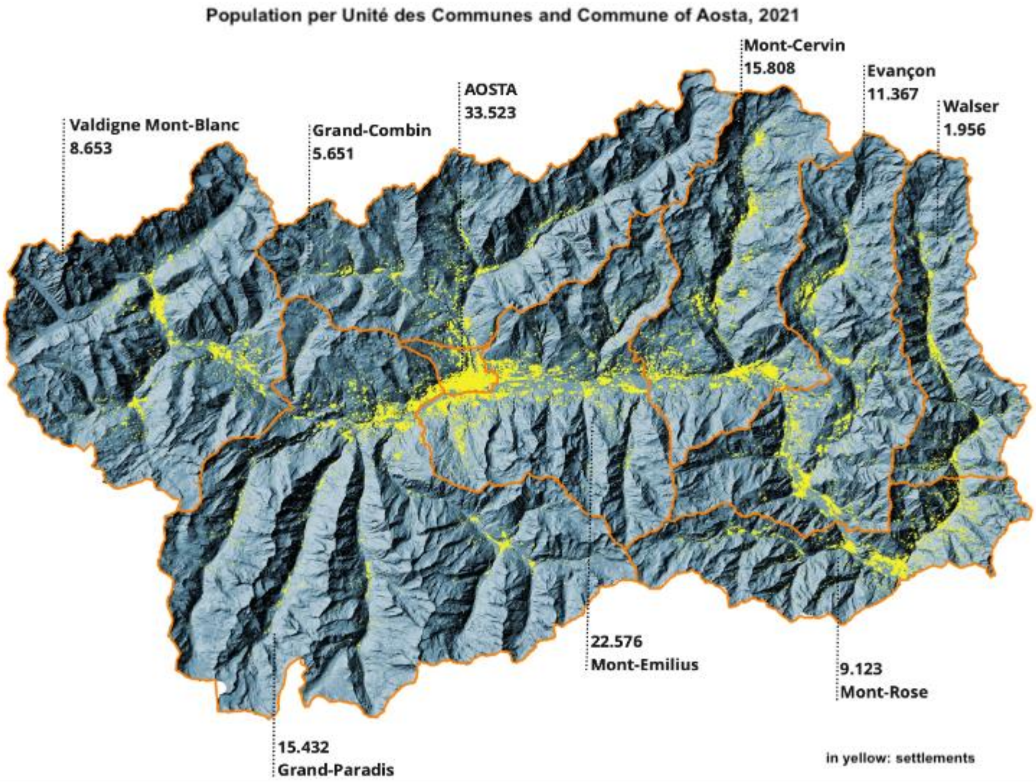
Territorial context

The Unité des Communes valdôtaines Grand-Paradis is a **small territorial entity within Aosta Valley**, the smallest of the Italian regions, on the border with France and Switzerland.

Before examining the characteristics of the Unité des Communes valdôtaines Grand-Paradis (hereinafter Unité Grand-Paradis), it could be valuable to quickly outline its broader regional territorial context.

Aosta Valley is entirely mountainous, with an average altitude of more than 2,100 meters above sea level. Orographically the Region is crossed by a central valley, traversed by the Dora Baltea, in which converge several tributary valleys. The total population is about 123,000 inhabitants, featuring the lowest population density (38 inhabitants per km^2) in Italy. **The altimetry and orography deeply influence the settlement pattern and the development of economic activities**; three zones are commonly identified to describe the different dynamics characterizing the territory: the central valley, the medium mountain and the high mountain. Approximately 75% of Aosta Valley population is gathered in the 28 communes located in the so-called central valley, which is crossed by the main communication arteries and where the majority of services and economic activities are centralized.

Figure 1: Regional population divided by Unité des Communes



The **regional capital** with an estimated population of approximately 34,000 inhabitants constitutes, together with its suburban communes, **the only site having urban characteristics**. A **mid-mountain zone surrounds the central valley**, defined residually as the area between the central valley and the high mountain, with a strong agricultural vocation, where altimetry and exposure conditions allow the cultivation of vineyards and orchards, above all. **The high mountain area i**ncludes communes whose main towns are located at an altitude of more than 1,200 meters above sea level (28% of the communes). In this area there two types of territories: the **high mountain tourist area**, where the main ski resorts and most of the accommodation facilities are concentrated, and the **high mountain non-tourist area with its main activity of livestock farming**, which benefits from large areas of meadows and pastures (permanent meadows and pastures represent 98% of the utilized agricultural area in Aosta Valley). The Region suffers from a **demographic decline and a marked ageing of the population**: since 2010, the natural balance has been negative, due to a constant widening gap between deaths and births, which in 2020 exceeded 1,000, also due to the effect of COVID.

Moving on to the **Unité Grand-Paradis**, its territory includes a total of **13 communes located in 4 side valleys** on the orographic right side of the region: Cogne Valley, Valsavarenche, Rhêmes Valley, Valgrisenche and in the central valley (Sarre, Saint-Pierre, Aymavilles, Villeneuve, Introd, Arvier, Avise and SaintNicolas).

Figure 2: Municipalities of the Unité des Communes Valdôtaines Grand-Paradis

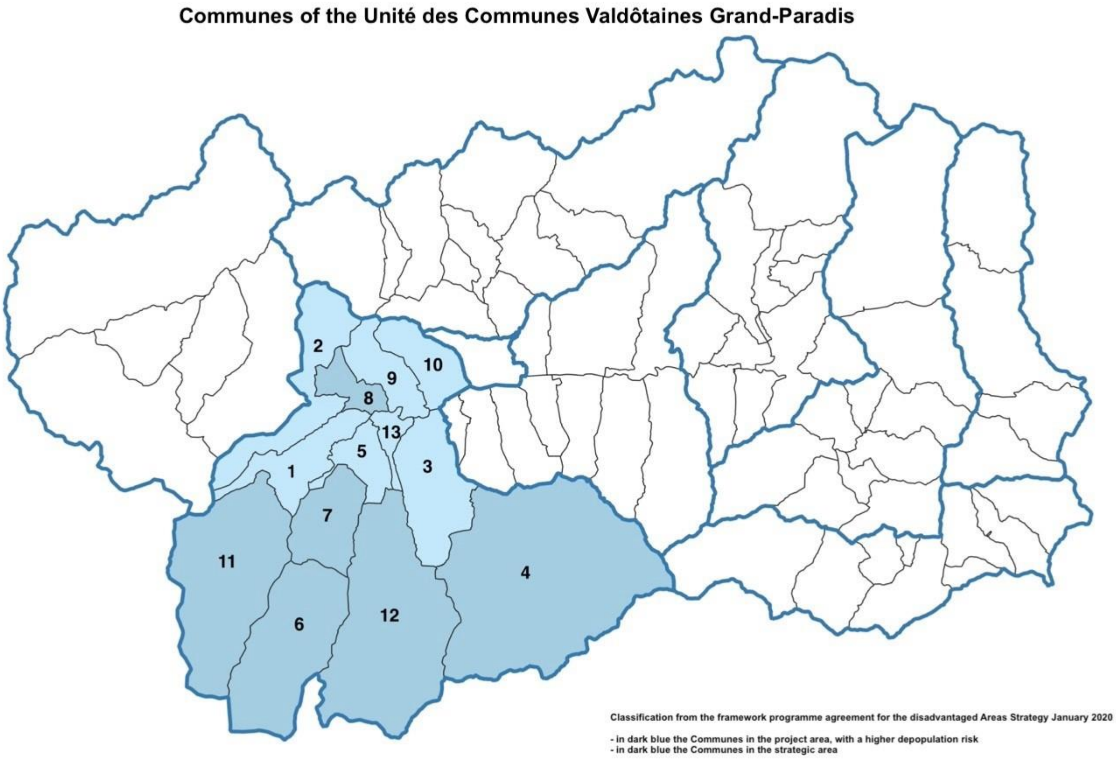


Table 1: Population of the Unité Grand Paradis, divided by commune - ISTAT 2022 data

		resident population out of the total of the Unité	males	females	total	Foreign population as of January 1st	aging index	population density per sq. km
1	Arvier	5%	415	418	833	49	175,7	24,58
2	Avise	2%	144	155	299	17	195,3	5,72
3	Aymavilles	14%	1036	1078	2114	141	176,1	39,4
4	Cogne	9%	653	662	1315	109	303,3	6,16
5	Introd	4%	331	311	642	15	149,5	32,34
6	Rhêmes-Notre-Dame	1%	44	37	81	6	833,3	0,91
7	Rhêmes-Saint-Georges	1%	87	80	167	0	287,5	4,49
8	Saint-Nicolas	2%	170	151	321	20	157,8	21,25
9	Saint-Pierre	21%	1607	1633	3240	263	147,5	124,54
10	Sarre	31%	2302	2453	4755	191	178,1	170,59
11	Valgrisenche	1%	111	81	192	7	325	1,68
12	Valsavarenche	1%	87	79	166	13	376,9	1,16
13	Villeneuve	8%	684	594	1278	113	180	144,13
	UNITE' GRAND-PARADIS	**100%**	**7671**	**7732**	**15403**	**944**	**181,1**	

Most of the population, services and enterprises of the central valley communes, especially those closest to the regional capital (Sarre, Saint-Pierre, Aymavilles, Villeneuve), is concentrated in the lower part of the area. As altitude and distance from the regional capital increase, **the depopulation phenomena** and ageing of the population **are exacerbated**. The more marginal communes of the side valleys have very low population density, well below the regional average, and high oldage indices. In this area, the agricultural vocation, primarily centered on bovine husbandry, is complemented by tourism development, particularly prominent in the Cogne valley. This partly accounts for the significant number of both residents and foreign population surveyed, many of whom are drawn to employment prospects in the tourism sector. Apart from the evident contrast between the central valley, which is more accessible and densely inhabited, and the side valleys, which are territorially marginal and face a high risk of depopulation, it is worth noting the widespread dispersal of the population across the entire territory. All 13 communes have numerous scattered residential settlements (hamlets), some of which are difficult to reach and have very few residents; an isolation that makes community dynamics increasingly difficult.

Contrast to depopulation

As pointed out by the stakeholders who have been interviewed, the issue of **energy poverty intersects with the structural weaknesses of mountain territories** (altitude, orographic characteristics of the territory, distance from the major communication networks, reduced connectivity), which entail **significant additional costs** for people, households and businesses, at the core of the abandonment, already observed in many more peripheral areas. In addition to the most significant household heating expenses, there is a notable impact from the maintenance costs for vehicles and fuel consumption. Residential dispersion, coupled with greater distances from essential services, and the closure of nearby businesses, lead to an increasing reliance not only on dwindling public transportation options, but also on private cars. These additional costs of living in mountainous areas widely contribute to the disadvantage of living and working at higher altitudes, and particularly affect younger generations.

In this scenario, the Unité Grand-Paradis has been involved since 2020 in the implementation of the Area Strategy "Man and Nature Allied for the Development of the Grand-Paradis Area", within the framework of the national policy for the country's **disadvantaged Areas**. Selected as the second regional pilot area (see figure 2), the Unité has developed **a coherent set of projects to counter depopulation**, focusing on strengthening essential services (education, healthcare, transportation) and promoting local development. The effort to fight the decline of the highlands serves a general interest that transcends the boundaries of local communities because preserving these territories means addressing environmental degradation (hydrogeological instability is often caused by the abandonment of traditional activities and the depopulation of mountain slopes) as well as the loss of the characteristic historical and cultural mountain heritage.

Focus on the green aspect

In the case of the Unité Grand-Paradis, efforts to fight against degradation and promote development are pursued through initiatives strongly marked by **environmental and social sustainability**. The strategy for disadvantaged areas, as implemented locally, includes support for typical agricultural production, tourist attractiveness and sustainable mobility (with a focus on projects such as OnDemand transportation and mobility; reorganization of school transport; In GrandParadis we travel green!)

Breaking the current vicious cycle of abandonment begins with the construction of a forward-looking vision focused on enhancing an exceptional natural territory, characterized by the presence of the **Gran Paradiso National Park**, through a "green" development model, capable of both preserving existing excellences and generating new ones. The key element driving this development scenario is precisely the Park, which, in addition to its role as a protected area preserving natural heritage, serves as a "symbol" for the disadvantaged area. In this vision, an important role is played by the restoration of the **sense of community**, a feeling that has waned with the social transformations of recent decades. The Unité Grand-Paradis strategy focuses on awareness of the value of the area's environmental and cultural heritage, consisting of environmental resources and networks of relationships that form communities (particularly in projects such as Multilingualism for a school of excellence; Digital education and exchanges for mountain schools; From natural design to the classroom garden, biophilia in mountain schools; Saint-Nicolas experiments with biophilic schooling; MixEté: three years for "A mountain to learn"; Healthcare: emergency stations in SaintPierre and Cogne to reduce emergency response time).

The green aspect is strongly pursued even at cross-border level though ALCOTRA projects, developed by the Unité in partnership with the territorial authorities of Savoie and Haute Savoie, within the framework of the INTERREG ITALY-FRANCE ALCOTRA Program. Environment, climate change mitigation and Green Community are the themes developed by the interventions financed by the NRPP in the territory.

Community approach

Defining what is meant by "community" is not a simple task. This notion stems from a **territorial** and geographical **dimension** that refers to a **social space** of action for civil society, the third sector, economic actors, and institutions. It is a space that, precisely because of its "proximity" to citizens, businesses, and associations, can be the privileged ground for defining and implementing mutual aid actions.

From the dialogue with stakeholders emerges the difficulty of hypothesizing community boundaries, especially in marginal areas where the social fabric is strongly weakened by depopulation and ageing. **Local government** levels, more than others, can articulate **creative and innovative visions "from the bottom up"**, precisely because they are the privileged meeting place between institutional action, in a vertical subsidiarity dimension, and private action, in a horizontal subsidiarity dimension. The inclusion of diverse economic, social, environmental and civil society components constitutes the true great potential of local politics, which, by virtue of its location, has greater possibilities to activate participation, or genuine shared action. A "commune" to be understood beyond institutional boundaries, as a space of relationships, participation, and creativity. While depopulation and isolation can complicate interconnections and aggregations, at the same time, elements typical of **mountain communities** can express significant added value: the dimension of proximity, care, attention to the individual; the effective leading action, demonstrating innovative subjects (public and/or private) in the territory; the thorough knowledge of the territory by local administrators; the ease of relationships between private actors in the territory and local governments; the rootedness and spread of associations and volunteer organizations, with the ability to understand needs.

2. Work Process

Nº	Action and sub action	Deliverables
1	**Energy poverty state of the art** The survey was conducted through the analysis of available documents (at both national and regional levels) and data collection from relevant institutions (mainly Social Bonus VdA)	Bibliography and data
2	**Stakeholder mapping** The mapping of key stakeholders considered various levels: institutions, the third sector, and civil society. Regarding the areas, the mapping was thematically divided into: energy; poverty and inclusion.	Stakeholder mapping
3	**Eligibility criteria definition** For the proposal of parameters and eligibility criteria, an analysis of existing tools was conducted, and quantitative and qualitative information was gathered about potential beneficiaries and expressed needs through dialogue with local stakeholders (particularly social workers).	Eligibility criteria
4	**General Data Protection Regulation procedures** In this preliminary phase, it was not necessary to acquire personal data. All data were processed cumulatively, without the possibility of identifying individuals or households. The target audience (people experiencing energy poverty) has always been reached through the mediation of local operators.	-

Nº	Action and sub action	Deliverables
5	**Citizen engagement and recruitment** Unité Grand-Paradis has identified key actors who mediated information to the final recipients, namely: local social workers, associations, and communes.	Territorial network
6	**Exchange of good practices with the pilot Communauté des Communes Coeur de Savoie.** Unité Grand-Paradis participated in the study visit to Montmélian in Coeur de Savoie, an area with similar characteristics (mountainous context, rurality, etc.) compared to the Unité. The opportunity was valuable for capitalizing on the experience of French partners and discussing with representatives from other territorial contexts involved in Sun4All. Another exchange opportunity occurred with the webinars on May 7th and May 27th which represented an important moment of comparison with experiences from other territories (primarily Roma Capitale).	- Study tour to Montmélian, 19th March 2024; - Webinar 7th May 2024 " RECs and the fight against energy poverty: capacity building and financial support schemes". - Webinar 27th May 2024 CER e Contrasto alla Povertà Energetica: Politiche Attive ed Esperienze di Rafforzamento della Cittadinanza”
7	**Training / education** The Workshop organized in the area (21/05/24) generated interest from many people. Besides the direct target audience (people experiencing energy poverty), it was an opportunity to raise awareness among communal administrators and local service providers. The Workshop program included: - Energy Tips: Understanding, Managing, Saving - Support measures for energy saving and efficiency Renewable Energy Communities: opportunities and benefits for citizens.	- Workshop on 21st May 2024 “Conscious energy management and energy poverty at the time of Renewable Energy Communities”; - Information material
8	**Replication tools** During the Stakeholders mapping and the establishment of territorial networks, some regional referents in energy policies (Energy Department and COA Energy) and social policies (Structures of the Department of Social Policies) were contacted. These networks will be beneficially activated for the continuation of the experience undertaken by the Unité, in order to replicate it in other territorial contexts of the region and establish more general policy frameworks.	Territorial network

3. Current State of Energy Poverty Action

National context

According to the definition adopted by the **National Energy and Climate Plan** (PNIEC, 2020), in Italy, energy poverty is defined *"as the difficulty in purchasing a minimum basket of energy goods and services or as the condition where access to energy services implies a diversion of resources (in terms of expenditure or income) higher than what is socially acceptable"*.

In line with the actions to combat energy poverty outlined in the PNIEC by 2030, the **National Observatory on Energy Poverty** was established by the Decree of the Minister of Ecological Transition on March 29, 2022, in order to monitor and assess the phenomenon of energy poverty in Italy and to assist public policymakers in identifying appropriate countermeasures.

Additionally, the **Italian Observatory on Energy Poverty (OIPE)**[1] operates in Italy, conducting research, providing information, and raising awareness on energy poverty at both national and international levels, in connection with the EU Energy Poverty Observatory (EPOV).

According to data compiled by OIPE **in 2022, there were over 2 million households in energy poverty, accounting for 7.7% of all families**, based on the official measure adopted with the 2017 National Energy Strategy.

As shown in figure 3 from 1997 to 2022, there has been a fluctuating trend in energy poverty, hovering around 8%. The 2020 Integrated National Energy and Climate Plan, currently under revision, aims to **reduce energy poverty by 2030 to a range between 7% and 8%** of all households.

[1] The Italian Observatory on Energy Poverty (OIPE) is a network of researchers and experts from universities, public and private entities, and institutions. The OIPE is hosted by the "Giorgio Levi Cases" Center for Studies in Energy Economics and Technology at the University of Padua. The Observatory is chaired by Prof. Paola Valbonesi (University of Padua), assisted by an executive committee, and its members include researchers, professors, and experts from various Italian and international institutions.

Energy poverty in Italy

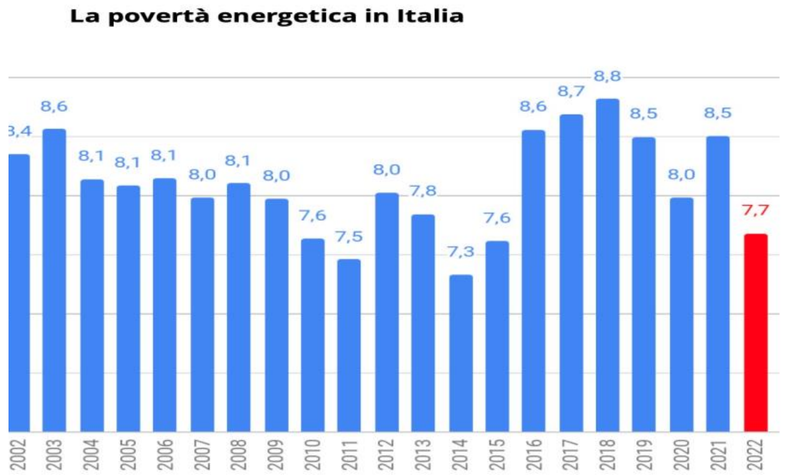


Figure 3: Trend of energy poverty in Italy 1997-2022.
Source: OIPE - Italian Observatory on Energy Poverty – Energy poverty in Italy in 2022

Regional context

At the regional level, as reported in the following chart (figure 4), in 2022 **Aosta Valley** stands just **above the national average** with an energy poverty index of 8.7%.

Energy poverty by region in 2022
(percentage values)

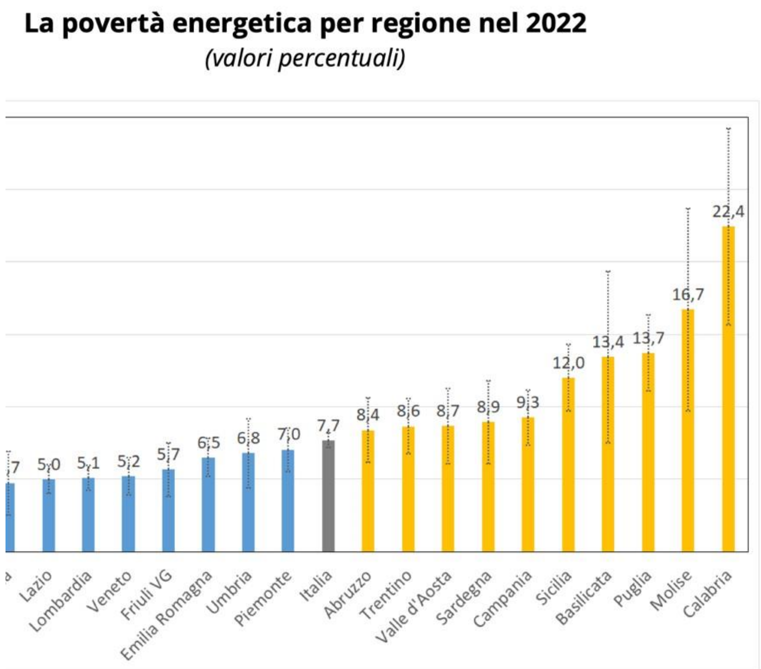


Figure 4: Energy poverty index in Italy in 2022, divided by region.
Source: OIPE - Italian Observatory on Energy Poverty – Energy poverty in Italy in 2022.

This data highlights how even in the northern regions of Italy, typically considered wealthier (in terms of income per capita GDP), **the phenomenon is certainly not to be underestimated**, especially considering the increasing marginalization characterizing some remote mountainous areas with high depopulation rates (disadvantaged areas).

In this context, **Aosta Valley Environmental Energy Plan** (PEAR VDA 2030) dedicates the action "P_11 – Energy Poverty – Monitoring and Combating Energy Poverty" to energy poverty, framed within Axis 4 – People, whose objective is to create a favorable environment for innovation and conscious change, involving and training people in the broadest sense of the term (public administrators and employees, citizens, professionals, business operators, young people, …)

In particular, through action P11, the **Aosta Valley Region intends to implement actions to combat energy poverty** by defining coordinated efforts aimed at:

- monitoring, based on the trend of prices and national indicators, the penetration of energy poverty in the regional territory;
- evaluating, based on the trend of energy poverty, the need for additional regional measures beyond what is already provided at the national level and the target audience for such measures;
- highlighting, in the regional regulatory instruments, the implications in terms of combating energy poverty;
- carrying out awareness-raising actions on the issue of energy poverty, particularly on the role of Energy Communities (RECs) on this subject.

As evident, what is indicated in the PEAR is fully consistent with the activities of the Sun4All project, whose experience could be framed within the regional context as a pilot model exportable to other similar territorial contexts (Unité des Communes, regional disadvantages areas, ...).

Households energy consumption

Thanks to the information provided in the PEAR, it's possible to outline the **energy consumption of families in Aosta Valley**. Specifically, in 2021, the most updated data available, albeit partly affected by the effects of anti-COVID-19 measures (lockdowns, remote working, and distance learning), the Aosta Valley families consumed approximately 49,470 ktoe of energy. Of this total, the predominant share (66%) was used for domestic purposes, while 34% was allocated to private transportation.

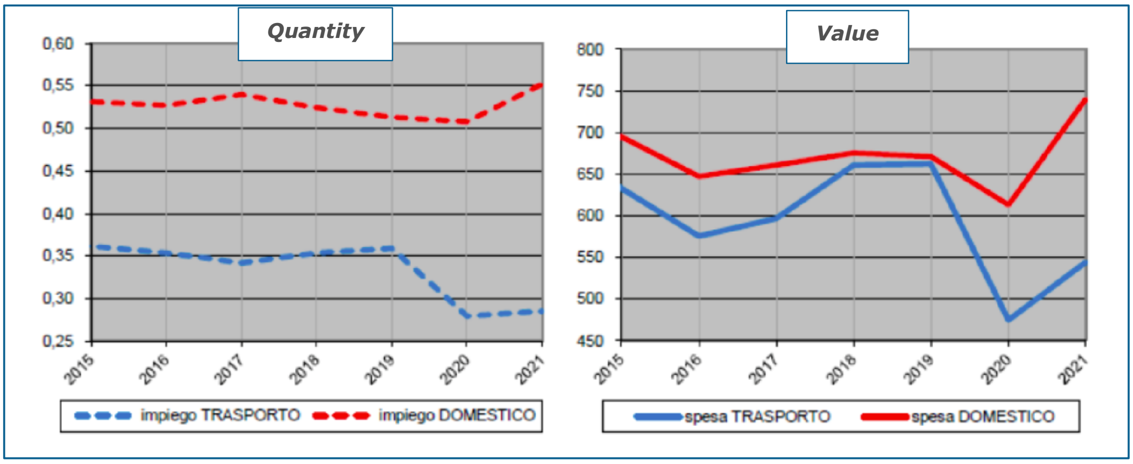


Figure 5: Households energy consumption trends, in quantity [toe per capita] and value [€ per capita], divided between domestic use and transport [2015-2021].
Source: PEAR VDA 2030 – 2030 REGIONAL ENVIRONMENTAL ENERGY PLAN FOR AOSTA VALLEY based on ISTAT data.

The households per capita energy consumption in physical terms has remained essentially constant until 2019 (around 0.88 toe per capita), decreasing to 0.79 toe in 2020 and rising to 0.84 toe in 2021. The same indicator in terms of energy expenditure, however, has been affected by the surge in consumer prices recorded in 2021, with a particularly significant impact on domestic use (in 2021, there was a 20.6% increase compared to 2020 and a 10.3% increase compared to 2019). This scenario results in an increase in household resources allocated to energy expenditure, which could exacerbate the phenomenon of energy poverty.

In reference to the 2021 data, the "average" household (4 members, climatic zone E, covering 15,000 km/year with a private vehicle) consumes approximately 1,400 cubic meters of natural gas and 2,700 kWh of electricity, in addition to 1,000 litres of fuel. The average expenditure, which in recent years was around €3,000, equivalent to 10% of an average income according to ISTAT, approached €3,308 in 2021. Roughly €107 of this amount was allocated to promoting sustainability, a slightly lower proportion compared to previous years.

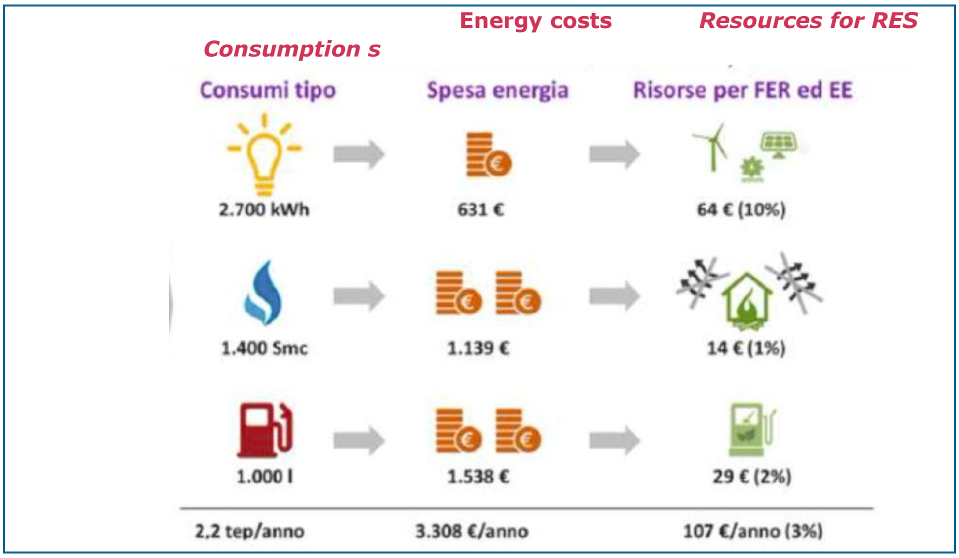


Figure 6: Consumption overview, energy expenditure, and contribution towards the sustainability promotion for a typical family in 2021.

Source: PEAR VDA 2030 – 2030 REGIONAL ENVIRONMENTAL ENERGY PLAN FOR AOSTA VALLEY based on ISTAT data- GSE on ARERA, ISTAT, and MISE data.

As evident from this analysis, in a typical Aosta Valley family, **electricity consumption** (for typical uses such as lighting, powering household appliances, and electronic devices) **accounts for approximately 21% of the total energy consumption** for the residential component alone, and about 12% when including transportation energy consumption.

With reference to the territory of the Unité Grand-Paradis, considering the altitude and the resulting position of a significant portion of the area in the colder climatic zone F, there is a higher incidence of thermal uses (heating) compared to the typical family, which impacts for 10% of the total energy consumption in the residential area.

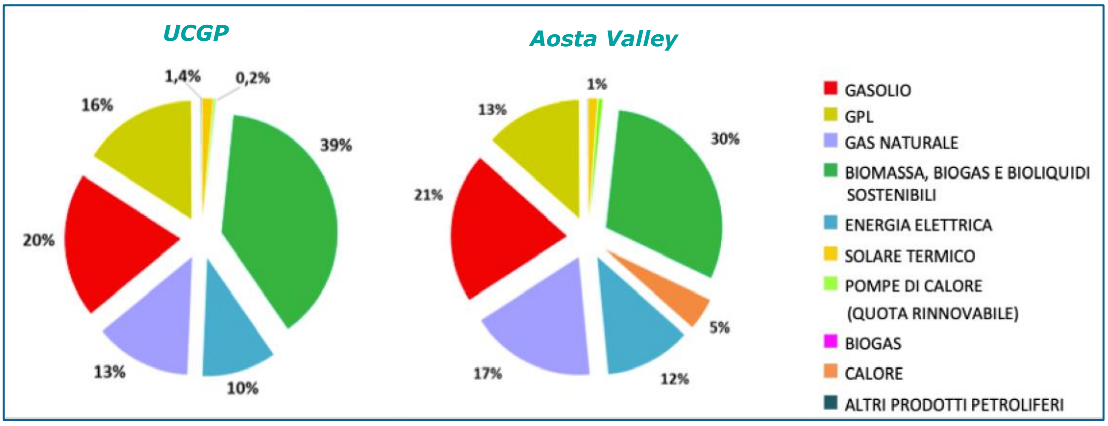


Figure 7: Percentage distribution of final net consumption – Residential area by energy carriers in 2019
Source: PEAR VDA 2030 – 2030 REGIONAL ENVIRONMENTAL ENERGY PLAN FOR AOSTA VALLEY - Regional Energy Balance Data

The analysis demonstrates how, despite the ongoing trend towards electrification in heating needs (heat pumps for heating and domestic hot water production, as well as electric mobility), the incidence of **fossil fuels** such as methane (13%), diesel (20%), and LPG (16%) **still remains significant in this context**. It's worth noting the significant contribution provided by woody biomass (39%), a renewable resource historically rooted in the usage of local households, but not devoid of issues such as its origin (often non-local) and negative effects on air quality.

On the other hand, the **electricity generated at the regional level comes from almost 100% renewable sources** (mainly hydroelectric), with a ratio between local consumption and production of 1 to 3, and a very broad potential for full renewable coverage electrification.

Finally, considering the "spread out" settlements distribution as well as the need to travel to the main attractive poles of the territory (the valley floor and the town of Aosta) for work, school, and general service access, this situation is further exacerbated by **transportation consumption**, which is still characterized by a low incidence of electric mobility and an inefficient public transportation service.

Albeit in constant evolution, this energy status quo must be duly considered when evaluating the most appropriate model actions to combat energy poverty and potentially develop Renewable Energy Communities (REC), which are typically oriented towards electricity both in terms of production and consumption.

National tools: energy bonus and national energy income fund

In Italy, the main measures to combat energy poverty are aimed at **reducing energy costs, improving energy efficiency, and promoting renewable energy sources**.

The first type includes **energy bonuses**: the electricity bonus for economic distress, the gas bonus, and the water bonus, provide a discount on bills with amounts that vary based on the number of household members and, for the gas bonus alone, also on the climatic zone and type of use. In 2024, access is restricted to households with an ISEE (Equivalent Economic Situation Indicator) value below 9,530 euros, raised to 20,000 euros for large families (with at least 4 dependent children). The bonus for physical hardship provides an additional discount on the electricity bill for individuals whose survival depends on life-saving medical equipment, regardless of income.

The following measures can enhance **energy efficiency and promote the installation of renewable energy systems in buildings**:

- Ecobonus: a tax deduction for energy upgrading of buildings, extended to families in energy poverty through the option of credit transfer for nontaxpayers (Budget Law 2017) and to public housing institutions (Budget Law 2018).
- Home bonus: a tax deduction for interventions that result in energy savings and/or the use of renewable energy sources (Art. 16-bis DPR 917/86), applicable to residential photovoltaic systems not covered by the Ecobonus.

- Thermal account: this measure promotes interventions to increase energy efficiency and produce thermal energy from renewable sources for smallsized systems. It provides a simplified process for interventions involving the installation of small-sized appliances (for generators up to 35 kW and for solar systems up to 50 m²) if the installed components with guaranteed characteristics are listed in the Catalog of Domestic Appliances, published and updated periodically by the GSE.

Recently, the new **National Energy Income Fund**, aimed at families in economic distress, has been introduced for the **installation of domestic photovoltaic systems** for self-consumption purposes:

- individuals belonging to households with an ISEE (Equivalent Economic Situation Indicator) lower than 15,000 euros or 30,000 euros for households with at least four dependent children are eligible for the financial help, as a capital grant
- the Fund has an initial financial endowment of 200 million euros, with the available resources divided into two equal shares for the years 2024 and 2025
- 80% of the available resources are allocated to the regions of southern Italy, while the remaining 20% are allocated to the other regions
- the implementing regulation of the fund was approved on May 27th (D.D. 242), and within 120 days, the GSE will open the first call for proposals

The aim of the Fund is to install at least 31,000 small-scale photovoltaic systems for as many economically disadvantaged households during the 2024-2025 biennium. The Fund aims to combat energy poverty by supporting energy selfconsumption and promoting the spread of renewable energies.

Regional tools: Social Bonus VDA

The measure of the **Social Bonus VDA** provided for by Article 2 of Regional Law of 23 September 2022, No. 21, consisted of a one-time and non-repayable grant in favor of households residing in Aosta Valley, with an Equivalent Economic Situation Indicator (ISEE) of less than 20,000 euros, valid at the time of application submission.

The planned percentage increases were based on:

- number of people in the household;
- ISEE brackets (three brackets: up to 5,999.99 euros, between 6,000.00 and 11,999.99 euros and between 12,000.00 and 20,000.00 euros)
- residence in a commune in E or F climate group (the classification is provided for by Presidential Decree no. 412 of 26 August 1993) - the eventual presence of severely disabled persons.

The application could have been submitted only by an adult member of the household residing in Aosta Valley or by a delegate, from 18 October 2022 until 15November 2022, exclusively through electronic means, by accessing the online platform specifically provided by the Region.

The subsidy was granted to all eligible applicants. The amount due to beneficiaries was determined at the end of the application deadline based on the number of applications received and communicated after November 15th, to the email address provided during the application submission.

A total of 8,342 applications were approved, amounting to a commitment of approximately 7,980,000 euros. The grant distributed to beneficiaries ranged from 639 to 1,500 euros depending on the requirements.

Regarding the distribution of applications, the income bracket criterion does not show significant peaks, with recipients fairly evenly distributed across different brackets. In terms of household size, the majority of applications come from households with only one person (30.2%) and with 4 people or more (20.8%).

Table 2: Social Bonus VDA number of total applications divided in brackets of 2,000 euros based on actual ISEE value.

ISEE amount bracket N.	applications	%	granted amount
from 0 to 2,000 euros	712	*8.54%*	672,288.97
from 2,001 to 4,000 euros	729	*8.74%*	743,545.17
from 4,001 to 6,000 euros	1,031	*12.36%*	1,067,170.57
from 6,001 to 8,000 euros	1,021	*12.24%*	980,893.75
from 8,001 to 10,000 euros	1,028	*12.32%*	982,771.77
from 10,001 to 12,000 euros	931	*11.16%*	892,388.95
from 12,001 to 14,000 euros	852	*10.21%*	769,141.21
from 14,001 to 16,000 euros	767	*9.19%*	709,175.18
from 16,001 to 18,000 euros	683	*8.19%*	618,195.73
from 18,001 to 20,000 euros	588	*7.05%*	544,782.23
Overall total	**8,342**	***100.00%***	**7,980,353.53**

Table 3: Social Bonus VDA divided by total applicants for household size.

members of the household	n. applications	percentage
one person	2,519	30.2%
two people	1,708	20.5%
three people	1,626	19.5%
four or more people	2,489	29.8%
Overall total	**8,342**	**100.0%**

With specific reference to the Unité Grand-Paradis territory, 917 applications were approved, 11% of the regional total, for a total of 906,000 euros distributed.

Table 4: Social Bonus VDA number of approved applications, amounts distributed in the Unité Grand-Paradis by commune.

Commune of residence	n. applications	granted amount	% applications / population
Arvier	51	55.110	6%
Avise	13	15.282	4%
Aymavilles	150	142.304	7%
Cogne	30	31.927	2%
Introd	32	34.264	5%
Rhêmes-Notre-Dame	2	1.588	2%
Rhêmes-Saint-Georges	5	5.081	3%
Saint-Nicolas	11	12.259	3%
Saint-Pierre	219	235.191	7%
Sarre	312	290.144	7%
Valgrisenche	8	8.016	4%
Valsavarenche	3	2.616	2%
Villeneuve	81	72.146	6%
UNITE' GRAND-PARADIS	**917**	**905.928**	**6%**

Table 5: Social Bonus VDA number of applications from Unité GrandParadis divided in brackets of 2,000 euros based on actual ISEE value.

ISEE amount bracket	n. applications	%	granted amount
from 0 to 2,000 euros	77	*8.40%*	74,416.85
from 2,001 to 4,000 euros	62	*6.76%*	62,962.31
from 4,001 to 6,000 euros	105	*11.45%*	115,270.79
from 6,001 to 8,000 euros	98	*10.69%*	94,385.68
from 8,001 to 10,000 euros	126	*13.74%*	128,045.21
from 10,001 to 12,000 euros	106	*11.56%*	105,568.05
from 12,001 to 14,000 euros	88	*9.60%*	83,869.22
from 14,001 to 16,000 euros	101	*11.01%*	95,145.55
from 16,001 to 18,000 euros	95	*10.36%*	90,074.86
from 18,001 to 20,000 euros	59	*6.43%*	56,189.76
Overall total	**917**	***100.00%***	**905,928.28**

Table 6: Social Bonus VDA applicants from Unité Grand-Paradis divided by household size.

members of the household	n. applications	percentage
one person	240	26,2%
two people	167	18,2%

three people	187	20,4%
four or more people	323	35,2%
Overall total	**917**	**100,0%**

With reference to severe disability, a total of 540 approved applications indicated the presence of a severely disabled person in their household, 59 of which were from the Unité Grand-Paradis territory.

Regional tools: social Emergency service

From the dialogue with local operators, the role played at the regional level by the Social Emergency Service has emerged. This is a tool activated through a memorandum of understanding between the Fondazione Comunitaria della Valle d'Aosta and the Caritas Diocesana of Aosta, supported by public and private resources, for **addressing urgent needs of primary necessity**. Based on the protocol, Caritas began to provide subsidies (up to 500 euro) to individuals and households, residing and/or domiciled in the region, who are in a situation of need characterized by temporary and contingent economic difficulties preventing them from satisfying their primary needs. The situations of need have been assessed in close cooperation with local services and social workers.

Within the framework of the social Emergency service, energy-related expenses (**bills)** constitute a significant portion of the expressed needs, along with requests for coverage of heating-related expenses such as **purchasing pellets**, **firewood, and diesel**. Over the 18 months from November 2021 to May 2023, a total of 280 payments were made to individual users and households in need, of which **31% specifically covering energy and heating needs**. It represents the main expressed need, together with requests for support in paying rent, surpassing requests for healthcare expenses and for groceries and essential items. Regarding the users of the social Emergency service, operators note a significant proportion of **foreign citizens** among the total number of applicants. This proportion is also confirmed by operators in the Unité Grand-Paradis working in the communes at the bottom of the valley such as Sarre, Saint-Pierre, Aymavilles and Villeneuve.

4. Stakeholder Mapping and Coordination

Category	Role
Public bodies **13 Communes of the Unité GrandParadis**	Direct involvement in the definition and implementation of initiatives and projects to fight energy poverty: - providing public buildings/surfaces for the installation of photovoltaic systems; - communication, engagement, and awareness-raising of beneficiaries; - potential managers of specific measures to fight energy poverty; - potential funding/co-funding.
Public bodies **Regional agencies and structures competent for energy**	They define and implement regional energy policies by: - planning and programming in the energy sector; - managing financial incentives; - granting authorisations; - promoting research, development, production, and installation of energy technologies and products (data, studies, insights); - promoting education, training, and information on energy development and sustainability.
Public bodies **Regional structures competent for social politics**	They define and implement regional policies to fight poverty, playing a fundamental role in identifying and involving users in situations of vulnerability by: - managing social services support, ensuring information and counseling for social services access and providing support and monitoring for cases; - promoting social networks in the territory and local services; - coordinating social workers; - assigning housing and granting support subsidies for renting in the private market.
Public bodies **Local educational institutions**	Chosen speakers for raising awareness and informing children/teenagers and their families.
Public bodies **Local public bodies, their unions, and consortia**	Entities potentially interested in replicating the experience and capitalizing on the results.
Third sector **Consumer associations**	Entities responsible for providing information, advice, and support to consumers: - information about energy contracts and providers; - information about support actions; - debt recovery assistance in case of arrears in bill payments.

Category	Role
Third sector **Foundations, associations, and volunteer organizations**	Third-sector organizations ensuring the support of individuals in situation of vulnerability, mobilizing financial resources and volunteers to: - address the primary needs of the beneficiaries; - organize services in the territory (e.g., transportation service, animation, and loneliness prevention).
Category	**Role**
Independents **Electricity producers and suppliers**	Companies producing, distributing, and supplying electricity within the region. Cooperatives producing, distributing, and selling electricity. Renewable Energy Communities (REC) established or in the process of being established.
Independents **Professionals in the field and suppliers/installers of renewable energy production systems**	Professionals, planning and commissioning firms, in the construction and engineering field, installers of integrated systems for energy efficiency and renewable energy production.

5. Defining Criteria and Conditions for Participation

For the definition of eligibility criteria and the assistance parameters, two macrocategories have been identified, as reported in the tables below.

1. Consolidated criteria at national and regional levels, to be recalled in order to ensure consistency and continuity in policies and tools to fight energy poverty.

Criteria	Declination / implications
ISEE - Equivalent Economic Situation Indicator.	It is the indicator, introduced in 1998, used to assess and compare the economic situation of households in order to regulate access to social and healthcare benefits (both monetary and in terms of services), provided by various government levels. This indicator takes into account the household overall income, to which must be added the value of movable assets (current accounts, financial investments, securities, bonds, etc) and immovable assets (land and buildings). All of it is divided according to an equivalence scale in which each household member is relevant. Eligibility: ISEE up to 20,000 euros The amount varies depending on the ISEE brackets.
Number of household members	Support varies according to the household size. Brackets: 1 person; 2 people; 3 people; 4 people and more.
Presence in the household of a disabled person	Parameter aimed at reducing the expenditure incurred for electricity supply by households where a member is in condition of disability / serious illness. Such situations require the use of electromedical equipment, aids, and conditions that impact energy expenses. Increase of the support in case of disability / serious illness.
Commune climate group (E, F)	The Presidential Decree No. 412 of August 26, 1993, introduced, based on the calculation of heating degree-day, six climatic groups across the territory. This allows to evaluate the thermal requirements for each area, thus estimating the economic impact of energy supply. Aosta Valley communes fall into zones E or F. However, this parameter doesn't consider the significant variations at communal level resulting, for example, from altitude bands.

2. Additional parameters useful for better targeting energy poverty support schemes, in order to maximize synergies with policies and tools thus counteracting depopulation in mountainous areas. Such parameters offer a reflection on the geomorphologic characteristics of the territory and on the structural disadvantage resulting from low population density in mountain areas.

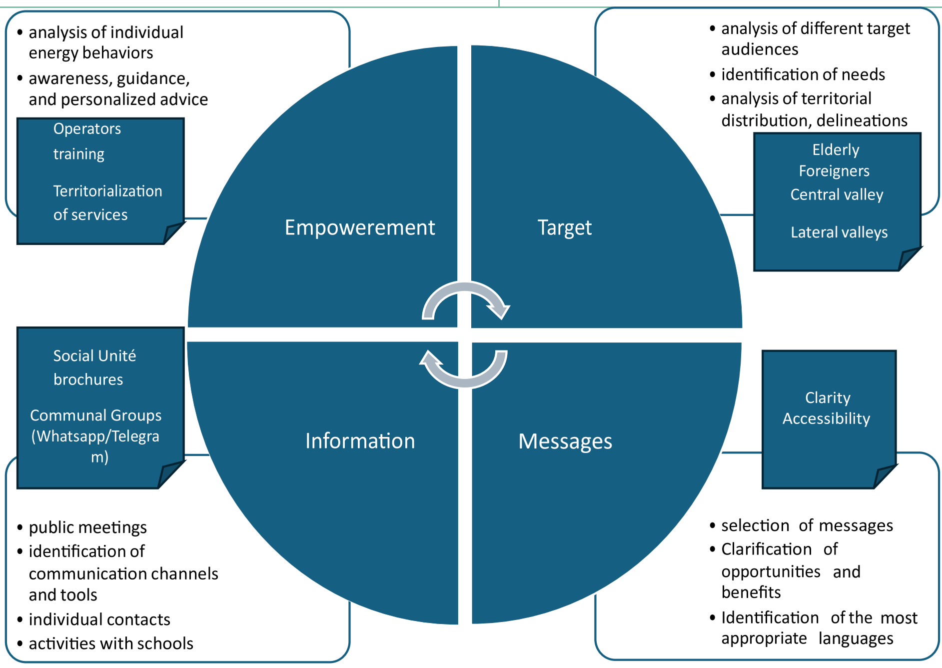
Criteria	Declination / implications
Altimetry	Climatic changes are a consequence of altitude variations. It is important for mountain communes to define altitude parameters (which can also vary at a sub-communal level) in order to tailor support based on the location of the buildings. Progressive assistance based on increasing altitude and climatic zoning.
Population density/ dispersion index	Housing dispersion entails higher costs for the provision of local public services due to the lack of economies of scale. For these reasons, some services/infrastructures are absent or require greater investments (e.g., internet networks, natural gas). Other basic services (healthcare, education, public transportation, …) are absent in the immediate vicinity, thus resulting in increasing expenses for travelling (fuel). Progressive assistance based on housing dispersion index.
Energy class of the building	Most of the historic buildings fall into the most energy-intensive energy classes between D and G (69 per cent), and households in economically disadvantaged situations typically reside in flats that are not very modern and efficient. Progressive assistance based on energy class of the building.
Age group of beneficiaries	Varying the intensity of the support based on age groups, focusing on supporting young people and young adults, enables local authorities to promote policies aimed at countering depopulation and population ageing.

6. Planning Citizen Recruitment and Engagement

A SWOT analysis of the context has been conducted before defining a plan to engage target awareness (chapter 6) and creating a community work plan (chapter 7).

Strengths	Weaknesses
→ Established network of local operators → Involvement and interest of local administrators → Comprehensive knowledge of the context by local administrators and operators → Highly active associations and volunteer organizations in the area → Widespread attention to the environment and sustainability	→ Residential dispersion and territory orography increase physical and social distances → Concentration of services and help desks (COA -Area operations centers, consumer help desks, social emergency services) in the regional capital, outside the area → Target heterogeneity (elderly, foreigners) → Distrust → Technical complexity of the issue and lack of information

Opportunities	Threats
→ SPA – Single point of access for newly established services → Multiple projects in the area to create synergies → Presence of educational institutions	→ Absence of specific regional policies or interventions on energy poverty → Social stigma associated with poverty → Narrowness of some foreign communities → Proliferation of scams targeting individuals



7. Community Building and Energy Awareness

Action	Stakeholders	Status
Social Governance Activation of internal (Unité level) and external (regional revel) networks - Connection with the Coordinator of Social workers in the territory - Contact with the reference points of social emergency service - Connection with the regional structure responsible for the disbursement of the 2022 Social Bonus VdA - Meeting with the PUA Unité operator - Meeting with the Assistant d'hameau Proposal: perpetuate the connections in view of future actions	Local administrations, operators, regional structures competent for social policies, third sector organizations	✓
Energy Governance Activation of networks in energy matters - COA Proposal: perpetuate the connections in view of future actions	Local administrations, operators, regional structures competent for energy policies, third sector organizations	✓
Local communication Illustration of the S4A project, raising awareness in the local community. - creation of a dedicated section on the Unité website - 1 Workshop 21st May 24 Proposal: replication of the Workshop in other territories	Administrators, local associations, recipients, and citizens	✓
Awareness/empowerment of recipients Informational material to be distributed to local operators for dissemination among the identified target groups. The objective is to provide them with tools to advise and guide recipients in situations of energy poverty. Proposal: to establish a system such as TED (Home Energy Tutor of the Assist Network).	Local operators, foundations, and associations	✓

Action	Stakeholders	Status
Youth Awareness Proposal: raise awareness among school students through dedicated activities (e.g., behavioural norms for energy saving, renewable energy, energy communities) with the aim of informing the new generations and, through them, their respective families.	Energy technicians; Schools	
Activation of local help desks Proposal: in collaboration with consumer associations and the Energy Info Desk Chez Nous" (COA), which mainly operate in the regional capital, to propose moments for providing services/information in the Unité territory, following the model of "mobile desks" targeting those in energy poverty as well as the entire community.	Consumer associations, Energy info desk Chez Nous, PUA Desk	
Active involvement of Renewable Energy Communities (RECs) In collaboration with the activity mentioned in the previous point, provide the community with tools to evaluate participation in REC (e.g., the Sun4U app).	Consumer associations, Energy info desk Chez Nous	

Prepared material Tonetti, Comé

Press review: Gazzetta Matin; Bobine TV;

Figure 8: Images from the workshop 21st May 2024

8. Technical Adoption Planning

Introduction

The technical requirements of the possible configurations of collective selfconsumption to be adopted for the energy poverty alleviation models of this Plan are largely based on the study **"CVd'A - Comunità Energetiche a misura di Valle d'Aosta"**, a feasibility pre-study aimed at identifying the potential of 'commune-centric' energy communities in the Aosta Valley Region.

The study, **conducted by CVA SpA**, the largest energy player in the region, **in collaboration with the Department of Economic Development and Energy of the Aosta Valley Autonomous Region and COA Energia – Finaosta SpA**, involved the active participation of 74 communes, 8 Unité des Communes, and 29 SMEs, which contributed by providing data on their building and plant assets.

Further specific technical considerations on the photovoltaic systems under construction are derived from the project **"Green Communities"**, funded under the National Recovery and Resilience Plan (NRPP) – Next Generation EU Program, Mission M2 – Component C1 – Investment 3.2 Green Communities, which entails a coordinated series of significant energy efficiency improvements and the installation of photovoltaic systems on the real estate assets of the Unité GrandParadis.

The adopted models will always refer to **solar photovoltaics as the preferred renewable energy source**, due to its modularity, cost-effectiveness, and ease of installation. Future, more in-depth evaluations could consider other forms of renewable energy historically rooted in the area and abundantly available, such as hydropower and forest biomass.

UVGP facilities portfolio: dal censimento del patrimonio all'analisi del suo potenziale

At the core of any model for sharing energy produced from renewable sources for the benefit of a territorially defined community is the **survey of the availability of buildings and sites** (of various types and uses: residential, offices, schools, sports facilities, warehouses, parking canopies, etc.) **and existing renewable energy systems**, which can be provided by the participants in the configuration as production and/or consumption centers (potentially both in the case of so-called prosumers) and as potential sites for the installation of new photovoltaic systems.

From the current state, the **analysis of the potential** of the surveyed assets is conducted in terms of:

- **consumption profiles;**
- **production profiles** (in the case of existing renewable energy systems);
- available surfaces for the **installation of new** photovoltaic **production systems**;

- **simulation of production profiles** of the new photovoltaic systems proposed for the model.

In the specific case of Unité Grand-Paradis, there are within its real estate assets **3 buildings potentially available to be included in an energy community set up** and for the installation of photovoltaic production systems:

1) Complex housing Maria Ida Viglino **middle school** (including a gym and auditorium) and the **offices of the Unité** in the Communes of Villeneuve
2) **Multifunctional building** housing a gym and an auditorium in the commune of Aymavilles
3) **Ethnographic museum** in the commune of Introd

None of these buildings currently have photovoltaic systems installed, and the **Unité Grand-Paradis currently does not possess any renewable energy system** available for a collective self-consumption configuration.

However, within the context of the **Green Communities project, there are plans to implement two photovoltaic systems** for self-consumption to be positioned on the buildings in Villeneuve and Aymavilles, which will be discussed in more detail later on.

This information will serve as the starting point to define the pilot models aimed at addressing energy poverty as envisioned in the current plan.

Criteria for the optimal site/building selection of solar photovoltaic panels installation

The **assessment of photovoltaic potential**, along with the analysis of **consumption profiles**, is one of the key technical elements on which local energy sharing models are based. As stated in the introduction, this plan adopts the methodologies outlined in the technical annex of the CVd'A study for consistency in evaluation with regional standards.

Firstly, regarding the installation of photovoltaic panels, **priority should be given to the roofs of existing buildings and already urbanized surfaces** such as adjacent areas used, for example, for parking, which still hold largely untapped potential across the area.

The main basic information for estimating the potential of a site in order to install photovoltaic panels can be extracted through the **processing of cartographic** and cadastral **data** available throughout the regional territory in the **Territorial Knowledge System (SCT) of the Aosta Valley Region**, accessible at the following link https://geoportale.regione.vda.it.

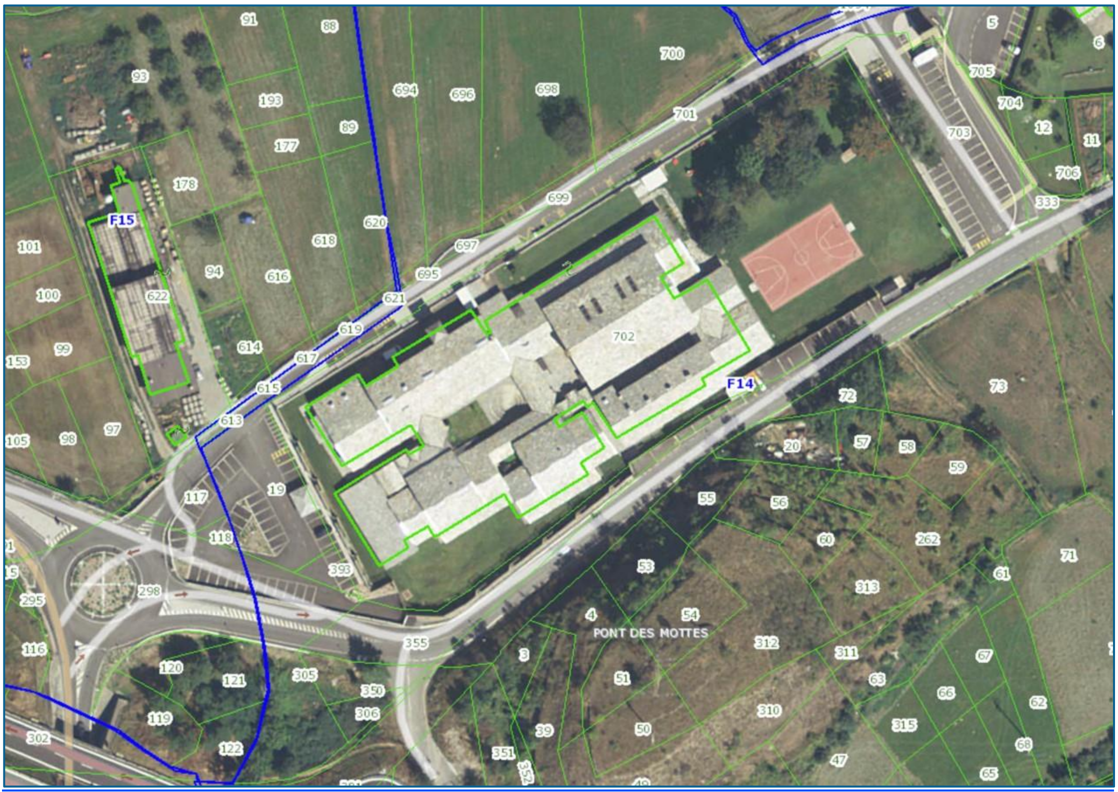


Figure 9: Example of cartographic analysis based on cadastral data extracted from the SCT system, showing the building in Villeneuve housing the Unité Grand-Paradis and the M.I. Viglino middle school.

In particular, using the Aosta Valley Digital Surface Model (DSM), polygons of buildings are extracted from the Regional Technical Map (CTR) and subdivided into cadastral parcels as depicted in the cadastral maps available in the SCT system.

For each extracted flat surface, **orientation and inclination** data are obtained, which are crucial for assessing the photovoltaic potential. These surfaces are then filtered based on certain criteria to focus the evaluation only on surfaces suitable for the installation of photovoltaic systems

Below are the **criteria for selecting** surfaces deemed unsuitable for hosting a photovoltaic system:

- Buildings or areas subject to special protection for historical and landscape assets (prohibited or unsuitable areas, decree under approval)
- Surfaces with orientations and/or inclinations outside the technically useful limits for PV exploitation, specifically orientations between 67.5° and 292.5° (with reference to NORTH clockwise / S +- 112.5°) and inclinations less than or equal to 60°;
- Surfaces where more than 50% of the identified area is, on average, shaded;
- Surfaces smaller than 14.5 m^2.

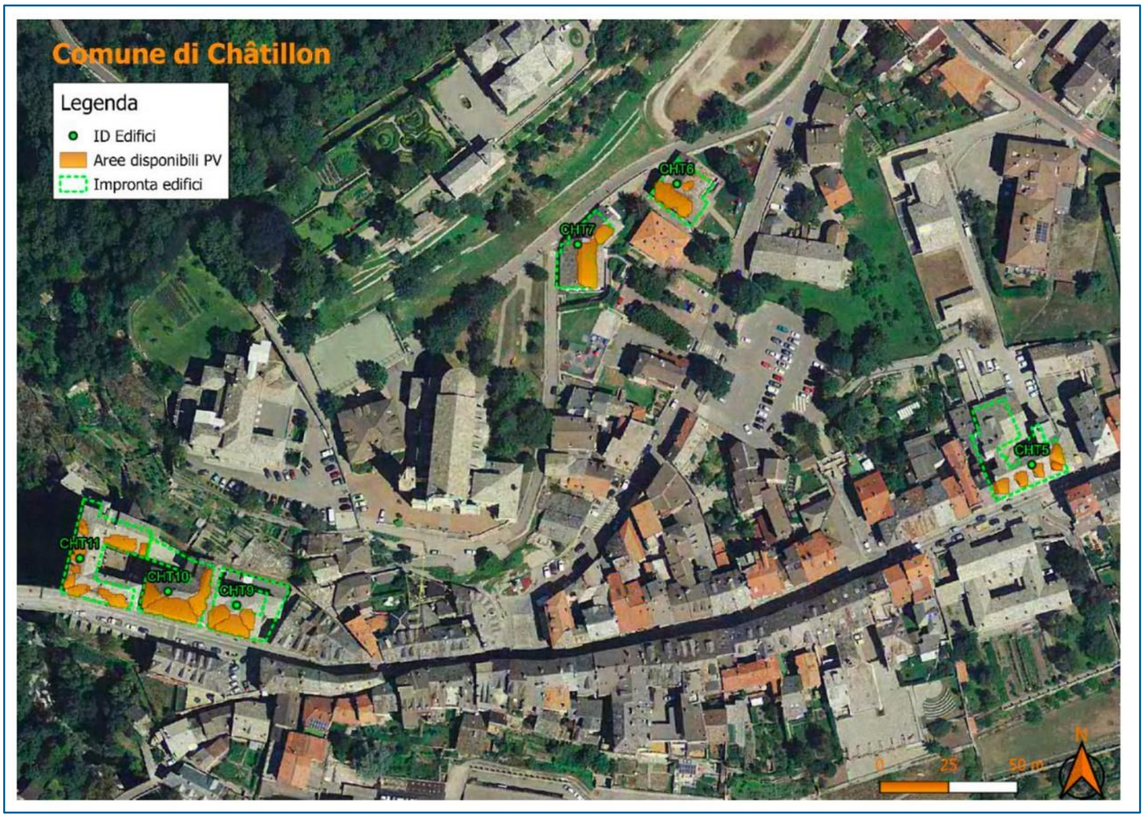


Figure 10: Example of cartographic analysis with identification of surfaces available for the installation of photovoltaic systems – Source: CVd'A study, elaborations conducted for the Commune of Châtillon

The roof surfaces, extracted through the process just described, can be used to **estimate annual production** (kWh) using appropriate simulation softwares. In the case of the CVd'A study, the identified suitable areas were fully utilized, assuming that the maximum peak power possible will be installed.

From the simulation obtained, it is possible to derive, for each surface, the **equivalent hours of operation** of the FV system (kWh/kWp).

From a technological standpoint, the installation of PV modules typically available on the market is assumed. Specifically, the panel adopted in the CVd'A study has the following **technical characteristics**:

- Type: crystalline silicon (c-Si);
- Area: 1,63 m^2; - Peak power: 330 Wp.

It is indeed possible to perform simulations with other types of panels to account for technological advancements, which include **continuous improvements in performance** and a trend towards manufacturing larger panels (400/500 W), allowing for better utilization of available surfaces.

Starting from the data on equivalent operating hours (kWh/kWp), surfaces are **classified according to their photovoltaic potential**. This allows for a straightforward identification of the most suitable surfaces for the installation of photovoltaic systems.

In particular, the CVd'A study identified 3 classes (0, 1, 2) in ascending order of equivalent hours obtained by extracting 3 quantiles from the sample of available areas throughout the Aosta Valley Region.

The proposed classification is as follows:

- **Class 0:** between 535 and 1010 equivalent hours.
- **Class 1:** between 1010 and 1086 equivalent hours.
- **Class 2:** between 1086 and 1393 equivalent hours.

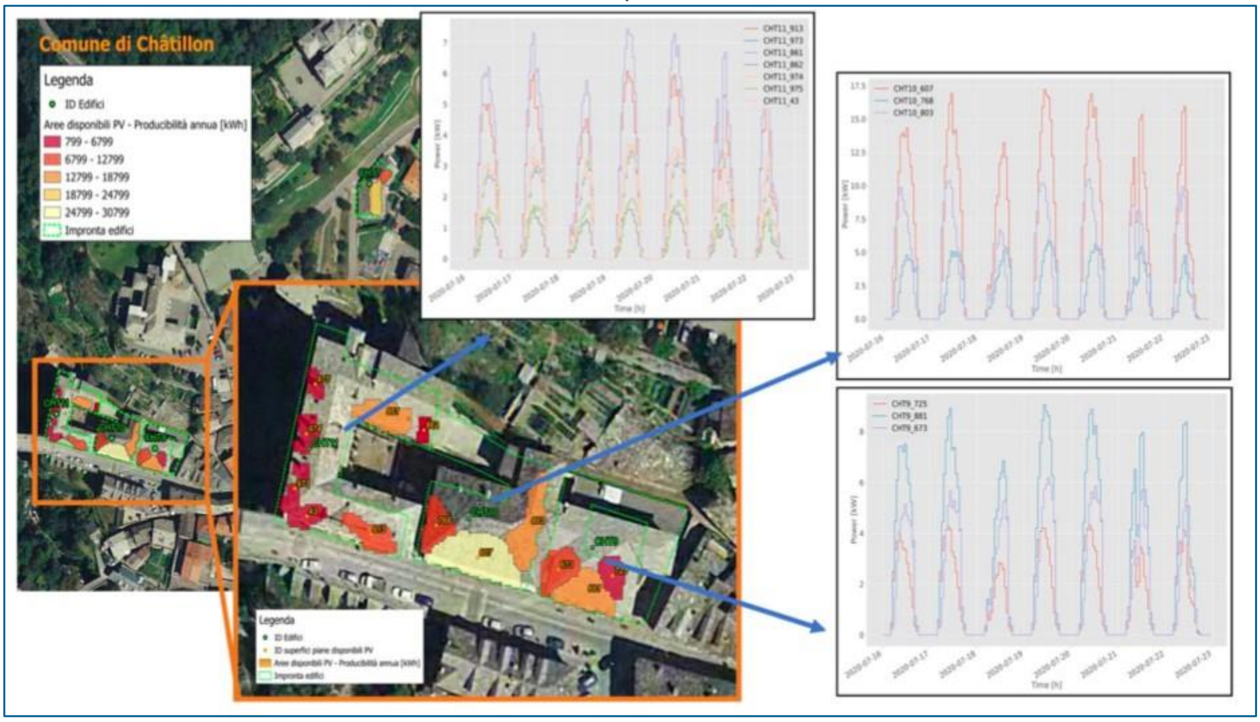


Figure 11: Examples of production profiles developed for some surfaces in the commune of Châtillon – Source: CVd'A study

Results of the analysis conducted on the three buildings of the Unité Grand-Paradis

Below are the results of the **specific analyses conducted on the 3 Unité buildings in the CVd'A study**.

Specifically, the buildings in **Villeneuve and Aymavilles were found suitable to be included in a configuration of self-consumption** to meet their energy needs, and **potentially appropriate** for the installation of photovoltaic production systems.

The Introd Ethnographic Museum was excluded from the detail analysis due to a lack of data and the specific conservation constraints on the building.

Table 7 - Analysis of the photovoltaic potential of the real estate assets of Unité

Grand-Paradis, drawn from the CVd'A study

Description	Primary substation	Available area [m^2]	Peak power capacity [kW]	Annual production [kWh]	Equivalent hours [kWh/kW]	Annual consumption [kWh]
School complex and Unité offices	VILLENEUVE	1.055	191	**226.767**	1.187	128.969
Multifunctional building	AOSTA WEST	607	110	**119.297**	1.089	24.211
Ethnographic museum	VILLENEUVE	-	-	**-**	-	-

The previous table shows that the two selected buildings, given the large available roof areas, have a **high potential for photovoltaic power** and fall both into Class 2, the highest according to the adopted classification, in terms of annual production potential.

As indicated in the table, it is highlighted, finally, that the building located in the commune of Aymavilles falls under the Conventional Area (primary substation) of Aosta West, while those located in Introd and Villeneuve fall under the Conventional Area (primary substation) of Villeneuve. Indicating the primary substation serving the analyzed buildings is of primary importance for the "energy community" model according to current Italian regulations.

The considerations regarding **the positioning of production/consumption units relative to High Voltage/Medium Voltage (HV/MV) primary transformation substations are crucial for the implementation of individual and collective remote self-consumption models such as Renewable Energy Communities**, for which the primary substation serves as the physical boundary for the allocation of incentives provided by current regulations

In particular, the Unité Grand Paradis area is served by the following two primary substations:

- **AOSTA WEST**, including the following communes of the Unité: Aymavilles (partially), Saint-Pierre (partially) and Sarre, in addition to Gressan (partially) and Jovencan.
- **VILLENEUVE** including the following communes of the Unité: Arvier, Avise, Cogne (partially), Introd, Rhemes-Notre-Dame (partially), Rhemes-Saint-Georges (partially), Saint-Nicolas, Saint-Pierre (partially), Valgrisenche,

Valsavarenche (partially), Villeneuve and Aymavilles (partially) in addition to a part of Champorcher (partially).

These aspects will be further detailed in chapter 9.

Photovoltaic installations of the Green Communities project and other opportunities

Within the framework of the **"Green Communities"** project, the Unité aims to implement two photovoltaic installations serving respectively the Villeneuve complex and the multifunctional building in Aymavilles.

Below are the technical specifications of the two installations as outlined in the working plans prepared by the appointed planners.

> Photovoltaic installation on the multifunctional building in Aymavilles

The above-mentioned system is part of the broader energy efficiency improvements for the **multifunctional building housing the Auditorium and Gymnasium in Aymavilles** (AO) involving the replacement of the existing natural gas central heating system with a geothermal heat pump using well water and an air-to-water heat pump.

Figure 12: Multifunctional building in Aymavilles

Notably, the project involves installing a **new photovoltaic array** on the southwest-facing roof (orientation 62°, tilt 21°) made of 48 monocrystalline silicon solar panels, each with a capacity of 415 Wp, resulting in a **total capacity of 19.92 kWp** and an **expected annual production**, accounting for all losses, of **21,572.80 kWh**, spread over an area of 91.2 m².

The system will be grid-connected in three-phase low voltage mode with a supply voltage of 400 V.

> Complex photovoltaic installation in Villeneuve

The system falls within the works planned within the broader energy efficiency improvements of the building, including, in addition to photovoltaic, the installation of a solar thermal system and an electric vehicle charging station.

Figure 13: Complex in Villeneuve housing M.I. Viglino middle school and the offices of the Unité Grand-Paradis.

In particular, the project involves the construction of a **new photovoltaic system** (orientation -32°, inclination 20°) on the Southeast-facing slope of the inclined roof of the gymnasium. The system will consist of 72 photovoltaic modules, each with a capacity of 400 Wp, totalling 28.8 kWp, and an **expected production**, net of all losses, of **33,242.2 kWh annually** spread over an area of 127.44 m^2. The system will be grid-connected in three-phase low voltage mode with a supply voltage of 400 V.

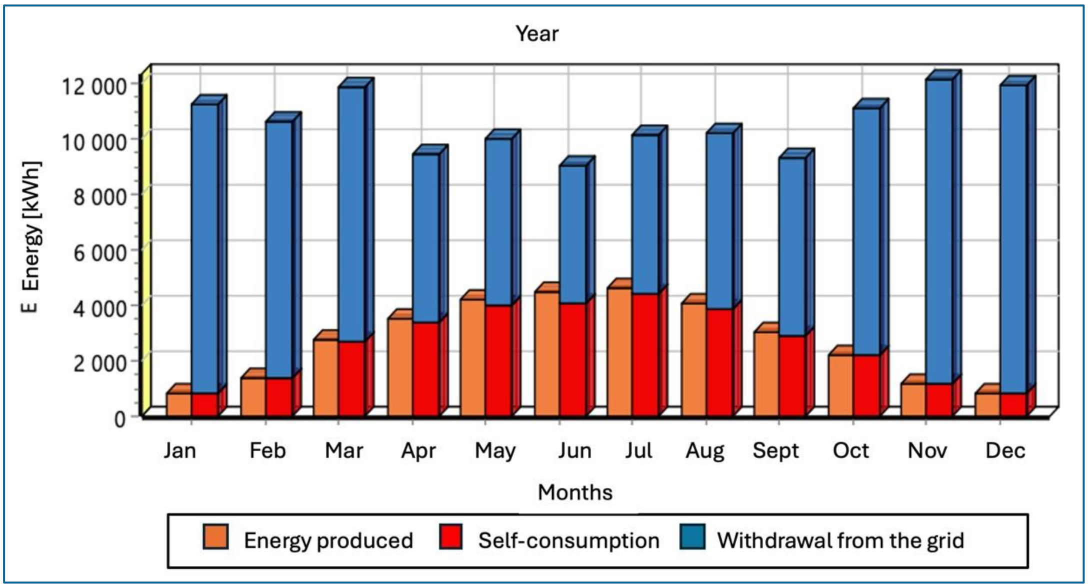


Figure 14: Monthly distribution of production, self-consumption, and grid withdrawals from the Villeneuve photovoltaic system.

> Further potential to exploit

As shown in the table 7 on page 35, the buildings in Villeneuve and Aymavilles have a total photovoltaic potential of 191 and 110 kWp respectively, for a residual potential of the two projects under construction of 162.27 and 89.64 kWp respectively.

As previously mentioned, further potential for utilizing already urbanized areas available in the Unité Grand-Paradis could arise from the use of large parking areas, particularly at the Villeneuve location.

In Italy, following the example of what is happening in France, there should shortly be a greater regulatory deregulation for these types of installations as part of the suitable areas decree currently under approval.

Conclusions

Regarding the potential development of a Renewable Energy Community (REC) within the Unité territory, there is a need, as indicated in the CVd'A study, for further investigations aimed at optimizing its composition. This includes increasing the installed capacity from photovoltaic sources and broadening participation (involving more families, SMEs, religious institutions, and the third sector), along with associated technical and economic evaluations.

It is also considered beneficial, following the example of the **SECAP** (Sustainable Energy and Climate Action Plan) and **French Climate Plans** implemented at Community of Municipalities level (e.g., Coeur de Savoie), to proceed with more targeted energy planning at the territorial scale of the Unité. This could lead to a **strategy for developing renewable energy sources with horizons set for 2030/2050**, where projects like Green Communities, CVd'A, and Sun4All can serve as initial evaluation frameworks.

To this end, an informative guide developed by the project in order to integrate Sun4All into the SECAPs is available at the following link: https://sunforall.eu/fileadmin/user_upload/Resources/D5.4_Sun4All_Guidebook_M30_ICLEI_v_1.2.pdf

9. Legal Adoption Planning

The various implementation phases of a distributed production and selfconsumption model based on photovoltaic energy require **compliance with numerous regulations**, including:

- Building regulations for the installation of photovoltaic systems on existing buildings and the construction of any new structures (e.g., canopies)
- Specific regulations related to the establishment of self-consumption configurations for renewable energy sharing (so-called CACER), including the following types:
  - Individual self-consumer of "remotely" renewable energy who uses the distribution grid
  - Group of renewable energy self-consumers acting collectively
  - Renewable energy communities
- Rules for obtaining incentives for the construction of photovoltaic systems and self-consumption configurations
- Aspects related to the appropriate legal form to be adopted for the identified self-consumption configuration

Specific regulations applicable to the implementation of photovoltaic systems

Regarding the implementation of renewable energy systems, the regulations stipulate that the installation of **photovoltaic systems**, either **mounted or integrated into the roofs of buildings** with the same slope and orientation as the roof surface, and whose components do not alter the building's shape, can be considered as a building activity not requiring preventive authorisations. Consequently, they are not subject to the certified start of activity notification (so called SCIA), but **only require prior notification to the relevant Commune**.

Particular attention must still be paid to the **constraints present in the A zones** of the Municipal Planning Act (historical centers) **and for all areas and buildings subject to specific historical and landscape constraints** (Cultural Heritage and Landscape Code), for which prior authorization from the Superintendence may still be required.

In all other cases, the installation of photovoltaic systems are subject to the certified start of activity notification (SCIA for building activities) if installed on existing buildings/structures or if they have a capacity of less than 50 kW. In any case, for systems with a capacity above this threshold, they are subject

to the **single authorization procedure**, which aims to streamline and simplify the authorization process.
In the case of the installation of systems on **new structures** (buildings, canopies, etc.), these will typically be subject to a **building permit** to be submitted to the commune where the installation is located.

Overall, it can be stated that **current building regulations favour the installation of photovoltaic systems on existing structures**. Soon, the new **Decree on Suitable Areas should be adopted**, according to which "surfaces and areas that are within the perimeter of protected properties" are considered unsuitable. The new regulation incorporates the prohibition, imposed by the recent Agriculture decree, on installing ground-mounted solar panels on agricultural land.

The legislative suggestion is therefore to prioritize *"the use of surfaces of existing structures, such as industrial warehouses and parking lots, as well as areas designated for industrial, artisanal, service, and logistics purposes, and to verify the suitability of areas that cannot be used for other purposes, including non-usable agricultural surfaces"*. It will then be up to individual regions to map out these areas where the installation of renewable energy facilities is prohibited.

For further details, please refer to the dedicated page on renewable energy installations permits on the website of the Aosta Valley Autonomous Region.

Specific regulations applicable to distributed self-consumption configurations

In order not to unnecessarily replicate the already extensive available bibliography, this paragraph aims to provide a **quick guide to the regulatory framework of distributed self-consumption configurations** as outlined in the Minister of Environment and Energy Security Decree of December 7, 2023, No. 414 (commonly referred to as the CACER Decree).

In particular, the final transposition of Directive 2018/2001 RED II has led to a series of decrees fully defining the regulatory framework for the implementation and promotion of self-consumption configurations for the sharing of renewable energy:

- DLGS 199/21 – Final transposition of Directive 2018/2001
- DELIBERA ARERA TIAD 727/2022/R/eel Integrated Text on Distributed SelfConsumption (TIAD) regulates the methods for enhancing distributed selfconsumption for configurations provided for by Legislative Decree 199/21
- DM 414/2023 - It regulates the subsidized tariffs for RES installations integrated into distributed self-consumption configurations and the access to the NRPP Contribution for Energy Communities and collective selfconsumption in municipalities with up to 5,000 inhabitants
- Technical Rules GSE

Table 8 – Self-consumption configurations for renewable energy sharing (Definitions from TIAD and Ministerial Decree 414/23)

Definition	Configuration	Installations	Shared Perimeter	Incentive Perimeter
Individual selfconsumers of renewable energy "remotely" using the distribution grid	End customer and producer located within areas fully available to the end customer	RES Installations	POD* and installations in the same market area	POD* and installations in the same primary substation
Group of renewable energy selfconsumers acting collectively	Group of end customers and/or producers located in the same building or condominium	RES Installations	POD* and installations within the same building/condominium	Coincides with the sharing perimeter
Renewable energy communities (REC)	A non-profit legal entity whose members are end customers and/or producers	RES Installations	POD* and installations in the same market area	POD* and installations in the same primary substation

*POD (Point-of-Delivery): the connection point within the perimeter of the primary substation operated by the Energy Community (REC), identified by a unique code corresponding to a specific location on the consumer's territory.

A local authority can simultaneously activate one or more configurations, provided that a single consumer unit or production unit cannot be part of more than one configuration.

Individual remote self-consumption allows maximizing the energy produced by a RES installation and has a compensatory impact on the energy costs of local authorities. Together with physical self-consumption, it directly affects the containment of the authority's energy bill, which helps alleviate the budget from energy charges and frees up resources for other purposes. This mechanism gains further relevance ahead of the January 1, 2025 deadline for the end of the net metering scheme for photovoltaic installations. The only alternative for remunerating energy not self-consumed and exported to the grid will be the less lucrative "dedicated withdrawal" option (approximately €80/MWh).

It is no coincidence that such a configuration has been suggested by planners as one of the possible incentives for photovoltaic installations being implemented by the Unité. This mechanism allows, during periods when the consumption of the building in question is lower than the production, to share the energy injected into the grid with other supply points of the same end customer and is particularly appealing for buildings with lower consumption during periods of higher photovoltaic production, such as schools, for example.

For **shared electricity**, a **"TIP" Premium Tariff** is granted, and for installations with a power capacity below 200 kW is equal to:

- TIP: 80 + max (0; 180-Pz) where Pz represents the hourly zonal price of electricity. The premium tariff cannot exceed the value of 120 euros/MWh

Additionally, for photovoltaic installations, a correction factor is applied based on the geographic area to account for different levels of solar irradiation. For Aosta Valley, the **correction factor** is +10 euros per MWh

The limit of such a configuration remains the requirement that both the production and consumption points belong to the area served by the same primary substation. In the specific case of the Unité Grand-Paradis, for instance, it would not be possible to include both the Villeneuve complex (served by the Villeneuve primary substation) and the multifunctional building in Aymavilles (served by the Aosta West primary substation) within the same configuration.

Furthermore, in this specific case, it is necessary to verify the compatibility of the premium rate with the funding obtained for the installation projects (PNNR).

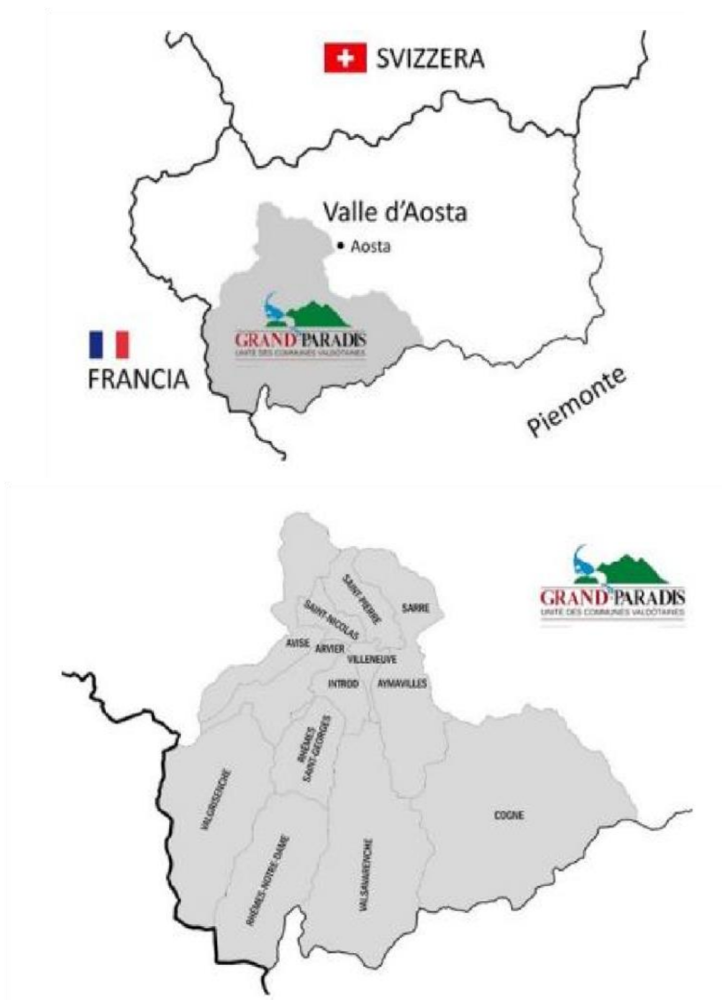


Figure 15: The Unité Grand-Paradis territory with respect to Aosta Valley and border regions and its administrative subdivision in 13 communes.

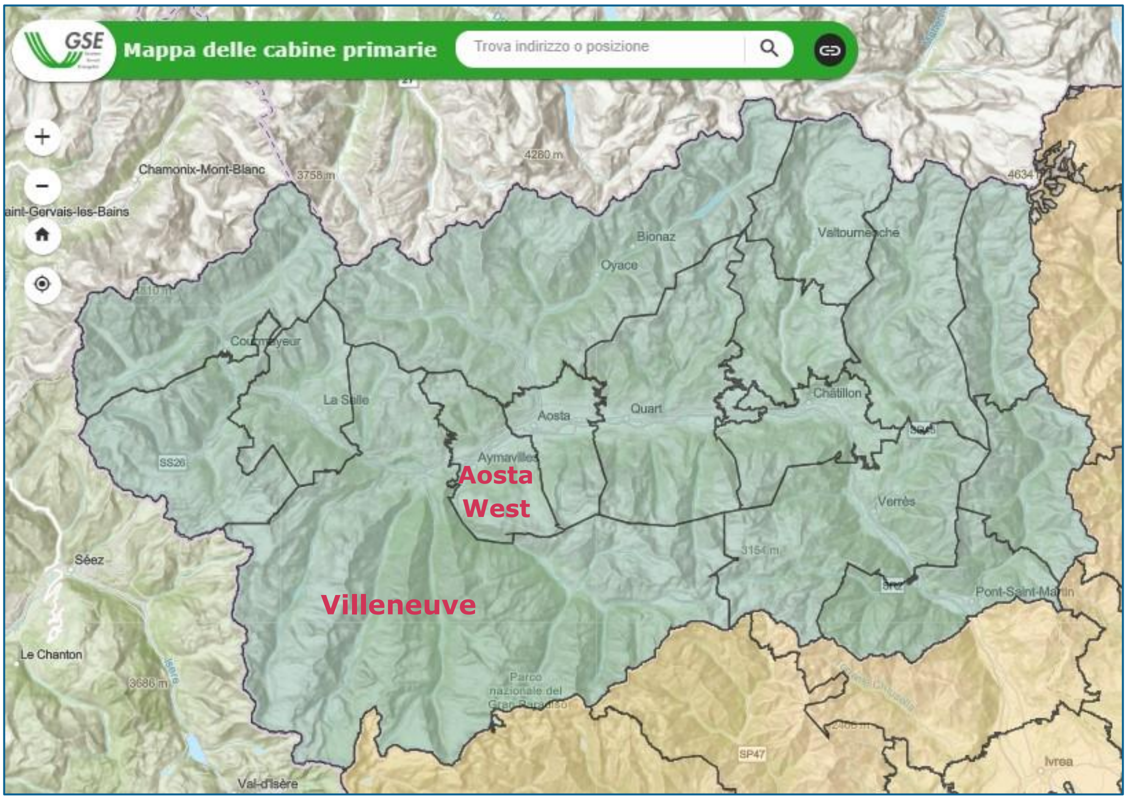


Figure 16: Subdivision of the regional territory into the 16 conventional areas covered by the High/Medium Voltage primary transformer substations of the Valle d'Aosta electrical grid – Source: GSE website.

> N.B.: An important innovation from a territorial extension perspective is the possibility for the community to extend beyond the limit of the primary substation, potentially covering the entire market area it encompasses (Aosta Valley is part of the Northern zone which includes all Northern Italian regions). Practically, this translates into the possibility of forming multiple configurations, each within the perimeter served by a specific primary substation, that could however be part of a single REC legal entity (referred to as mega REC). Producers and end consumers will share energy within their respective configuration (related to the specific primary substation), and the incentive earned by each configuration will be paid to the community.

Groups of self-consumers and renewable energy communities represent an opportunity for institutions that lack resources and/or assets to develop their own renewable energy installations, enabling them to participate as consumers in the benefits generated by these configurations.

Renewable Energy Communities (REC) are undoubtedly the most appealing configuration for a local authority. However, promoting their establishment is primarily a way to **develop policies that benefit the local area and pursue strategic objectives** within the competencies of local authorities:

- **safeguarding collective interests** and sustainability of resources and local identity;
- **promoting local renewable sources** for the benefit of the community;

- **reducing energy poverty** in territories by supporting families unable to meet their primary energy needs and promoting policies to support struggling businesses and enterprises, encouraging their participation within
  the community members' group during REC project development and allocating a portion of revenues for this purpose;
- **enhancing the economic potential of a territory**, for instance, by reporting to the competent authorities non-divisive areas suitable for renewable energy installations and fostering system actions with energy sector operators;
- **proposing and providing guidance** to private entities and higher authorities, even through urban planning tools, **to achieve sustainable energy transition in the area** while respecting needs, resources, and territorial balance;
- **promoting repopulation of abandoned areas** by including participation in a renewable energy community among the benefits for those willing to repopulate or maintain a presence in such areas;
- **promoting the qualification of a "work" sector dedicated to renewable energies** and sustainability across various fields, starting from education, employment, associations, and youth entrepreneurial initiatives;
- **spreading sustainability culture** through citizen awareness and involvement.

In the case of the REC, the economic benefits concern:

1. for **shared electricity**, a "**TIP" Premium Tariff is granted for 20 years** and calculated according to the following table:

Table 9 – "TIP" Premium Tariff for REC

System size P [kW]	Incentive [€/MWh]	Minimum incentive [€/MWh]	Maximum incentive [€/MWh]
P ≤ 200 kW	80 + max (0; 180-Pz)	80	120
200 kW < P ≤ 600 kW	70 + max (0; 180-Pz)	70	110
P > 600 kW	60 + max (0; 180-Pz)	60	100

Where Pz represents the hourly zonal price of electricity.
The premium tariff cannot exceed the value of 120 euros/MWh.

Additionally, for photovoltaic installations, a correction factor is applied based on the geographic area to account for different levels of solar irradiation. For Aosta Valley, the correction factor is +10 euros per MWh. The premium tariff can therefore reach the maximum value of 130 euros/MWh.

2. **selling the energy produced** at market price, according to the dedicated withdrawal (RID) agreement: approximately 80€/MWh

3. **compensation for grid fees** not owed for energy transmission and distribution: approximately 10 €/MWh

Grants and tax incentives for the implementation of capital-funded installations

For communes with fewer than 5,000 inhabitants, installations included in a REC or collective self-consumption configuration up to a maximum power of 1000 kW can benefit from a capital grant of up to 40%, which can be combined with the premium subsidized tariff. Access to these capital grants, however, requires a reduction in the subsidized tariff according to the following formula

$$\text{TIP Contributed Capital} = \text{Tip} * (1 - F)$$

where F is a parameter that, in general, varies linearly between 0, when no capital grant is provided, and a value of 0.50, when the capital grant is 40% of the investment.

This reduction factor does not apply to shared electricity from consumption points owned by local authorities, religious institutions, third sector organizations, and environmental protection entities.

Considerations regarding the suitable legal form to adopt for the identified self-consumption configuration

REC configurations must include at least two members/partners of the REC itself, participating in the configuration as final consumers and/or producers, and at least two distinct connection points, each connected to a consumer unit and a production facility.

Below are the **key elements that the statute or founding act of a properly established Renewable Energy Community (REC) must include**:

a) the **primary social objective of the community is to provide environmental, economic, or social benefits** at the community level to its members or partners or the local areas where it operates, rather than to generate financial profits;
b) **members or partners who exercise control powers** can only be individuals, small or medium-sized enterprises, associations with legal personality under private law, territorial entities or local authorities, including, pursuant to Article 31, paragraph 1, letter b) of Legislative Decree 199/21, municipal administrations, research and training institutions, religious institutions, third sector and environmental protection organizations, as well as the local administrations listed in the register of public administrations published by the National Institute of Statistics (ISTAT) as provided for in Article 1, paragraph 3, of Law 31 December 2009, n. 196, located in the same communes where the production facilities owned by the renewable energy community are situated;

c) the **community is autonomous and has open and voluntary participation** (provided that the participating enterprises are SMEs and that participation in the renewable energy community does not constitute their main commercial and/or industrial activity);
d) **members or partners participating in the community retain their rights as final customers**, including the right to choose their own supplier, and are allowed to leave the configuration at any time, without prejudice to, in case of early withdrawal, any fair and proportionate compensation agreed upon for shared investment costs;
e) a designated entity responsible for the distribution of the shared electricity has been identified;
f) **any excess amount of the premium tariff**, compared to the amount determined by applying the shared energy threshold value expressed as a percentage in Annex 1 of the CACER Decree (55%), **will be allocated solely to non-business consumers and/or used for social purposes** that benefit the territories where the sharing installations are located.

This last aspect is particularly relevant concerning the possibility of allocating a portion of the REC's revenues to address energy poverty and promote social inclusion.

For further insights into the legal and juridical aspects of Individual Remote SelfConsumption and Renewable Energy Communities, please refer to the recently published Guide for Municipalities by the GSE (National Energy Services Management Company) and ANCI (National Association of Italian Communes).

10. Financial Scheme Adoption Planning

Selection of the more appropriate use case

In consideration of the administrative and governance characteristics of the Unité Grand-Paradis, as well as the current regulatory framework in force at the national and regional levels (see Chapter 9), the **two models** identified for the implementation of the Sun4All project in the area are:

- **Model 1 – Financial assistance to support energy expenses from RES**
- **Model 2 – Solidarity Renewable Energy Community (SREC)**

The first model bases its technical and economic evaluations on the expected commissioning by June 2025 of the two photovoltaic systems financed under the Green Communities initiative.

The second model relies instead on the analyses conducted by the CVd'A study on the potential of REC with public leadership through:

1. Quantification of the potential for installing photovoltaic systems on public building rooftops
2. Analysis of energy and financial reports at the municipal and primary substation (conventional area) scales

Below is a detailed analysis of the two models:

Model 1 – Financial assistance to support energy expenses from RES

The first proposed model draws **inspiration from the practices tested in Sun4All by the partner "Cœur de Savoie"**, a Community of Municipalities in the Savoie Department, which shares very similar territorial and administrative characteristics to those of the Unité Grand-Paradis.

Starting from the availability of renewable energy production facilities owned by the proposing authority, the model entails the **redistribution of a portion of the income generated** from these facilities to households/individuals experiencing energy poverty, identified following the criteria outlined in Chapter 5 of the plan.

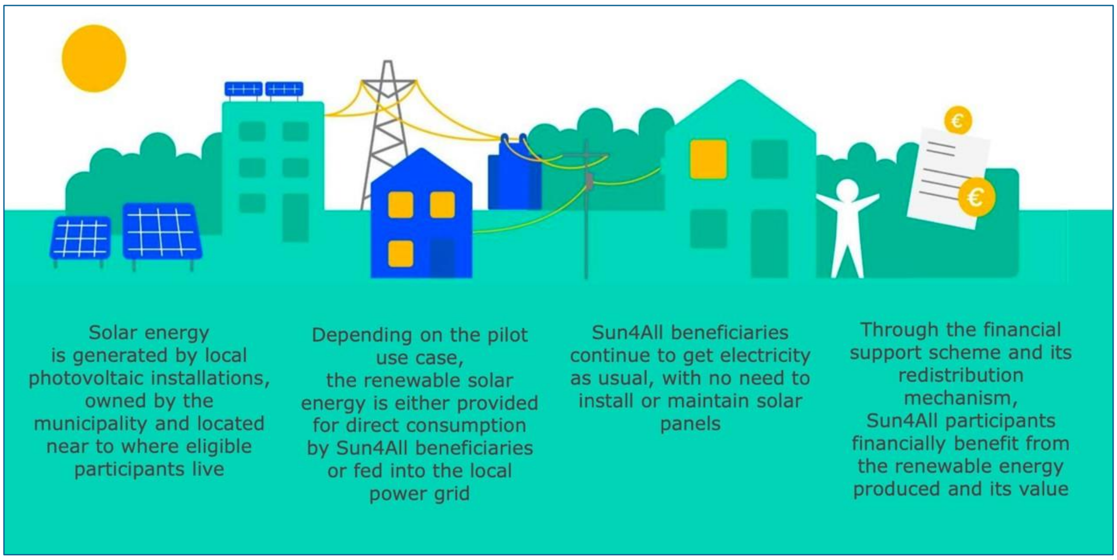


Figure 17: Operating principle of model 1 – Sun4All model.

As previously mentioned, the Unité does not currently have photovoltaic installations to implement the model. However, thanks to the "Green Communities" project, it will soon own **two photovoltaic systems** designed for selfconsumption.

> N.B: As shown in the tables below, self-consumption is actually the best way in Italy to maximize revenue from a photovoltaic system.

Therefore, according to this model, a portion of the economic earnings from these two installations can be directed towards direct **financial assistance to families facing difficulties**, as support for energy expenses.

For the financial management of the initiative, it's important to note that the revenue generated from the self-consumed energy does not result in actual economic income, but rather in savings (at market prices) from the energy not drawn from the electrical grid.

Below is a technical-economic analysis derived from the project data of the two photovoltaic installations:

Table 10 – Technical characteristics of the photovoltaic installations in Villeneuve and Aymavilles

Description	Primary substation	Occupied area [m^2]	Peak power [kW]	Estimated annual production [kWh]
Complex in Villeneuve	VILLENEUVE	127.44	28.80	**33,242.20**
Multifunctional building in Aymavilles	AOSTA WEST	91.20	19.92	**21,572.80**

Table 11 – Estimated revenue from the photovoltaic installations in Villeneuve and Aymavilles

Description	% selfconsumption	Self-consumed energy [kWh]	Energy injected into the grid [kWh]	total
Complex in Villeneuve	75.00%	24,931.65	8,310.55	33,242.20
Multifunctional building in Aymavilles	25.00%	5,393.20	16,179.60	21,572.80
Total		**30,324.85**	**24,490.15**	**54,815.00**
Economic valorisation [€/kWh]		Savings on utility bills	Dedicated withdrawal	
		0.30	0.08	
Estimated revenues [€/year]		**9,097.46**	**1,959.21**	**11,056.67**
Revenues allocated to the initiative [€/year]	**50.00%**			**5,528.33**
Individual aid [€/year]				**200.00**
No. of deliverable aids				**28**

Assuming that 50% of the annual revenues are allocated to the support measure, and providing a basic aid of € 200 per beneficiary, approximately 28 families experiencing energy poverty could be assisted.

These numbers may still be modest compared to the data on energy poverty outlined in Chapter 3, where the total requests for income-based assistance (ISEE) were distributed across the entire Unité territory as follows:

- Requests with ISEE below 5,000 € amounted to: 244
- Requests with ISEE below 10,000 € amounted to: 468

Considering the lowest income bracket, this would cover just slightly over 10% of potential requests.

From an energy perspective, the **equivalent solar energy virtually distributed** among the 28 beneficiaries of the measure amounts to 27,297.50 kWh, which translates to approximately **978 kWh per beneficiary**. This is equivalent to the production of about 0.9 kWp of photovoltaic capacity.

To improve the economic balance of the model, some **optimizations** could include:

a) Management and technological measures to increase the proportion of selfconsumed energy (better alignment of consumption profiles and photovoltaic production);
b) Integration of the installations, as hypothesized in Chapter 9, into a remote individual renewable energy self-consumption model;
c) Increase in installed photovoltaic capacity.

In the scenario described in point b), since the two installations belong to different primary substations, two separate systems of remote individual renewable energy self-consumption would need to be created. The proposal should then be further developed with a detailed analysis of the consumption profiles of the electrical users within the Unité who could connect to the two systems.

Here is a rough estimate of the economic impact of the system under the following simplified assumptions:

- the portion of energy injected into the grid is fully shared (absorbed) by the other participating users in the model
- the premium tariff for shared energy is assumed at the maximum value of €130/kWh, as indicated in Chapter 9. In practice, it varies based on the hourly zonal price of electricity (Pz), ranging between €90 and €130/kWh

Table 12 – Revenue analysis adopting the remote individual selfconsumption model

Complex in Villeneuve	Energy [kWh]	Individual [€/kWh]	Revenue [€]
Self-consumption value	24,931.65	0.30	7,479.50
Energy injected into the grid	8,310.55	0.08	664.84
Revenue for shared energy (TIP)	8,310.55	0.13	1,080.37
Grid fees compensation	8,310.55	0.01	83.11
Total revenue Villeneuve			9,307.82
Multifunctional building in Aymavilles	**Energy [kWh]**	**Individual [€/kWh]**	**Revenue [€]**
Self-consumption value	5,393.20	0.30	1,617.96
Energy injected into the grid	16,179.60	0.08	1,294.37
Revenue for shared energy	16,179.60	0.13	2,103.35
Grid fees compensation	16,179.60	0.01	161.80
Total revenue Aymavilles			5,177.47
Total revenue			**14,485.29**

Therefore, in a scenario of maximum benefit, **adherence to a remote individual self-consumption model of renewable energy could potentially increase revenues** from photovoltaic installations by up to +31% compared to the standard situation.

It should be noted that such a system cannot access the non-repayable contribution, up to a maximum of 40%, for the installation of photovoltaic systems provided by the NRPP measure as per Article 14, paragraph 1, letter e) of Legislative Decree No. 199 of 2021.

Regarding point c), as indicated in the table 7, the buildings in Villeneuve and Aymavilles have a total photovoltaic potential of 191 kWp and 110 kWp, respectively. After accounting for the ongoing projects, the remaining potential is 162.27 kWp and 89.64 kWp.

Assuming the installation of the total capacity, the hypothesis above are modified as follows:

Table 13 – Technical characteristics of the photovoltaic installations in Villeneuve and Aymavilles – Maximum installable power

Description	Primary substation	Occupied area [m^2]	Peak power [kW]	Estimated annual production [kWh]
Complex in Villeneuve	VILLENEUVE	1,055	191	**226,767.00**
Multifunctional building in Aymavilles	AOSTA WEST	607	110	**119,297.00**

Table 14 – Estimated revenue from the photovoltaic installations in Villeneuve and Aymavilles – Maximum installable power

Description	% selfconsumption	Self-consumed energy [kWh]	Energy injected into the grid [kWh]	Total
Complex in Villeneuve	30.00%	68,030.10	158,736.90	226,767.00
Multifunctional building in Aymavilles	10.00%	11,929.70	107,367.30	119,297.00
Total		**79,959.80**	**266,104.20**	**346,064.00**
Economic valorisation [€/kWh]		Savings on utility bills	Dedicated withdrawal	
		0.30	0.08	
Estimated revenues [€/year]		**23,987.94**	**21,288.34**	**45,276.28**
Revenues allocated to the initiative [€/year]	**50.00%**			**22,638.138**
Individual aid [€/year]				**200.00**

Description	% selfconsumption	Self-consumed energy [kWh]	Energy injected into the grid [kWh]	Total
No. of deliverable aids				113

Table 15 – Revenue analysis adopting the remote individual selfconsumption model – Maximum installable power

Complex in Villeneuve	Energy [kWh]	Individual [€/kWh]	Revenue [€]
Self-consumption value	68,030.10	0.30	20,409.03
Energy injected into the grid	158,736.90	0.08	12,698.95
Revenue for shared energy (TIP)	79,368.45	0.13	10,317.90
Grid fees compensation	79,368.45	0.01	793.68
Total revenue Villeneuve			44,219.57
Multifunctional building in Aymavilles	**Energy [kWh]**	**Individual [€/kWh]**	**Revenue [€]**
Self-consumption value	11,929.70	0.30	3,578.91
Energy injected into the grid	107,367.30	0.08	8,589.38
Revenue for shared energy	53,683.65	0.13	6,978.87
Grid fees compensation	53,683.65	0.01	536.84
Total revenue Aymavilles			19,684.01
Total revenue			63,903.57

As can be inferred from the reported data, the saturation of installable capacity on the two buildings under consideration would allow for increasing amounts to be reached, thereby potentially increasing the impact of the measure to accommodate approximately 160 beneficiaries.

The model also includes, alongside the economic benefit, the activation of **support and awareness initiatives**, that beneficiaries of the support will be required to participate in:

- personalized consultancy and training on energy efficiency measures and electricity management in order to learn how to reduce consumption.
- educational meetings to understand and optimize the electricity bill and reduce costs.
- Tour of the photovoltaic installations whose production they indirectly benefit from.

Model 2 – Solidarity Renewable Energy Community (SREC)

The second proposed model supposes the creation of a **Renewable Energy Community** in which the Unité may participate either as a proposing entity or as a simple participant.

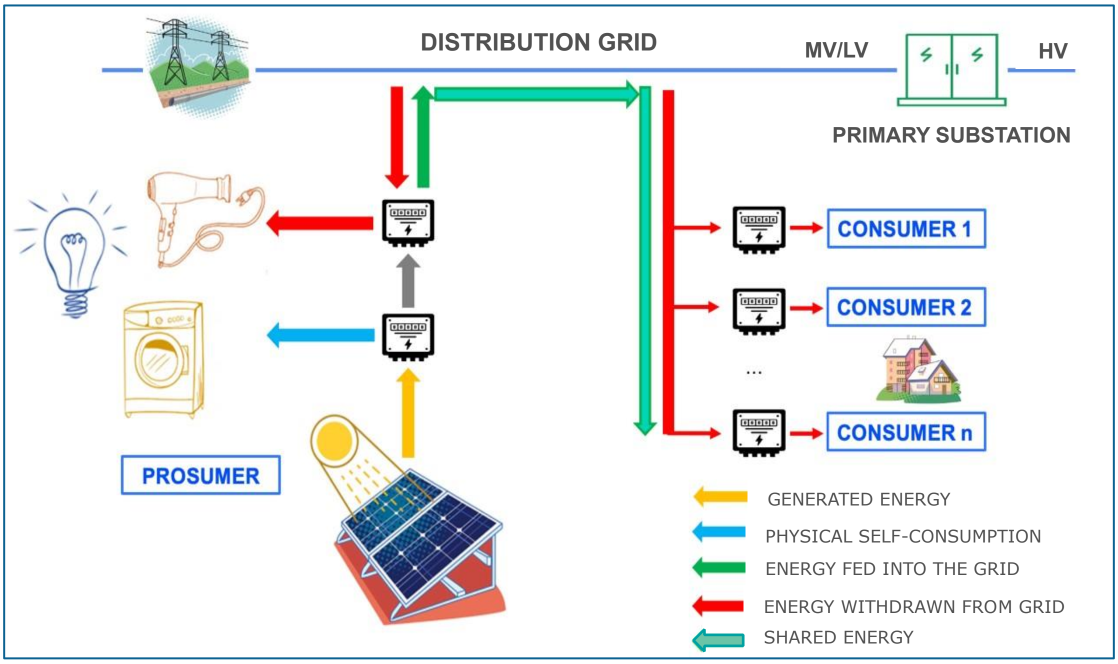


Figure 18: Principal diagram of energy flows within a REC.

In the previous paragraphs, the technical and regulatory requirements governing the establishment and management of a REC have already been highlighted. This model, on the other hand, aims to **explore how energy poverty can be included in the context of a so-called "solidarity" REC**, focusing on its technical aspects and possible financial flows.

The **model data is based on the findings of the CVd'A study**, which have led to the definition of numerous and detailed scenarios for the configuration of RECs across the entire regional territory, including that of Unité Grand-Paradis.

The CVd'A report provides the main indications regarding the technical and economic feasibilitỳ of a Renewable Energy Community (REC), based on Public Administration buildings, potentially involving Small and Medium Enterprises in the area that have shown interest.

In particular, considering the primary constraint that all production and consumption units within the same configuration must belong to the same primary substation, the study proposed the following REC hypotheses:

- **13 RECs**, one for each of the communes of the Unité Grand-Paradis
- **2 RECs** encompassing the two conventional areas under the primary substations of Villeneuve and Aosta West

For each of the hypothesized RECs, analyses were conducted on the following **four different scenarios**:

- ➔ **Scenario 1:** Commune buildings only
- ➔ **Scenario 2:** scenario 1 + buildings of other Public Administrations (UCGP, Region)
- ➔ **Scenario 3:** scenario 2 + SMEs (4) participating in the initiative
- ➔ **Scenario 4:** scenario 3 + simulation on household users

The model focuses on the configuration of RECs associated with the two conventional areas (primary substations) of Villeneuve and Aosta West. Although the latter includes a number of communes outside the Unité perimeter, these communes could be beneficially involved in the initiative, considering the extension and replicability of the Sun4All models.

The primary substation aggregations are those that involve, from a spatial perspective, the largest number of municipalities and underlying territorial surface area. Moreover, they have the greatest quantitative impact on energy flows in terms of energy produced and shared.

REC Analysis - Conventional area "Villeneuve"

The VILLENEUVE conventional area includes buildings in the following communes: Arvier, Avise, Cogne (partially), Introd, Rhemes-Notre-Dame (partially), RhemesSaint- Georges (partially), Saint-Nicolas, Saint-Pierre (partially), Valgrisenche, Valsavarenche (partially), Villeneuve, Aymavilles (partially) and Champorcher (partially, not included in the Unité Grand-Paradis).

These are the **key data** of the considered REC: ➔ 68 public buildings (communes, UCGP and Region -> PA), out of which 31 can install new photovoltaic capacity

- ➔ 3 SMEs without the possibility to install new photovoltaic capacity ➔ simulation of 261 households, increasing energy demand by 25% compared to the baseline scenario
- ➔ new installed photovoltaic capacity of 1,486 kW (including the Unité GrandParadis building in Villeneuve)

> N.B.: Unlike in model 1, in this case, the expansion of the photovoltaic system at the Villeneuve complex (as well as at Aymavilles) could access the non-repayable grant, up to a maximum of 40%, for the implementation of photovoltaic systems under the NRPP measure referred to in Article 14, paragraph 1, letter e) of legislative decree No. 199 of 2021.

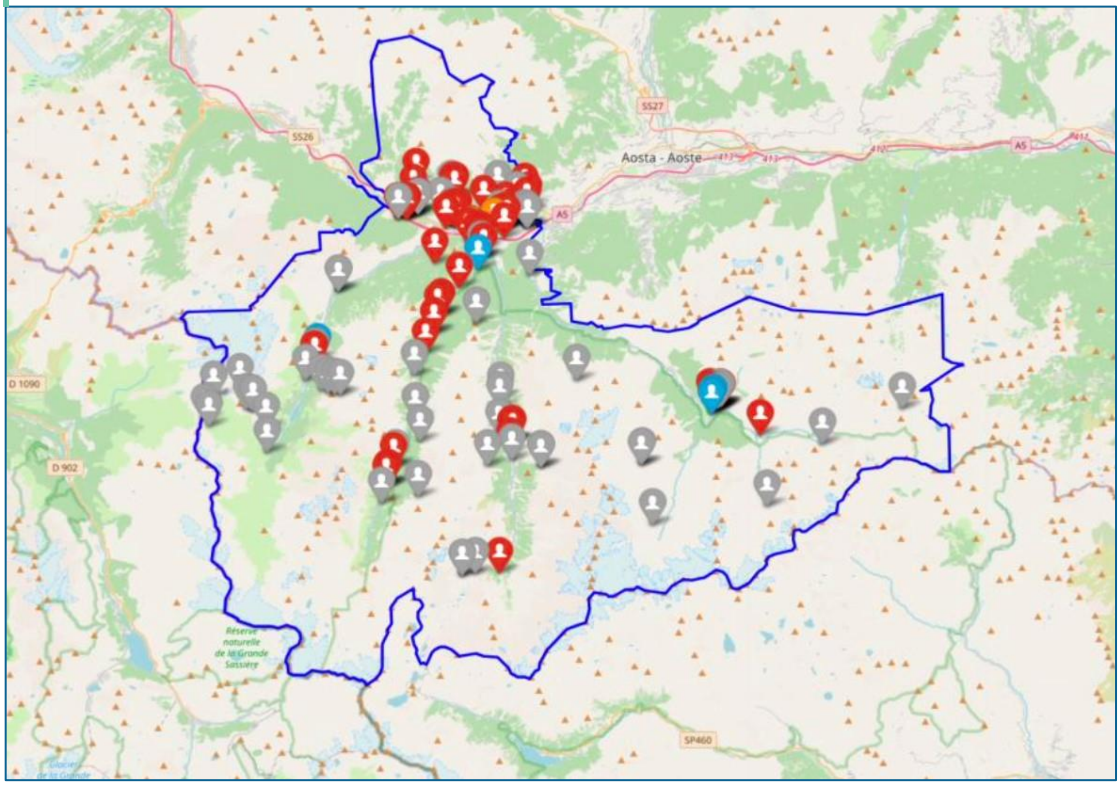


Figure 19: The map shows on a georeferenced scale the buildings analyzed within the Conventional Area of Villeneuve: in red the municipal buildings, in grey the regional buildings, in orange the buildings of the UCGP, and in blue the buildings of the SMEs.

Below are the results of the CVd'A study for the area concerning the four reference scenarios.

Table 16 –REC Data analisys - Conventional area under the Villeneuve primary cabin

Parameter	Scenario			
	1 Communes	2 PA	3 PA+SME	4 PA+SME+ Households
Installed power [kW]	1,186.00	1,486.00	1,486.00	1,486.00
Annual PV production [kWh]	1,195,360.00	1,529,962.00	1,529,962.00	1,529,962.00

Parameter	Scenario			
	1 Communes	2 PA	3 PA+SME	4 PA+SME+ Households
Annual consumption [kWh]	731,261.00	994,288.00	1,632,089.00	2,039,771.00
Annual shared energy [kWh]	318,205.00	433,591.00	671,041.00	779,975.00
Non-shared energy [kWh]	877,155.00	1,096,371.00	858,921.00	749,987.00
PBT with FP 20% [years]	-	13,.0	12.50	10.30
% energy shared/energy produced	**26.62%**	**28.34%**	**43.86%**	**50.98%**

As pointed out in the simulations, **the aggregation of SMEs and households would increase the percentage of shared energy, thereby increasing the profitability of the REC**, which in the case of scenario 4 has a Pay Back Time (PBT) in new PV installations built for the configuration of 10.3 years.

It is important to note that in the simulation for calculating the payback time, a non-repayable contribution (FP) of 20% was assumed, which is lower than the maximum 40% grant provided under the NRPP, in order to avoid an excessive reduction of the subsidized tariff for shared energy. It should be noted that the aggregation of SMEs in the REC entails, in accordance with the provisions of the CACER decree (MASE Ministerial Decree No. 414 of December 7, 2023), the application of a reduced subsidized tariff, if a non-repayable grant is accessed for the installation of the systems. This reduction factor does not apply to electricity shared from consumption points owned by territorial entities and local authorities, religious institutions, third sector organizations, and environmental protection entities.

The proposed model therefore envisages the inclusion of households and SMEs in a mixed public-private Renewable Energy Community. Compared to the previous model, this approach allows for the direct inclusion of households experiencing energy-poverty, enabling them to actively participate in the Community.

To facilitate the bottom-up participation of these actors, it can be useful to **implement initiatives and support tools promoting social aggregation in the establishment of RECs**. Among these we can mention the **Sun4U App**, developed within the framework of the European urban sustainable development project promoted by ICLEI Local Governments for Sustainability, a global network of more than 2,500 local and regional governments, which allows the aggregation of members, the sharing of necessary information to simulate the best REC configuration, and the identification of financial resources for the implementation of the system.

Focus on Citizen Participation in an REC

The individual citizen, or household user involved, can participate in a REC either as a consumer or as a prosumer (consumer + producer). In the first case, the citizen holds a point of delivery (POD) connection within the primary substation where the REC operates. By adhering to the REC's statute, he exposes his consumption to it, which is relevant for the hourly quantification of the shared energy.

In this way, the citizen member of the REC contributes to the generation of revenue and can benefit from a share of it. The revenue distribution plan among the members of the REC, distinguishing between consumers and prosumers, will be defined by a private law agreement among the REC members themselves, in accordance with the provisions of the statute. This is subject to the following limitation introduced by the MASE Decree 2024:

if the percentage of shared energy compared to the produced energy exceeds 55%, the incentive generated by the excess must be reserved for consumers who are not businesses and/or used for social purposes having an impact on the territories where the systems are located.

In the event that incentives and capital contribution (NRPP) are combined, the threshold decreases from 55% to 45%.

Applying this regulatory provision, it appears that the 45% threshold is exceeded by approximately 6 percentage points in the case of household participation in the REC. Therefore, the system would allow, in addition to direct participation of households in the REC, the potential allocation of this excess specifically for addressing energy poverty.

> Extract of the MASE Decree 141/2023 - Art. 3(g)
> ... *CACERs ensure, through explicit statutory provision, private contractual agreement, or, in the case of individual self-consumption, a declaration in lieu of affidavit that any excess premium tariff amount, compared to that determined based on the threshold value of shared energy percentage as specified in Annex 1 (45 or 55%) is allocated exclusively to consumers other than businesses and/or used for social purposes having an impact on the territories where the sharing systems are located. The CACERs also ensure comprehensive, adequate and proactive information to all end consumers, whether they are, members, shareholders, or collective self-consumers within the same configurations, about the benefits deriving from access to the subsidized tariff provided for in Article 4*.

From an economic point of view, considering a reduced subsidized tariff for the reasons mentioned above, of 110 €/MWh plus 10 €/MWh allocated for the compensation of grid charges, totaling 120 €/MWh, the following data are obtained for the 261 participating households:

- Shared energy generated by households: 108,934.00 kWh/year
- Shared energy per household: 417.37 kWh/year
- Economic value: 13,072.08 €/year
- Specific contribution per household: 50.08 €/year
- Value of the excess quota above 45% for social purposes: €5,597.12

Considering the remaining available energy in the configuration, economic estimates can be improved by optimizing the alignment between the consumption patterns of participating citizens and the renewable energy sources production, thus increasing the shared energy quota.

In this regard, the concluding notes from the CVd'A study suggest that *optimizing the PBT of the REC is feasible by adjusting the installed capacity and related investment, or by modifying the composition of the REC, changing the number of PA buildings and households participating as consumers, or considering the inclusion of SMEs and/or additional entities such as religious institutions, third sector organizations and environmental protection entities. Such evaluation should be subject of a more detailed feasibility studỳ, aimed at optimizing the composition of the REC, involving fine-tuning of installed capacity/capex parameters and the users involved*.

Similar considerations can be made for the REC pertaining to the Aosta West primary substation.

Integration of Sun4All models with other measures

The **National Energy Income Fund**, as introduced in chapter 3, targets households experiencing economic hardship by facilitating the installation of domestic photovoltaic systems with the objective of supporting energy selfconsumption and promoting the use of renewable energy.

Although northern Italian regions have a limited allocation of funds, this initiative, set to begin in July 2024, can complement both proposed models and, if appropriately promoted, lead to the development of new photovoltaic installations, further integrating income from energy and renewable energy production.

11. Replication and Scalability Potential

With its constant commitment to energy and environmental sustainability, and a vision that extends, thanks to Sun4All, to community and social aspects, the Unité Grand-Paradis aims to position itself at the regional level as a **privileged laboratory** for experimenting with innovative solutions for the benefit of the community and the most vulnerable segments of the population.

What is proposed in this plan represents the **first attempt by a local authority in Aosta Valley to include the issue of energy poverty** among the key themes of its programming. In this perspective, a dialogue will be initiated with the relevant regional offices, the COA energia, and other stakeholders in the sector to share the Plan and to concretely evaluate the feasibility of the proposed actions and their extension to other similar contexts.

The proposed models can be **replicated and adapted** both to the scale of the other Unité des Communes in Aosta Valley and, with the appropriate adjustments, to the scale of individual communes. The same consideration applies to the spatial dimension, which is thus far unprecedented for local authorities, related to the electrical distribution network and the mapping of the territory concerning primary transformation substations. This latter concept often transcends normal administrative boundaries, laying the foundations for connecting, in the perspective of RECs, portions of territory spanning across different municipalities and different Unité des Communes.

The replicability of the Plan is further strengthened using a **common methodological base** represented by the CVd'A study, which covered the entire regional territory. Therefore, all local administrations in Aosta Valley (Unité and Communes) have already the methodology and data on which to base models like those proposed in the Plan. This is well illustrated by the regional map derived from the CVd'A study, which shows all the buildings mapped in the regional territory for which the possibility of installing new photovoltaic systems has been assessed and simulated.

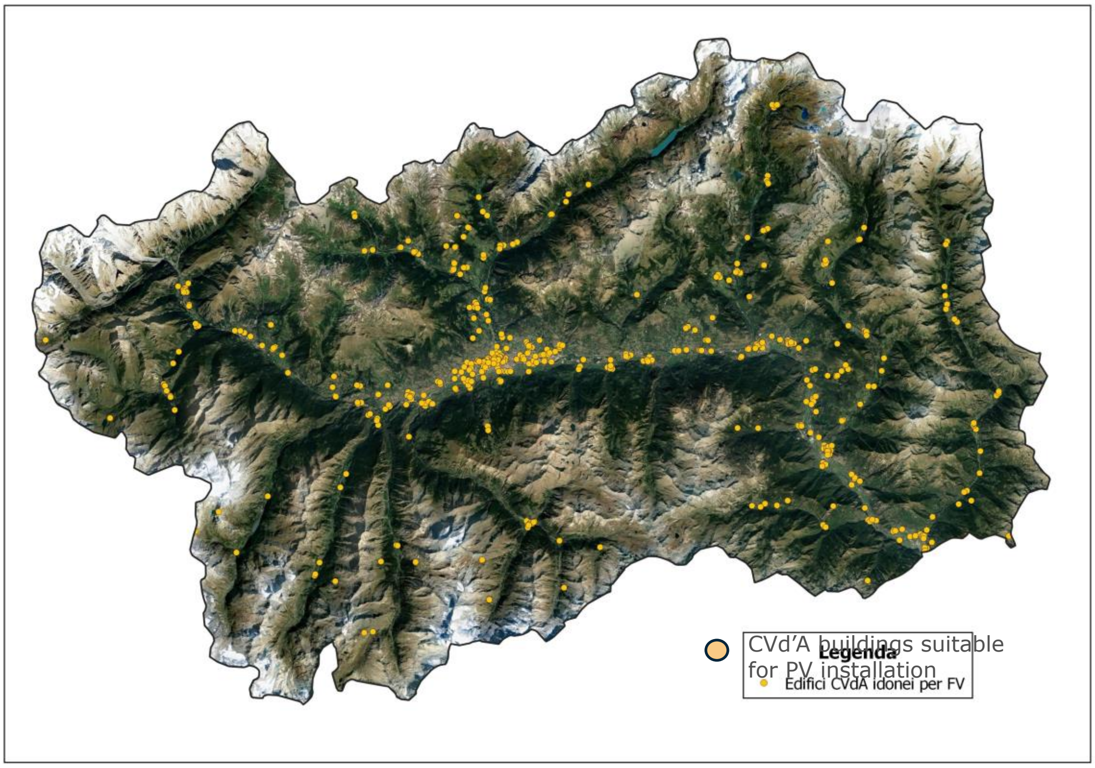


Figure 20: CVd'A Study - Mapping of the buildings suitable for photovoltaic installations in Aosta Valley.

Finally, the **information material** produced by UCGP during the project will be shared with the other Aosta Valley Unités des Communes so that they too can initiate educational activities with their residents and promote the creation of RECs.

12. References

Relevant policy documents:

- **DLGS 199/21** – Final transposition of Directive 2018/2001.
- **DELIBERA ARERA TIAD 727/2022/R/eel** Integrated Text on Distributed Self-Consumption (TIAD) regulates the methods for enhancing distributed self-consumption for configurations provided for by Legislative Decree 199/21.
- **Minister of Environment and Energy Security Decree of December 7, 2023, No. 414** (commonly referred to as the CACER Decree) - It regulates the subsidized tariffs for RES installations integrated into distributed selfconsumption configurations and the access to the NRPP Contribution for Energy Communities and collective self-consumption in municipalities with up to 5,000 inhabitants.
- **GSE Operating rules** - DECREE CACER and TIAD Operating rules for access to the diffuse self-consumption service and the PNRR contribution.

Planning decuments:

- **Framework Programme Agreement Aosta Valley Region for the "Internal Area - Grand-Paradis" - Accordo di programma quadro Regione Valle d'Aosta "Area interna - Grand-Paradis"** – Agenzia per la Coesione Territoriale Ministero dell'Istruzione, dell'Università e della Ricerca Ministero delle Infrastrutture e dei Trasporti Agenzia Nazionale per le Politiche Attive del Lavoro Ministero delle Politiche Agricole, Alimentari e Forestali Ministero della Salute, Regione autonoma Valle d'Aosta/Vallée d'Aoste Unité des Communes valdôtaines Grand-Paradis, gennaio 2020.
- **PEAR VDA 2030** – 2030 REGIONAL ENVIRONMENTAL ENERGY PLAN FOR AOSTA VALLEY – Aosta Valley Autonomous Region - Assessorato Sviluppo economico, Formazione e Lavoro, Trasporti e Mobilità sostenibile Dipartimento Sviluppo economico ed energia - Finaosta S.p.A. COA energia, ottobre 2023.

Studies

- **CVd'A - Energy Communities for the Aosta Valley- Specification for the UCGP** - Feasibility pre-study aimed at identifying the potential of "municipalities-centred" energy communities in the region – CVA Group in collaboration with the Department of Economic Development and Energy of the Aosta Valley Autonomous Region and COA Energia – Finaosta SpA, marzo 2024.

- **Guidance on Renewable Energy Communities with Social Impact** - Guida alle comunità energetiche rinnovabili a impatto sociale – Fondazione Compagnia di San Paolo, Versione 4 marzo 2024.
- **Energy poverty in Italy 2022 - La Povertà Energetica in Italia nel 2022** - Italian Observatory on Energy Poverty (OIPE), febbraio 2024.
- **UNITÉ DES COMMUNES VALDÔTAINES GRAND PARADIS ENERGY FRAMEWORK -** Finaosta S.p.A. COA energia, gennaio 2024.
- **Guide for Municipalities - VADEMECUM ANCI PER I COMUNI** - Autoconsumo Individuale a Distanza e Comunità di Energia Rinnovabile - GSE (National Energy Services Management Company) and ANCI (National Association of Italian Communes), aprile 2024.

Surveys

- **Bonus Social VDA**, Legge regionale 23 settembre 2022, n. 21 – Articolo 2 – Sintesi finale.

Web site:

- https://sun4u.it
- https://oipeosservatorio.it
- https://www.gse.it/servizi-per-te/autoconsumo/gruppi-di-autoconsumatorie-comunita-di-energia-rinnovabile
- https://www.mercatoelettrico.org/it/
- https://www.regione.vda.it/energia/default_i.asp

Annex 9

Sun4All Sustainable Implementation Plan for the València Clima i Energia y Las Naves (Ayuntamiento de València)

Sun4All Sustainable Implementation Plan

València Clima i Energia & Las Naves (Municipality of Valencia)

July 2024

Project title	Eurosolar for all: energy communities for a fair energy transition in Europe (Sun4All)
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Executive summary

Executive summary – textual element
This plan seeks to alleviate energy poverty in the city of Valencia through the implementation of a collective self-consumption (CSC) PV installation, Requiem in Power (RIP) project, that will provide free energy to vulnerable households. In order to do so, the implementation plan of Sun4All will provide a useful and replicable working methodology with social services for the management of the participants of the CSC, including agile and useful resources and tools for the social intervention done by social services, linking social intervention with energy.

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
CAP	Personalised Action Commitment
CSC	Collective Self-Consumption
DSO	Distribution System Operator
EO	Energy Office

FVCiE	Framework for Vulnerability Classification in Energy Poverty
GHG	Greenhouse Gas
GVA	Servei Valencià d'Ocupació i Formació-LABORA
LOPD	Ley Orgánica de Protección de Datos
MCSS	Municipal Centres of Social Services
NGO	Non-Governmental Association
ODOO	Integrated ERP software
PEI	Prestaciones Económicas Individualizadas
PV	Photovoltaic
RAI	"Renta Activa de Inserción" – Employment integration program
RIP	Requiem in Power
RVI	"Renta Valenciana de Inclusion" – Regional program of subsidies for low-income households
SAD	"Servicio de Atención Domiciliaria" – Home care service
SEPE	Valencian Employment Service
Socyal	Social Services database
VCE	València Clima i Energia

1. Introduction

Introduction – textual element

By installing a CSC PV installation - RIP project, that will give vulnerable homes free electricity, this initiative aims to reduce energy poverty in Valencia. In order to achieve this, the Sun4All implementation plan will offer a practical and replicable working methodology with social services for the management of CSC participants. This working methodology will include flexible and practical resources and tools for the social intervention carried out by social services, which will establish a connection between social intervention and energy.

Another action of the plan is to raise awareness among citizens about energy consumption, savings, efficiency, renewable energies, and the reduction of greenhouse gas (GHG) emissions.

The plan wants to integrate RIP in the draft of the Energy Vulnerability Action Plan of the City Council of Valencia and its coordination with other municipal initiatives linked to energy and exclusion.

The project will be linked to other projects and initiatives that take place in the city such as WELLBASED project, where the control group participants will be able to be part of the project.

2. Work Process

Work Process – combination of textual and visual elements

The steps to achieve the outcome of the project have been structured as follows:

1. To develop a guide of requirements to benefit from the project, under definition with Social Services.

- Define the criteria for the beneficiaries (who can access) and how to prioritize them:
    - Meetings carried out with municipal decision-makers and Social Services
    - Under definition with Social Services that would be the entity responsible for selecting the vulnerable households to participate in the scheme
    - Define vulnerable criteria with debts paid, subsidies received, etc
- Identification of vulnerable households by Social Services:
    - Meetings to establish the process (internal, with Social Services)
    - Social Services will oversee this task using their database and selecting the profiles based on subsidies that they already perceive

2. To develop a work plan for the recruitment strategy:

- Mapping and direct interaction with neighbourhood-specific grassroots organizations
- Engagement and collaboration with local energy cooperatives and social stakeholders to support the pilot implementation
- Tailored awareness-raising campaigns
- Organization and development of informative events targeting vulnerable households

3. To develop a Work Plan for the engagement strategy:

- Tailored support for participating in the scheme around 5 target areas of the city, related to 5 municipal PV plants accounting for more than 2 MW installed power:
    - Guidance under development, to be provided once the participant is registered, the small cemeteries will be used as a trial
    - Energy Office (EO) training and materials, using existing material
- Direct contact for offering technical and administrative support to vulnerable households participating in collective self-consumption and coordinating with relevant stakeholders or already existing public services
- Personal provision and explanation of the guides and materials: under development

4. Gather all the evidence and documentation to develop the Sun4All Sustainable Implementation Plan for Valencia.

3. Current State of Energy Poverty Action

Current State of Energy Poverty Action – combination of textual and visual elements

In Valencia, the official definition of energy poverty divides the causes of energy poverty (Municipality of Valencia, 2016):

- internal to the home – low income, inefficiency, misinformation, and so on
- external to the home caused by the energy market – high costs, insufficient subsidies, market complexities, and so on

The municipality also reportedly tries to go beyond the requirements of the Spanish government, treating energy as a right, and working to remove stigma and other barriers to their services to improve engagement with households. It is particularly noted the impact of high energy prices on energy poverty, which is something omitted from the national government definition.

The results of the Valencian study found that 32.7% of Valencians experienced feeling too cold and/or too hot at home, which affected their day-to-day lives negatively. Also, 12.2% spend more than 10% of their income on energy bills, and 18.2% allocate more than twice the national median share of energy expenditure in income on their energy bills. Another 15% are deemed to be at

Current State of Energy Poverty Action – combination of textual and visual elements

risk of energy poverty – i.e. they would fall into energy poverty if energy costs increased or income decreased (Municipality of Valencia, 2016).

Also identified at the national level, is the inability to keep cool in the summer, a key issue in Valencia. Due to the warmer climate, the winters are relatively mild, and thus people tend to suffer more discomfort from the heat in the summer, rather than the cold in winter. Recently, an update on this study has been carried out. Preliminary findings show that the situation has not improved since 2016.

Four key strategies to tackle the issue in the city were identified:

1. Governance: Consolidation, coordination, monitoring, policy advocacy
2. Prevention: For the citizens: Training, rehabilitation, shelter, employment
3. Correction: Specific attention to vulnerable populations: training, employment, participation in renewable energies
4. Urgency: Emergency aid

A fuel poverty map of Valencia was produced by Gomez-Navarro et al. (2021), based on the municipality-commissioned study, demonstrating clear inequalities in fuel poverty levels between the city districts.

The RIP project is being developed in 5 public cemeteries, where solar panels will be installed on the graves to generate energy that can be used for vulnerable groups.

The groups most affected by energy poverty are low-income households and aged people.

4. Stakeholder Mapping and Coordination

Stakeholder Mapping and Coordination – combination of textual and visual elements

As a result of the diagnosis done by the technical assistance that included interviews with key actors and the collection and analysis of information, it's considered important to establish the technical possibilities of coordination between the City Council and VCE to determine different working procedures.

1. Identification of Key Rip Stakeholders

In order to successfully implement the project and reach the maximum possible number of vulnerable households, key players in the city have been identified to be part of the project throughout its duration.

The main key actors in RIP will be:

- Municipal RIP project coordinator
- VCE Foundation RIP Project Coordinator
- RIP project coordinator appointed by MCSS
- Municipal Planning and Innovation Section
- Municipal Primary Care Section
- Municipal Section for the Promotion of Autonomy
- Municipal Social and Labour Insertion Section
- Municipal Statistics Office
- Energy Offices
- Servei Valencià d'Ocupació i Formació-LABORA (GVA)
- Social Entities
- Single Manager

It is proposed to gather them as a Joint Technical Commission with defined responsibilities, such as.

- Convene the most appropriate municipal persons/sections for the design and implementation of the different phases of the project
- Convene the rest of the people who will form, together with the Joint Technical Commission, the area-specific Joint Technical Commissions
- Decide on the general recruitment criteria and conditions
- Decide on the maximum time the households will be linked to the project
- Decide on the number of households that can be linked per zone (depending on the coefficient of participation in the photovoltaic installation)

The project tasks can be split into 3 different categories, and in each of them different key players will take part:

- Coordination of the technicalities such as PV plant installation, management, and maintenance that will be coordinated between VCE and the municipal coordinator (Project coordinator at municipal level and VCE)
- Recruiting and follow-up of vulnerable households will be done by Social Services in coordination with VCE to define the eligibility criteria, the recruitment process, and follow-up planning (Social Services, NGOs, Energy Offices)
- Management of the participants and DSO (manager of the scheme)

Stakeholder Mapping and Coordination – combination of textual and visual elements

2. Coordination Process

First steps for the coordination between VCE and Social Services:

There is communication between the Municipal Centres of Social Services (MCSS) and VCE through the energy offices and referrals are made from the MCSS of people in vulnerable situations to be attended in the Energy Offices.

This communication is different depending on the MCSS and the professional social worker of reference, since, after the attention in the MCSS, it can be done through:

- Direct referral of the professional person to the Energy Office (using a referral sheet)
- Indicate to the person in a situation of vulnerability to make an appointment in the Energy Office

In both cases, the information is recorded in the Social Services database (*Socyal*) and in the file of the person being intervened in the MCSS, but it is up to the person whether they are attending the Energy Office appointment and whether a communication channel can finally be established between the Energy Office and the MCSS reference professional.

Making people responsible for their process is part of the social intervention and is a way of gauging their involvement, but with this system it is not possible to check how many referrals are made and how many are attended to the Energy Office, thus losing relevant information.

Another referral possibility is to request an appointment at the Energy Office directly from the MCSS referral professional through telephone or e-mail contact or set a fixed date in the MCSS when the referred people can go and are attended there by the Energy Office experts. In this case, it is known in advance at the Energy Office that a referral is going to take place and the reference professional with whom to coordinate and return information from the Energy Office is known.

In the existing scenario, some difficulties have been identified:

In order to make the referral from the MCSS to the Energy Office, a *Doc.1.-Sheet for referral to the Energy Office* has been designed, which must be completed specifically with identification data (previously collected in *Socyal*) and it is also necessary to sign a *Doc.2.-Consent for the transfer of data to third parties*, a copy of this must be kept in the MCSS. This procedure is time-consuming, which makes the referral process tedious and sometimes makes MCSS professionals opt for other, more direct ways, as they hardly use the document *Doc.1.- Referral sheet to the Energy Office*.

If there is no referral sheet or prior communication requesting an appointment from the MCSS reference professional to the EO when the person finally goes to request an appointment at the EO, there are many difficulties in knowing where the referral comes from (which MCSS professional attended the person), the intervention proposal that was made, the time that has passed since the MCSS care and the appointment request and whether or not information has to be returned to the reference professional and to whom, which sometimes entails a considerable investment of time to be able to gather this information.

Stakeholder Mapping and Coordination – combination of textual and visual elements

The application for an appointment at the Energy Office is itself a complex procedure.

- If an appointment is requested by telephone, there is a triage procedure at the reception of the Energy Office which, once it has been cleared and decided that it is a case to be dealt with by the Energy Law professionals, includes the applicant in a *Doc.3.-Excel Reception List sheet*, where the request is noted down and it is the Energy Law professionals who call the person back and make an appointment by consulting their personal agendas and time availability.

Telephone calls can be taken from: the general telephone line, telephones of each Energy Office, and personal mobiles of the Right to Energy professionals. This triple entry of appointment requests can lead to duplication.

- If the appointment is requested in person, the request is collected after the previous triage and goes to *Doc.3.-Excel Reception List* or if it coincides with the availability of the Energy Law professional to attend you at that moment, the first attention can be given.

Once the appointment has been made (which can take up to one or two weeks) and if the person attends, the intervention begins in the Energy Office with its system of intervention registration and data protection in the ODOO database, independent of the *Socyal* database used in the MCSS.

According to the information gathered, the difficulties identified are as follows:

- Few *Doc.1.- Energy Office referral sheets* are filled in and hardly reach the Energy Office. It is impossible to assess the success rate of referrals from MCSS.
- Arranging the appointments is a time-consuming task because the person concerned has to be called back and may not be easy to contact. In addition, time must be set aside each week to review and retrieve from this *Doc.3.-Excel Reception list* those people who could not be contacted initially.
- Identifying the reference professional with no referral sheet or previous contact is very complicated and can delay or make it impossible to return information from the EO on the intervention process.
- Communication between Social Work professionals in the MCSS and the Energy Office is established via e-mail or telephone, often duplicating information recording in the different databases (Socyal and ODOO) with the consequent duplication of time and possible errors.
- The complexity of the communication between entities can hinder the social intervention, as the return of information may not arrive on time, as the Energy Office is not aware of the intervention proposal or its timing, and in the MCSS, they do not know when the intervention is taking place until the information is prepared and returned. There is communication, but it is difficult to maintain a coordination of actions that is useful for the social intervention of the MCSS reference workers.

Stakeholder Mapping and Coordination – combination of textual and visual elements

To improve communication and coordination (ordered by degree of difficulty) some ideas are proposed:

- Enable access to the Socyal database for the FVCiE (Framework for Vulnerability Classification in Energy Poverty) to a part of the individual file (encrypted and with all security measures) in which the intervention carried out can be recorded in the Socyal database itself and speed up the referral and transfer of information.
- Enable computer access to an information gateway that connects Socyal and ODOO databases and from which direct referral to MCSS can be made and the intervention carried out in the EO can be recorded in the corresponding file, thus making the information available at the time and improving the coordination of social intervention.
- Incorporate FVCiE and the EO as entities agreed with the City Council so that they can have the same treatment regarding data protection and the transfer to third parties that exist with the list of entities agreed for individual economic benefits (PEI) such as dental clinics, opticians, which appear in the complementary information of Procedure BS.TP.10 Individualised economic benefits. Subsidies for social needs.

These options need to be explored with the relevant service and IT.

According to the privacy policy published by València City Council:https://www.valencia.es/val/politica-privacitat/-/content/politica-privacidad-pie-web?uid=A1A78F99CC5543E8C125830100329206

- Include the València Clima i Energía Foundation, the Energy Office and the Fundación Las Naves, as entities with Social Action Activities in the Register of Holders of Social Action Activities of the Generalitat Valenciana to be included as recipients of the communication of data on recipients of the Valencian Inclusion Income Subsidy: https://www.gva.es/es/inicio/procedimientos?id_proc=20020
- Establish 3 fixed weekly mornings to attend potential participants in each Energy Office, previously scheduled, so that the Right to Energy professionals can speed up appointments. The multitude of tasks currently entrusted to them makes this prior calendar difficult, as their availability is highly variable depending on the other activities outside of direct attention that they are in charge of.

5. Defining Criteria and Conditions for Participation

Defining Criteria and Conditions for Participation – combination of textual and visual elements

The criteria to participate in the project are under development among VCE and Social Services.

The municipal center of Social Service will select the households based on distance criteria; each cemetery will have a maximum number of households that can join depending on the PV share:

Priority	Installation	Nominal Power (kWn)	Max Power (kWp)	Vulnerables households [%]	Households at 0,8 kWp	Households at 0,5 kWp	Social service center
1	Grau	50	62,7	99%	78	**125**	Nazaret, Trafalgar, Cabanyal
2	Benimamet	96	111,1	98%	137	**218**	Campanar
3	Campanar	100	161,15	98%	198	**316**	Campanar, Olivereta
4	Cabanyal	510	618,24	20%	155	**248**	Malvarrosa, Cabanyal, Trafalgar
5	General I	1560	1877,72	13%	306	**489**	San Marcelino, Patraix, Quatre Carreres
	General II	20	19,78		0	**0**	
	Total	**2336**	**2850,69**	**25%**	**874**	**1426**	

Table 1. Households' information and PV share

Another criterion to participate is to have the electricity contract under the name of the beneficiary and to perceive or have perceived subsidies from the municipality that are aligned with the project. Also, Social Services can select the profiles that they consider suitable for the scheme.

It is proposed by the technical assistance to run a pilot trial splitting the households into a control group and an intervention group. The intervention group receives training and workshops to better use the energy they receive and be more efficient. The control group does not get any of it. The pilot study is proposed to take place in the Grau area, it is advisable to start with a distribution of 0.5 kWp to 125 households, establishing two groups of target households:

- 1st group would follow all phases of the project including training workshops and active involvement of the target households
- 2nd group would not be provided with information

With this measure, we intend, in the first pilot, to study two hypotheses. One is if the availability of free energy raises the general levels of household consumption, the other is to check if training vulnerable households on collective self-consumption is associated with better use of the renewable energy supplied.

Beforehand, it would be the responsibility of the Joint Technical Commission to carry out a prior analysis of the available data about energy poverty in the territory affected by the installations, requesting them from the relevant bodies.

It would be necessary to analyze the latest data on some topics to develop a document with all the relevant data (*Doc. RIP.1*), an integrated visualization map

Defining Criteria and Conditions for Participation – combination of textual and visual elements

of Energy Poverty data, and related actors by the area affected by the installations. Namely:

- Energy Poverty by neighborhoods provided by FVCiE and updated annually
- Statistical data by territory from the Municipal Statistics Office
- Existing social resources in the area affected by the facilities provided by the Planning and Innovation Unit
- Data on the intervention of the MCSS in the field of Energy

The document would identify neighborhoods for preferential action and social resources that could be incorporated into the project, being specific for each area of intervention.

In the configuration of the Joint Technical Commission, it would be advisable, at the beginning of a specific installation, to convene the RIP project coordinator(s) of the MCSS that would be affected by the installation, configuring a specific Joint Technical Commission for each area.

Thus, if we were to start the project in Zone 1 belonging to Grau cemetery, the designated RIP coordinators of the MCSS Nazaret, Trafalgar, and Cabanyal should be summoned to the zone-specific Joint Technical Commission.

This zone-specific Joint Technical Commission would draw up the:

- *Doc. RIP.2* - Selection criteria adapted to the intervention zone.

- *Doc. RIP.3* - Calendar of RIP actions in the area.

- *Doc. RIP.4* - Preliminary unified list with households and entities that are candidates to participate in the project for each intervention zone that is useful for the rapid implementation of the collective self-consumption RIP.

PRELIMINARY CRITERIA FOR THE SELECTION OF VULNERABLE HOUSEHOLDS (NOT VALIDATED)

To facilitate the selection of vulnerable households by zone, an initial criteria is proposed, this could serve as a basis for the preparation of the *Doc. RIP.4 - Preliminary Unified List*, which must be consulted and assessed beforehand. However, this document has not been validated yet.

These criteria respond to the logic of inclusion in pre-existing dynamics, ease of management, and data protection.

1. Location of the household in the neighbourhood prioritised by the Municipal Energy Vulnerability Action Plan within the area.

To respond to Valencia City Council's Energy Vulnerability Action Plan, households linked to RIP must be in neighbourhoods, where there are plans for coordinated action by different measures of the Plan, so that the impact of RIP and its contribution to the Municipal Energy Vulnerability Action Plan can be measured.

Defining Criteria and Conditions for Participation – combination of textual and visual elements
2. Ownership of the household electricity supply contract The characteristics of the project's collective self-consumption require recipient families to own the energy supply contract in order to participate in the RIP, which eliminates many households in need of assistance. 3. Receive or have received subsidies and/or benefits that imply an activity agreement, inclusion commitment, or personalised activity agreement either from the City Council, GVA, or Labora. With this measure, the aim is to integrate RIP within the existing mechanisms of social intervention of the MCSS. The signing of a personalized agreement commitment (CAP in the processing of municipal PEIs) or if benefiting from *Renta de Garantía de Inclusión Social* (RVI), *Renta Activa de Inserción* (RAI), or *Ingreso Mínimo Vital* (IMV), implies involvement in the inclusion process of the proposed vulnerable household and make it mandatory, to benefit from solar energy, to carry out certain activities. The advantages of this criterion are multiple: • There is a preliminary assessment of the situation of social exclusion by specialised technical staff • There is a relationship and a previous intervention proposal that can be oriented to RIP and the consequent improvements in quality of life and inclusion • With the existence of a commitment to personalised agreements/intervention projects or with the relevant denomination, the transfer of data to third parties has already been formalised by the different participating organisations • The involvement of the Vulnerable Household in the actions proposed by RIP is expected The following table shows benefits and assistance involving commitments, with a compilation of benefits and assistance and the option to include a commitment agreement.

	PRESTACIONES		DESCRIPCIÓN Y EXISTENCIA O NO DE COMPROMISOS Y/O PLAN DE INTERVENCIÓN
GVA	Renta Complementaria de Ingresos por Prestaciones RVI	s://inclusio.gva.es/es/web/integracion-inclusionsocial-cooperacion/renta-enciana-de-inclusion-rvi	Dirigida a complementar el nivel de ingresos de la unidad de convivencia cuando los ingresos de ciertas pensiones o prestaciones sociales (no incompatibles) sean insuficientes
	Renta Complementaria de Ingresos del Trabajo RVI		Dirigida a complementar el nivel de ingresos de la unidad de convivencia cuando los ingresos del trabajo sean insuficientes. Actualmente se encuentra en desarrollo, **no está disponible**
	Renta de Garantía de Ingresos Mínimos RVI		Dirigida a las unidades de convivencia en situación de riesgo de pobreza o exclusión social sin suscribir un acuerdo de inclusión y siempre que no haya personas menores de edad en la unidad
	Renta de Garantía de Inclusión Social RVI		Dirigida a las unidades de convivencia en situación de riesgo de pobreza o exclusión social **suscribiendo un acuerdo de inclusión a cambio de un incremento en la prestación final**
LABORA -SEPE	RENTA ACTIVA DE INSERCIÓN	https://www.sepe.es/HomeSepe/Personas/distributiva-prestaciones/he-dejado-de-cobrar-el-paro/no-tengo-prestacion.html	Si sigues en paro y no tienes derecho a la prestación contributiva ni al subsidio por desempleo, puedes solicitar la renta activa de inserción (RAI) Personas desempleadas de larga duración. Personas con discapacidad, Personas emigrantes retornadas.Víctimas de violencia de género, violencia sexual o violencia doméstica. **Con acuerdo de Actividad**
SEGURIDAD SOCIAL	INGRESO MÍNIO VITAL SEGURIDAD SOCIAL	https://imv.seg-social.es/	El Ingreso Mínimo Vital es una prestación dirigida a prevenir el riesgo de pobreza y exclusión social de las personas que viven solas o están integradas en una unidad de convivencia y carecen de recursos económicos básicos para cubrir sus necesidades básicas. Se configura como un derecho subjetivo a una prestación económica, que forma parte de la acción protectora de la Seguridad Social, y garantiza un nivel mínimo de renta a quienes se encuentren en situación de vulnerabilidad económica. Persigue garantizar una mejora real de oportunidades de inclusión social y laboral de las personas beneficiarias. particpar enlas estrategias de intervención que promueva el Ministerio de Inclusión, Seguridad Social y Migraciones
AYUNTAMIENTO DE VALÈNCIA	AYUDAS DE NECESIDAD SOCIAL. PRESTACIONES ECONÓMICAS INDIVIDUALIZADAS PEI	https://sede.valencia.es/sede/registro/procedimiento/BS.TP.10?lang=1	las prestaciones económicas individualizadas (en adelante PEI) son un derecho subjetivo en los términos establecidos en el artículo 32 de la ley 3/2019 de Servicios Sociales de la Generalitat, que se concreta a través de actuaciones de carácter profesional y económico dirigidas a personas individuales o unidades de convivencia, a fin de remediar una situación gravemente deteriorada, de urgente necesidad o con graves problemas específicos que afecten a su autonomía personal, social y económica, y que no puedan resolverse con medios propios. El fin que se pretende es satisfacer las necesidades básicas y mejorar las condiciones de la calidad de vida de todas aquellas personas que cumplan los requisitos específicamente regulados para el acceso a esta prestación **Con compromisos de acuerdos personalizados**
	SERVICIO DE AYUDA A DOMICILIO	https://sede.valencia.es/sede/registro/procedimiento/BS.MA.60?lang=1	Recibida la solicitud los equipos profesionales de los CMSS serán los responsables de estudiar y valorar la necesidad, realizar el correspondiente diagnóstico y diseñando el **proyecto de intervención individual y/o familiar**, aplicando el baremo establecido al efecto y que se expone en el Anexo I para aquellas solicitudes pertenecientes a los sectores de Tercera Edad y Diversidad Funcional.

Table 2. Benefits and assistance involving commitments

Defining Criteria and Conditions for Participation – combination of textual and visual elements

4. Identification of the reference professional in MCSS to monitor the intervention.

In order for RIP to be an integrated social intervention tool within the system of aid and benefits and to be useful in the social intervention of Social Services, there must be a clear identification of the technical reference person who will carry out the assessment and relevance of the intervention proposal and the agreement of commitments. And it is the individual who should obtain information from RIP for the purpose of monitoring and evaluating their social intervention.

5. Viability of the follow-up by the MCSS reference technician.

This follow-up must be feasible and framed within the intervention process proposed by the MCSS. It may therefore be necessary to establish a ratio of RIP cases per reference professional or to establish internal criteria in the MCSS for its correct development.

6. To be participating in some project/initiative related to energy vulnerability identified and relevant to the area.

It is possible that projects and/or initiatives are already being implemented in the territory linked to energy vulnerability, neighbourhood rehabilitation, unwanted loneliness or others that could contribute candidates to this preliminary list. These would be households already linked in some way to the promoting entities or identified as key actors in the intervention areas.

7. Severity and urgency criteria, determined by each area-specific Joint Technical Commission, which will adapt and/or include selection criteria.
8. It is important to establish the possibility that singular criteria may be arbitrated according to the area of intervention and at the discretion of the MCSS professionals who are the ones who know best the specific circumstances and realities of each area and the existence or not of public and/or private projects and initiatives with which it may be interesting to establish synergies.

Difficulties identified

- It is not easy for MCSSs to consult the Socyal database due to a lack of training to select and create lists including the people that meet the requirements, and are a priori, suitable cases in each intervention area. For example: 'PEIs granted with Personalised Agreement Commitment by reference technician and neighbourhood'. Consultations that could be useful to preliminarily determine possible candidate households in each selected neighbourhood.
- There is currently no inclusion in Appendix 2 of the PEI application form of a commitment that is 'Inclusion in the RIP collective self-consumption project' or 'Municipal collective self-consumption referral sheet' exclusive to this project.
- In the Energy office it is also not easy to make appropriate queries to the ODOO database in order to be able to discriminate specific issues that may be suitable for prioritisation of cases.
- There is a disparity of listings and databases within the different projects that may be implemented by FVCiE and/or Las Naves related to Energy and that could provide Vulnerable Households for the RIP project, e.g. Activage, WELLBASED, Power Up, Value Care....
- The collaboration agreement established between FVCiE- City Council and Labora is not clear, but it would be interesting to incorporate the possibility of proposing vulnerable households receiving subsidies or other benefits with an

Defining Criteria and Conditions for Participation – combination of textual and visual elements

activity agreement to participate in collective self-consumption and with a specific focus on training for Municipal Energy Agents.

- There is currently no system that allows lists to be unified and data to be cross-referenced to avoid duplication, as different actors (mainly MCSS and EO) are intervening in the same households.

Proposals for improvement

The following draft unified list is suggested if the above-described communication and coordination issues cannot be resolved, nor can the enhancements from the preceding section:

1. To develop the Joint Technical Commission in collaboration with the municipal planning, innovation, and IT services Automatic Consultations, as well as a simplified manual for carrying out consultations with Socyal. The manual should specify the criteria that best suit the project's overall requirements as well as the potential for specific area-specific adaptations.
2. Expand the catalogue of Social Needs subsidies currently available to the City Council and add 'incorporation into the municipal collective self-consumption project' to the PEI application in Annex 2. Personalised action commitment (CAP).
3. Create a document for referral to the RIP municipal collective self-consumption project similar to the one that exists with other agreed entities: https://sede.valencia.es/sede/registro/procedimiento/BS.TP.10?lang=1
4. Specific training in explanation, data exploitation from Socyal and management of the RIP municipal collective self-consumption project for municipal technicians who may be involved.
5. Modify, if appropriate, the collaboration agreements signed with LABORA to assess the possible incorporation of households into the project.
6. Make improvements to the ODOO platform to simplify the extraction of information and its possible contribution to the list of candidates with subsequent training and implementation manuals.
7. Create a system for sharing information about the people assisted in the different projects related to energy and exclusion assisted by FVCiE/Las Naves/others in accordance with the LOPD.
8. Design a methodology in accordance with the LOPD that allows the purging of duplicates in the provision of data from different sources to be able to draw up a preliminary unified list of households that are candidates to participate in municipal collective self-consumption**.**

Conclusions on the definition of criteria and conditions for participation:

The channels of communication and coordination that will be employed must be established in advance and clearly.

The members of the Joint Technical Commission and the Technical Commission for a particular area, along with their roles and routes of communication, must be clearly defined.

Integrate all the information that may come from different sources to establish:

- *Doc. RIP.1* - Integrated visualisation map of Fuel Poverty data and actors linked by the zone of incidence of the installations.
- *Doc. RIP.2* - Selection criteria adapted to the intervention area.
- *Doc. RIP.3* - Calendar of RIP training actions in the area.

Defining Criteria and Conditions for Participation – combination of textual and visual elements

- *Doc. RIP.4* - Preliminary unified list with households and entities that are candidates to participate in the project for each zone.

See Figure 1 for a summary of this phase.

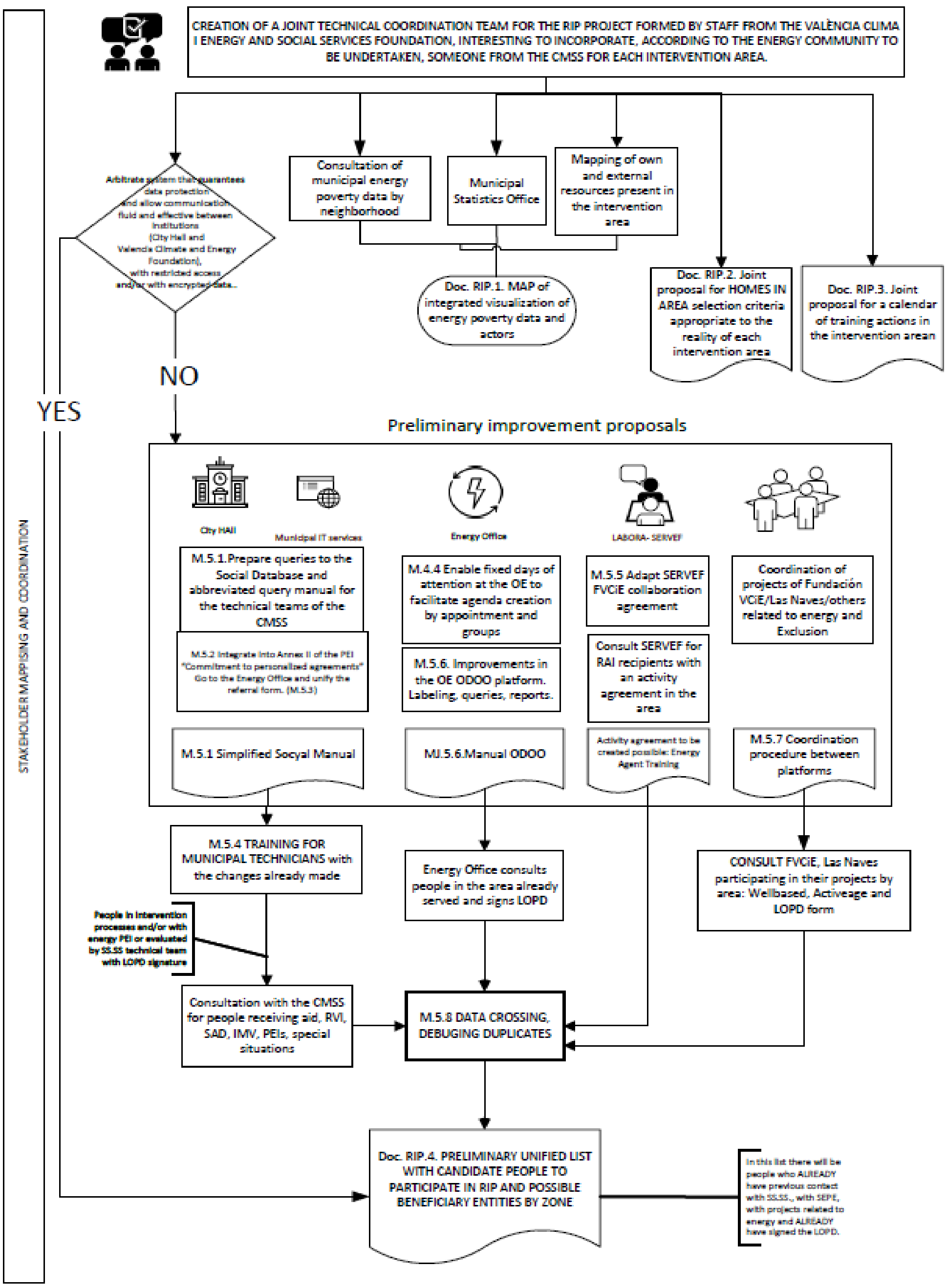

Figure 1. Definition of criteria and conditions for participation

6. Planning Citizen Recruitment and Engagement

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
The recruitment and participation strategy will develop as follows: 1. Adaptation of the Project To Each Intervention Area Strategies for recruitment, participation, and community work plan for each territory will need to be adapted. For this reason, in each intervention zone, the Joint Technical Commission will convene people from the territory in which action is to be taken, setting up a specific Joint Technical Commission for each zone. This zone Joint Technical Commission will review and/or complete the general documents already drawn up: • *Doc. RIP.1*. Integrated visualisation map of Energy Poverty data and linked actors by zone of incidence of the installations. With the identification of singular elements of the specific area that may be relevant for the project. • *Doc. RIP.3.* Calendar of RIP training actions in the area. It is important to schedule the training actions and the milestones for the constitution of the municipal collective self-consumption in advance and with sufficient time for their execution. • *Doc. RIP.4*. Preliminary unified list with households and entities that are candidates to participate in the project for each zone after consulting the databases. It will also decide the number of households to which the production is destined based on the criterion of 0.5 kWp or 0.8 kWp. On the number of members of the control group and assess the possibility of including among the recipients, social action entities registered in the area that have been benefited by the project, and on the number of members of the control group and assess the possibility of including among the recipient's social action entities registered in the area that have been benefited by the project. And finally, will demand that the relevant MCSS technical teams take training measures. 2. Training for Municipal Technicians This training is necessary to demonstrate how RIP may be used as a tool for social intervention and how it can enhance users' quality of life. The technical teams must be able to voice their opinions and take part in the project's development in order for their involvement to be achieved. This training will cover the following topics: the rationale behind RIP, the process of calling and/or referring cases, the benefits that collective self-consumption can offer those receiving MCSS assistance, the anticipated timeline for implementation, and more. Providing useful details on how to use the installation and save money so that they can communicate it to users.

Planning Citizen Recruitment and Engagement – combination of textual and visual elements

In this training, the singular selection criteria for each area can be finalised. *Doc.RIP.2.* Selection criteria Households in the area.

In the annexes, we include a sketch of one of the materials on the use of solar production, *Doc.RIP.6*. Solar Consumption, which could be used as training material both for technical teams and for group trainings for vulnerable households.

This training would be the chance to complete evaluating the RIP.1 Preliminary Unified List with the MCSS technical team, approving or rejecting the initial home proposal, and allowing the possibility of adding new households under specific conditions.

All of this would culminate in the creation of a Doc.RIP.5, Definitive List of Proposed Participants, wherein the technical reference person—who might come from the MCSS, the EO, or businesses conducting projects in the area—would be mentioned.

3. Recruitment

A four-month period for the referral of cases for group training will begin after the technical team has completed its training, the criteria have been adjusted, the number of possible households—differentiating between those in the control group and those with training—and the possibility of including entities that have received subsidies—as well as an established calendar of training activities—have been agreed upon with the Joint Technical Commission specific to the area.

In order to create groups and align with the times of revision and redistribution of participation quotas for communal self-consumption, the referral of cases is supposed to be established in 4-month intervals.

While it is not necessary to complete all of the cases within the first four months, this allows groups that have completed the training within the recommended durations to be included.

The RIP.3 Calendar of Training Actions is essential, and it needs to be shared with the public and the MCSS technical staff in order for them to call those who have signed Personalised Action Commitments to the various training sessions. This way, in month four, they can finish the first three training sessions and become a member of the RIP Municipal CSC.

In order to save money and reduce emissions, the program addresses the need to establish an energy culture and learn how to harness solar production from collective self-consumption.

Optimizing supply contracts is also required to increase the impact of savings.

It is also critical to fully explain what collective self-consumption entails, its benefits, and liabilities, as an agreement is made between RIP and the owner of the supply included in the project.

Planning Citizen Recruitment and Engagement – combination of textual and visual elements

4. Group Training Modalities

Depending on the groups that have been defined in the area-specific Joint Technical Commission, there are several training possibilities:

4.1. Training In The MCSS For Detected Cases And New Cases That May Arise From The MCSS In The Initial Period Of 4 Months Given By The Itinerant Energy Office

The idea is that this group training in the MCSS itself is mandatory to be integrated into the collective self-consumption and that it can be part of the commitments of personalised actions of the beneficiaries of RVI, PEI's, SAD, RAI... trying in this way, not to multiply the work of the MCSS technical staff but to integrate it as another tool of social intervention with its users.

The plan is to develop cycle group trainings scheduled in the MCSS itself and given by the Itinerant Energy Office over a four-month period in which the contents are:

- Understand your utility bill. Optimisation. RIP Project
- Saving and efficiency measures
- How to be part of RIP and make the most of it. CSC RIP

This training should also announce the documentation that will be necessary to join the project, so that, in the last session, it can be compiled.

This way people can be referred to these training sessions on different dates during the 4 months of the 1st recruitment.

The idea of carrying out the training in the MCSS itself, responds to the logic of proximity, making efforts profitable, ease of referral, and ease of monitoring and return of information to the technical reference persons on the assistance of the persons referred as part of the monitoring of their commitments.

4.2. Training In The Energy Office For Households Known/Proposed From The EO And From The Projects Of The Foundations/Municipal Entities

In the Specific Joint Technical Commission it may be decided to include households coming from projects that are being implemented in the area and that do not have a MCSS professional of reference. In this scenario, the recommendation is that they be integrated into the same training as would be provided by the MCSS, but in the Energy Office related to the area of action.

4.3. Training as a Municipal Energy Agent Provided by FvCIE

We suggest, in partnership with LABORA, that people referred by the Valencian Employment Service, SEPE, or other organisations be included in the pilot project to undergo training as Municipal Energy Agents.

We consider that this pilot project opens up the possibility of new professional profiles that would be necessary in the management of collective self-consumption, whether municipal or private.

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
Because the trainees are also part of the self-consumption community, they will gain vital firsthand experience. The content of this training should be defined, but it would be important to be able to fit in with the 4-month cycles that mark the rhythm of the project. 4.4. Control Group Without Training Recall that we had set out two working hypotheses: H1 - The availability of free energy raises the general levels of household consumption. H2 - Training vulnerable households in collective self-consumption is associated with better use of the renewable energy supplied. With the establishment of the control group, which would not receive training, but only the notification that it would have been selected to be part of the project and a process of formalization of documentation to join it, we consider that it would be sufficient. 5. Integration Into the RIP Municipal CSC System The people who can definitively be part of the collective self-consumption are those who, having been pre-selected by the area-specific Joint Technical Commission, meet the defined criteria and have completed the group training of three workshops or the Municipal Energy Agent Training. It would be interesting for the Single Manager to be part of the training process and to be able to establish contact from the beginning with the potential households involved in the project. In the final training session, the Sole Manager should be present and will be the interlocutor with the households linked to the project from that moment on. It would be optimal to be able to establish the signature of *Doc.RIP.7*. Authorisation of participation in Collective Self-consumption as the end of the third workshop or the end of the Municipal Energy Agent training. For the control group, it would be necessary to establish another system for collecting information and signing *Doc.RIP.7*. Authorisation of participation in Collective Self-consumption. It is thus proposed to consolidate groups every 4 months and to complete the number of households/entities linked in each period. The Single Manager will be in charge of the administrative processing of the Municipal Collective Self-consumption and communication with the energy distribution company. See Figure 2 for Recruitment/Management.

Planning Citizen Recruitment and Engagement – combination of textual and visual elements

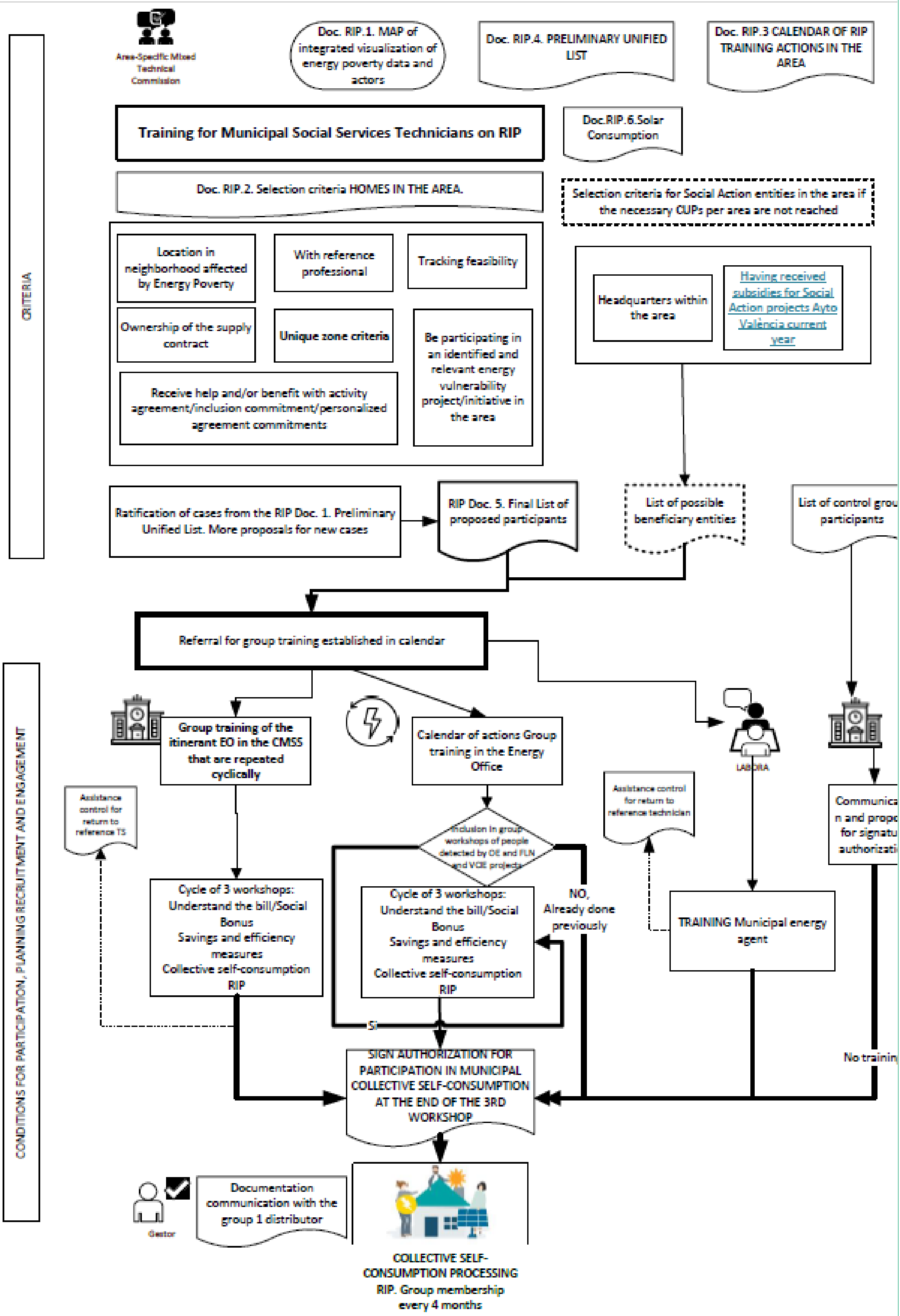

Figure 2. Recruitment/Management

Planning Citizen Recruitment and Engagement – combination of textual and visual elements
As the municipal Social Services will do the recruitment it is vital that the recruiters have received training and materials to better understand the project and its impacts on the beneficiaries. Therefore a methodology for recruitment with Social Services will be designed, including a timetable, the minimum criteria, flexible criteria for recruiting based on the expert knowledge, and the follow-up steps after the participant selection. It is possible to change the shares of the installation every 4 months, therefore the recruited participants will sign up for the scheme every 4 months regularly until the maximum number of participants is reached. Once the participants have been selected, they will receive 3 different trainings: • one to understand their bill, so they will be able to optimize it and minimize their costs • one based on energy efficiency • one to better understand the benefits of the scheme (collective self-consumption) and to adapt their consumptions to the PV generation hours. Also, their bill will be optimized to maximize the economic benefits. The location for the training will be selected based on the most convenient place for the participants (probably Social Services centers or the Energy Office).

7. Community Building and Energy Awareness

Community Building and Energy Awareness – combination of textual and visual elements
The communication campaign will be oriented to the recruiters and the people that will be in contact with the participants, to be prepared and understand the benefits of the schemes and the needs of the participants. Moreover, the participants will receive training and materials through the duration of the project, to understand and benefit from it. For the participants it will be possible to attend the Energy Offices in the Citizens School for the right to energy, an initiative created for the WELLBASED project, to receive workshops based on energy and wellbeing. The formation of groups will continue until the number of participants in the project per area is reached, and it will be under the evaluation of participation quotas mandated by legislation. We believe that to accurately estimate the benefits of collective self-consumption, participation in the initiative must extend at least one year. In this way, beginning the 12th month from the start of the first group of families linked to self-consumption in a region, it will be possible to assess whether the assumptions raised regarding energy consumption have been met.

Community Building and Energy Awareness – combination of textual and visual elements

1. Monitoring Activities Of Collective Self-Consumption

1.1. Monitoring meetings

It is proposed that the Sole Manager and the zone-specific Joint Technical Commission hold quarterly monitoring sessions.

The Single Manager will notify the zone-specific Joint Technical Commission on the state of self-consumption in the *RIP Doc. 8* quarterly self-consumption status report, which will include:

- Number of households/entities linked and vacancies
- Incidents with the distribution company or internal to the project
- Incorporation of a new group

The Single Manager will oversee controlling self-consumption and, through the Specific Joint Technical Commission, will communicate any incidents that may be relevant for the technical reference persons in each case and for the development of the project.

1.2. Energy awareness

We continue to believe that involvement in the municipal RIP collective self-consumption should be a beneficial social intervention tool for the social workers of reference in following up on the planned intervention in their cases.

As a result, our idea does not end with the participation of Hogar in communal self-consumption; rather, we believe it can be extended during the 12-month period that would initially last for the duration of Hogar's involvement in the project.

Households not included in the control group may join the Citizen School for the Right to Energy, organized by the Energy Office in the intervention area, starting from the fourth month of their participation in the collective self-consumption RIP. This integration will occur after an evaluation with the technical reference person and confirmation of their ability to meet the program's commitments.

This Citizen School extends the training provided in the initial courses that led to participation in the RIP project and covers many more aspects related to health, well-being, food, and sustainable mobility.

There is a previous experience within the framework of the European WELLBASED project carried out during a year and a half in which AeioLuz has participated, with the realization of more than 25 workshops on different themes.

We suggest a similar arrangement in terms of chronology and content. Fortnightly meetings have been organized, which have featured a variety of activities. The outcomes of this experience are still being evaluated by WELLBASED, but AeioLuz believes they have been extremely enriching and have yielded far more benefits than anticipated in terms of group cohesion and knowledge transfer.

Community Building and Energy Awareness – combination of textual and visual elements
This Citizen School for the Right to Energy, integrated with the activities of the Energy Offices, would be an ideal complement to the energy awareness of the households linked to the RIP project. At the four-monthly sessions, this School would present information on which families are participating through the area-specific Joint Technical Commission to assess their adherence to the promises made with the technical reference individuals. 1.3. Other commitments The technical reference person, who is aware of the household's concerns and situation, will decide whether or not to acquire commitments through the intervention procedure, which may differ from attendance at the Citizen Energy School. 2. Renewal Of Participation in Rip Municipal Collective Self-Consumption The initial proposal is that each household should be linked to the RIP municipal collective self-consumption for at least 12 months to be able to assess its use. Before these 12 months, each household would have had initial training in energy matters, and once their inclusion into the RIP has been formalized, they would enjoy the energy for 12 uninterrupted months. From the fourth month after joining RIP, and as agreed with the technical reference person, the energy training can be prolonged, or households can participate in other inclusion procedures that are more beneficial to them. Starting in the 11th month of the project, the follow-up meetings will include, for the first time in the agenda of the meeting scheduled for the 12th month, the *RIP Doc.9 - Final Report on Energy Usage*, which will compare data with the control group. This report will be repeated once the incorporated groups have completed one year of the municipal self-consumption RIP. In the Follow-up Meetings with *RIP Doc.9 - Final Report on Energy Usage*, the area-specific Mixed Technical Commission will decide whether to renew the connected homes for another year after consulting with technical reference persons. Renewal in future years will depend on Social Services' assessment of the original need that led to it.

Community Building and Energy Awareness – combination of textual and visual elements

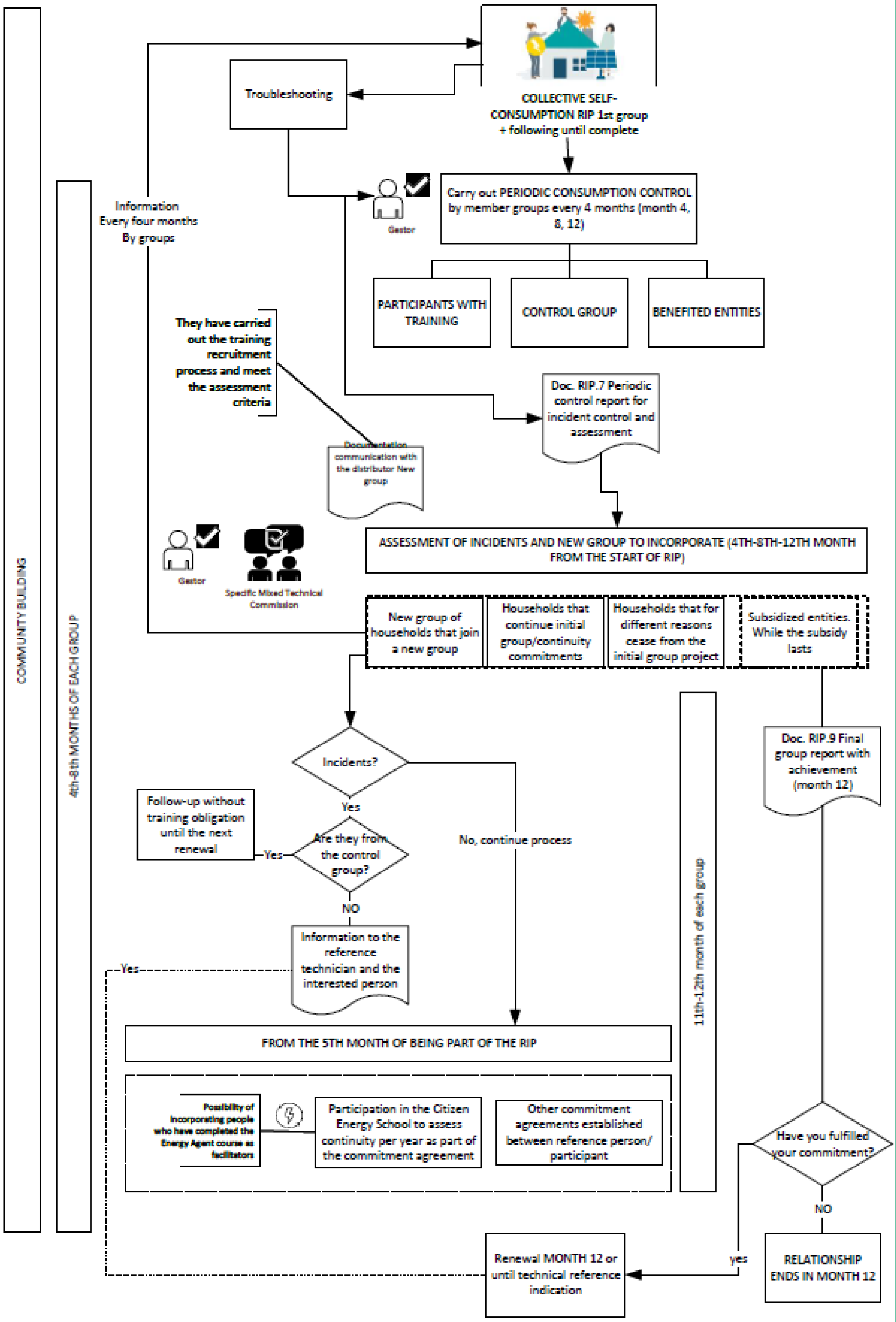

Figure 3. Monitoring Activities of Collective Self-Consumption

Community Building and Energy Awareness – combination of textual and visual elements
3. Communication 3.1. External communication No informative communication is foreseen in the recruitment phases, as this project is conceived as a tool at the service of the MCSS, which will be the ones to carry out most of the calls for applications through their technical staff. The external communication of the milestones achieved will follow the usual publication channels of the City Council of Valencia and the València Climate and Energy Foundation and may be constant throughout the project. 3.2. Internal communication to households/related entities. We propose a four-monthly Newsletter with information supplied by the Single Manager with information on production, use and dates of the next milestones in the calendar. As more installations are added, the number of recipients should be expanded. This Newsletter would provide aggregated RIP information and decentralized information by facility. It could also serve to publicize energy-related events that may be of interest to the linked households/entities and technical reference persons. For example, in the Energy Poverty Week. It could be integrated in the Newsletter issued by the Energy Office or in a separate platform.

8. Technical Adoption Planning

Technical Adoption Planning – combination of textual and visual elements
The preparatory works, technical assistance for project design, and public tendering for the selection of construction and installation companies have been already implemented by the municipality of Valencia during the last 2-3 years. Using the city's cemeteries for PV plant installations aims to demonstrate how to use the built environment to produce locally owned energy and make it accessible to all citizens through collective self-consumption schemes while adhering to energy efficiency principles and leaving no one behind.

9. Legal Adoption Planning

Legal Adoption Planning – combination of textual and visual elements
An exhaustive analysis of the regulatory framework regarding collective self-consumption regulation has been performed, supporting the decision-making for the energy sharing management. Moreover, a specific legal study was conducted to assist the municipality in understanding and deciding how to legally and administratively administer this energy sharing model, resulting in the formation of a new renewable energy public service.

10. Financial Scheme Adoption Planning

Financial Adoption Planning – combination of textual and visual elements
The Municipality of Valencia has made an initial investment for the installation of the photovoltaic plant. The return on this investment will come from 75% of the generated energy, which will directly reduce municipal electric bills. This reliable revenue stream allows the remaining 25% to be allocated to vulnerable households without any economic return. Additionally, there is a hypothesis that using energy to combat energy poverty will eventually decrease the municipal subsidies needed for debt payments.

11. Replication and Scalability Potential

The suggested method can be both upscaled at the city level, applied to any new municipal-owned PV installation, and reproduced by any municipality in Spain, taking into account any financial constraints when it comes to the required upfront expenditure.

12. References

Activage (s.f.) General information. https://activagevalencia.eu/que-es-activage/?lang=es

Ayuntamiento de València (s.f.) Missions València 2030. https://www.missionsvalencia.eu/?lang=es

Ayuntamiento de València (s.f.) Official Information PEI. https://sede.valencia.es/sede/registro/procedimiento/BS.TP.10?lang=1

Ayuntamiento de València. (s.f.) Official information Servicio de Ayuda a domicilio. https://sede.valencia.es/sede/registro/procedimiento/BS.MA.60?lang=1

Ayuntamiento de València (s.f.) Council private policy.

https://www.valencia.es/val/politica-privacitat/-/content/politica-privacidad-pie-web?uid=A1A78F99CC5543E8C125830100329206

Ayuntamiento de València (s.f.) Official Information PEI. https://sede.valencia.es/sede/registro/procedimiento/BS.TP.10?lang=1

Ayuntamiento de València. (s.f.) Official information Servicio de Ayuda a domicilio. https://sede.valencia.es/sede/registro/procedimiento/BS.MA.60?lang=1

Ayuntamiento de València (s.f.) Derivation Sheet fron City Council to entities: https://sede.valencia.es/sede/registro/procedimiento/BS.TP.10?lang=1

Baeza Roca, N. (2020a). Alfabetización energética para la intervención social en plena crisis COVID-19 - Documentación Social. https://documentacionsocial.es/6/en-marcha/alfabetizacion-energetica-para-la-intervencion-social-en-plena-crisis-covid-19/

Baeza Roca, N. (2020b). Trabajo Social desde La Vulnerabilidad energética. Servicios Sociales y Política Social, 1130–7633, 203–210. https://www.serviciossocialesypoliticasocial.com/trabajo-social-desde-la-vulnerabilidad-energetica

Baeza Roca, N., & Moncayo, S. (2022). Comunidades energéticas locales de generación fotovoltaica. Oportunidad para el empoderamiento ciudadano y el derecho a la energía. http://ciriec.es/valencia2022/wp-content/uploads/COMUN-044.pdf

Generalitat Valenciana (s.f.) Procedure for Registration of social services ENTITIES in the General Registry of Owners of Activities, Services and Social Service Centers. Generalitat Valenciana.

https://www.gva.es/es/inicio/procedimientos?id_proc=20020

Generalitat Valenciana (s.f.) Official Information about Renta Valenciana de Inclusión. https://inclusio.gva.es/es/web/integracion-inclusionsocial-cooperacion/renta-valenciana-de-inclusion-rvi

Generalitat valenciana (s.f.) Official Information Renta activa de Inserción. https://www.sepe.es/HomeSepe/Personas/distributiva-prestaciones/he-dejado-de-cobrar-el-paro/no-tengo-prestacion.html

Gomez-Navarro et al. (2021) Fuel poverty map of Valencia (Spain): Results of a direct survey to citizens and recommendations for policy making. Elsevier. https://www.sciencedirect.com/science/article/abs/pii/S0301421521000318

Google (s.f.) RIP map on Google: https://acortar.link/of0LQJ

Ministerio de Seguridad Social. (s.f). Official information Ingreso Mínimo Vital. https://imv.seg-social.es/

Power Up (s.f.) General information. https://www.socialenergyplayers.eu/

Value Care (s.f) General Information. https://projectvaluecare.eu/news/valencia-pilot/

Wellbased (s.f.) General information. https://wellbased.eu/