Sun4All Sustainable Adoption Plans for Pilot Cities (4 Plans)

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Author(s)	Jurijs Grizāns, ICLEI European Secretariat	
Co-Author(s)	Almada Pilot Catarina Alves, AGENEAL Rui Sebastian, C.M.Almada Barcelona Pilot Milena Ràfols, ALEB Sergi Delgado, ALEB Raquel Rodriguez, Ecoserveis Paco Jofra, Ecoserveis	Couer de Savoie Pilot Cléa Verdot, CCCS Xavier Bouvier, INES Rome Pilot Antonia Caruso, RCP Roberta de Santis, RCP
Contributor(s)	-	
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Reviewer(s) (if applicable)	Camila Canelas, Ecoserveis Cristina Ramos, Ecoserveis Catarina Alves, AGENEAL Cléa Verdot, CCCS	

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Contact

info@sunforall.eu

www.sunforall.eu

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Executive summary

This report is entitled "Sun4All Sustainable Adoption Plans for Pilot Cities (4 Plans)" and represents intellectual outcome of the European Union's (EU) Horizon 2020 research and innovation program funded project: "Sun4All – Eurosolar for All: Energy Communities for a Fair Energy Transition in Europe (Sun4All)". This is one out of 15 EU-funded projects included in the European Commission (EC) CORDIS Results Pack on an inclusive energy transition – a thematic collection of innovative EU-funded research results "Citizen engagement for affordable and sustainable energy solutions" (May 2024).

The Sun4All project was implemented from October 2021 till September 2024 by a consortium of 11 European organisations to set up a financial support scheme for renewable energy access for vulnerable households. Four cities and regions in Europe: Almada (Portugal), Barcelona (Spain), Coeur de Savoie (France), and Rome (Italy) acted as pioneers and led the way in implementing this financial support scheme in four pilot sites. This scheme has been tailored to the specific characteristics of each pilot location, ensuring that all activities are oriented towards local needs.

To foster continuation of Sun4All approach to tackle energy poverty beyond the project timeline, Sun4All pilots developed four Sun4All Sustainable Adoption Plans. This report presents a comprehensive collection of these four plans developed by the Sun4All pilots: Almada Pilot (chapter 2), Barcelona Pilot (chapter 3), Coeur de Savoie Pilot (chapter 4), and Rome Pilot (chapter 5).

This document establishes the strategic foundation for scalability planning of the Sun4All approach in the pilot cities and regions beyond the project timeline, as well as for planning the adoption and replication of the Sun4All financial support scheme in other cities and regions across Europe, and beyond, to address energy poverty.

This report can be relevant and helpful for local and regional governments, public and private utilities and energy agencies, civil society organisations, social housing associations, energy cooperatives, energy agencies, energy service companies, etc.

1. Introduction

1.1. Sun4All Project Overview

EC Recommendation (EU) 2023/2407 of 20 October 2023 on energy poverty highlights that renewable energy is more affordable for consumers if they can have direct access to it. Collective self-consumption schemes can 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'). Being a prosumer and participating in collective self-consumption schemes brings wider non-financial benefits, such as empowerment, new skills, and social inclusion for the individual, as well as trust and interconnections for the community.[1]

Over the course of the project, Sun4All consortium focused on the creation of the financial support scheme to help vulnerable households in Europe access renewable energy. Thus, engaging and empowering them to break the energy poverty cycle and participate in a transition towards renewables, better energy efficiency, and climate-neutrality.

To make renewable energy generation, along with its economic and environmental benefits, accessible to vulnerable households that suffer from energy poverty and lack the resources to invest in solar installations, the Sun4All project executed the following actions:

- Learning from the existing American initiative "Solar for All" and adapting it to the European context and the pilot sites: from "Solar for All" to "Eurosolar for All".
- Defining, designing, and setting the model of implementation in each Sun4All pilot city and region.
- Engagement of additional cities and utilities that became members of the Sun4All Community of Practice Observer's Group.
- Setting a blueprint model for the Sun4All financial support scheme after piloting: from "Solar for All" to "Eurosolar for All".
- Setting the criteria access to the Sun4All financial support scheme and to identify and engage the participants in the pilots in Almada (Portugal), Barcelona (Spain), Coeur de Savoie (France), and Rome (Italy).
- Implementing Sun4All financial support scheme and monitoring its progress in the pilot cities and regions.
- Ensuring that Sun4All financial support scheme remains a stable programme to tackle energy poverty and ensuring vulnerable consumers participation in the energy transition in Europe.
- Communicating and disseminating project outputs at local, national, and EU level.
- Developing policy reports and identifying the main policy implication and recommendations on energy poverty at local, regional, national and EU level.

[1] European Commission. Recommendation (EU) 2023/2407 of 20 October 2023. European Commission, Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302407. Accessed on 28 September 2024

During the project timeline Sun4All pilots worked on designing the local model of the Sun4All financial support scheme and testing it in practice. Pilots defined local requirements to benefit from the financial support scheme, developed local strategies for engagement and community work plans, implemented educational events and photovoltaic panel site visits. Sun4All pilot practical experiences and lessons learned formed a basis for several valuable intellectual outcomes of the project, including this report "Sun4All Sustainable Adoption Plans for Pilot Cities (4 Plans)".

1.2. Purpose of the Sun4All Sustainable Adoption Plan

Sun4All Sustainable Adoption Plans focus particular attention to the pilot cities and regions participation in the Sun4All project. Sun4All pilot teams built the Sun4All Sustainable Adoption Plans under integrated management processes and based on a deep understanding of the energy poverty challenges identified during project development phases.

The key purposes of the Sun4All Sustainable Adoption Plan are as following:

- To highlight the importance of addressing energy poverty for a fair transition and specify the plan's focus for each pilot city.
- To detail the results of analysing stakeholders involved in the Sun4All financial support scheme within the pilot city.
- To outline the strategy to promote acceptance and use of the Sun4All project within the target audience or community.
- To set clear steps, allocating resources, and establishing responsibilities to achieve the plan's goals.
- To define the process and activities to equip stakeholders with the knowledge, skills, and resources needed to effectively benefit from the Sun4All project.
- To describe how to integrate Sun4All outcomes and practices into existing structures and systems in the pilot city.
- To provide a structured and systematic approach for assessing the adoption, implementation, and impact of the Sun4All project at the local level.

Sun4All Sustainable Adoption Plans describe key achievements and outcomes of the implementation of the Sun4All financial support scheme, impact assessment and success metrics, results of the stakeholder analysis, etc. Important structural elements of the Sun4All Sustainable Adoption Plans are adoption strategy and implementation framework, as well as planned capacity building initiatives and training needed for the successful continuation of the Sun4All financial support practice in pilot cities and regions.

Sun4All Sustainable Adoption Plans can act as a strategic intellectual and practical tool for the city and region practitioners for expanding and developing / localising the Sun4All financial support scheme further according to the local characteristics, needs, and capacities.

2. Sun4All Sustainable Adoption Plan for Almada, Portugal

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
ADENE	National Energy Agency
AGN	Local Municipal Energy Agency
CENSE	Centre for Environmental and Sustainability Research
CMA	Almada Municipality
CSPCR	Centro Social Paroquial Cristo Rei (local social association)
DGEG	Directorate-General for Energy and Geology
DSO	Distribution System Operator
EGAC	Entidade de Gestão do Autoconsumo Coletivo (Collective Self-Consumption Management Entity)
EPAH	Energy Poverty Advisory Hub
ERedes	Portuguese Energy Distribution System Operator
ERSE	Entidade Reguladora dos Serviços Energéticos (Independent Energy Regulator in Portugal)
FCT NOVA	Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa (College of Science and Technology at Nova University Lisbon)
HERB	Holistic Energy-efficient Retrofitting of residential Buildings
IPQ	Instituto Português da Qualidade
NER 3 Vales	Núcleo Energia Renovável_NER (Renewable Energy Hub_REH)
OSS	One Stop Shop
PVP	Photovoltaic Panels
REC	Renewable Energy Community
REH	Renewable Energy Hub (NER, Núcleos de Energia Renovável)
RNAE	Rede Nacional de Agências de Energia (National Network for Energy Agencies)
Q1 and Q2	Questionnaire 1 and Questionnaire 2
SECAP	Sustainable Energy and Climate Action Plan
VC	Vulnerable Consumer

2.1. Almada Pilot Achievements and Outcomes

Almada Pilot Achievements and Outcomes

Almada's primary purpose in the Sun4All project has been to lower the energy bill of social housing residents, by promoting energy efficiency and distributing the energy production from solar installations, focusing on those most vulnerable to energy poverty. Target audience is solely residents of municipal social housing buildings since the municipality is the owner and can implement these PV technologies on its rooftops.

The main objectives for Almada include:

1) Reducing energy costs for vulnerable households.
2) Increasing renewable energy adoption in social housing.
3) Improving energy efficiency awareness and behaviours.

Key activities involve:

- Installing PV panels on municipality-owned roofs.
- Sharing the generated energy among building users.
- Conducting workshops for beneficiaries on energy efficiency measures and behaviours.

Almada is adapting the Sun4All scheme through the following process:

1) **Beneficiary Identification:** Directly inviting vulnerable households in this social housing district to participate.
2) **Leveraging Existing Projects:** Building on awareness and experience from the HERB project and other current interventions, which involve energy refurbishment of social housing buildings.
3) **Community Engagement and Training:** Organizing workshops and one-on-one meetings with residents in the target buildings.
4) **Mentorship Program:** Having energy-experienced residents as mentors to support and engage new Sun4All beneficiaries.
5) **Technical Implementation:** Installing PV panels in social housing buildings to generate energy to be used by beneficiaries and municipal buildings in adjacent areas.

Almada is adapting the Sun4All project financial support scheme to the local contextual characteristics, especially, the restrictions raised by national and local legislation and regulations, as well as the internal difficulties in managing support schemes other than the one adopted. The proposed model is based on the direct transfer of energy, which is considered the simplest way to manage this municipal support, being regulated by the sharing coefficients, according to the size of the families (from 1 to 6 inhabitants per house) and the size of the household (from two to four-bedroom households).

Almada is tailoring the Sun4All scheme to address specific local challenges:

Almada Pilot Achievements and Outcomes

- **Tailored energy Workshops:** Developing a series of workshops on energy management at residential level, for beneficiaries that may have low schooling, old age, numerous family, and other specificities of the community.
- **Regulatory Framework:** Implementing the project within the context of a municipal managed Collective Self-Consumption, with potential to evolve into a Renewable Energy Community once the national regulation is approved.
- **Stakeholder Collaboration:** To promote the project, working closely with local entities like social associations in the community, local public institutions, and small businesses.

Almada is ensuring the project meets local needs by:

1) Collaborating with AGN (Local Municipal Energy Agency) to tailor the project to Almada's specific context.
2) Focusing on social housing residents' energy expenses and residential comfort.
3) Providing both financial benefits (reduced energy bills) and non-financial support (workshops, energy management advice) to holistically address energy poverty and literacy.

In Almada this project already has several significant and positive outcomes, and the Municipality expects much more immediate and long-term ahead.

- **Improved Quality of Life:** Access to reliable and affordable energy can enhance living standards by providing electricity for lighting, heating, cooling, and the operation of extra appliances, significantly improving daily life. This outcome will be included in the qualitative metrics.
- **Community Empowerment:** The project has the potential to foster a sense of ownership and self-reliance within the community, mostly because the community has been involved in the Sun4All project; this outcome has already been proved.
- **Promotion of Sustainability:** The project could set an example for other communities or regions, promoting broader adoption of clean energy technologies and practices, and contributing to climate change mitigation.
- **Sustainable Development:** Over the long term, solar panels can contribute to the community's sustainable development, improving economic stability, reducing environmental impact, and fostering inclusive growth.

Almada Municipality is already designing a similar municipal project in which it aggregates the solar production of several municipal facilities and distributes and optimizes the energy, always including social housing. This scheme was an inspiration for future municipal solar investment, combining the economic component with the social and environmental components.

During the Sun4All project, the city has been sharing this concept with other municipalities, as well as the associated bureaucratic procedures in various forums, hoping that replication will be broader, and may contribute to the just transition of more communities in Portugal.

2.1.1. Summary of Key Sun4All Project Results

Summary of Key Sun4All Project Results

In Almada, Sun4All project demonstrated significant progress and success across multiple areas:

- **Energy Literacy:** A thorough approach to energy education and community participation was achieved through the wide range of workshops offered to both beneficiaries and the public.
- **Renewable Energy Integration:** The project has vastly exceeded its PV power installation target (fourfold), which is a major success and shows the Municipality's commitment to a just transition.
- **Financial Investment:** Exceeding the investment target demonstrates strong financial management and commitment to the project's goals.

Areas for potential improvement include:

- **Recruitment:** With 80% of the objective reached, this target needs to make some progress, and more work is needed to reach the whole target. The municipality will keep trying to recruit new beneficiaries in this area, especially once energy sharing is activated.
- Providing more detailed tracking of individual **energy advice sessions** to ensure more households are interested and receive one-to-one energy counseling sessions.
- Expanding the **mentorship program** once energy is being shared.

Overall, the project appears to be highly successful, with most areas meeting or exceeding targets. The significant overachievement in PV power installation and financial investment suggests that the project has expanded its scope and found additional resources, which is particularly noteworthy. The comprehensive approach to community energy literacy through varied workshops also stands out as a key strength of the project.

Other key achievements:

- Successfully formalizing collective self-consumption was a significant achievement, despite numerous challenges. This pilot project served as the foundation for the municipality to establish a genuine Renewable Energy Hub. Almada pilot was able to achieve positive outcomes in terms of community and partner engagement. This initiative has paved the way for future developments, setting the stage for continued success and growth in renewable energy initiatives.
- It is important to emphasize the efforts made to license the first collective self-consumption initiative in the municipality, including the formal establishment of the EGAC entity – Entidade de Gestão do Autoconsumo Coletivo (Collective Self-Consumption Management Entity). Additionally, the creation of internal regulations, which was a mandatory requirement for licensing, has undergone

Summary of Key Sun4All Project Results

internal validation by the municipal assembly and was published in the Diário da República (national legal decree publishing entity).

- Building on the work accomplished in the Sun4All pilot, the city was able to advance to a larger initiative: the establishment of the first Renewable Energy Hub (REH/NER) in Almada. This project will include several municipal buildings near the housing complex involved in the Sun4All pilot, specifically a health centre, four schools, a public swimming pool, and a public library, all of which will be equipped with solar panels.
- Also, it is important to note that building on the framework developed during the three years of the Sun4All project, the municipality is now preparing to replicate this model in the city centre and other areas. For example, this initiative will leverage the existing solar installation at the Forum Municipal Romeu Correia building, a cultural municipal facility, to share the surplus solar energy produced with the nearby municipal social housing and service buildings.

The acquisition and installation of PV panels and the electrical and structural adaptation works may be complex in a public procurement context, but the necessary tasks have been listed, flowcharts created, and the replication will be much quicker and simpler.

Having had to produce an External Regulation to oversee the functioning of such an REH, the city is now able to promote further REHs, with their Regulation where municipal buildings are, preassigned to a certain REH and they will subsequentially consume and/or produce energy for the nearby vulnerable households and other municipal equipment.

There are complex administrative procedures that depend on 2 factors:

- The creation of a Renewable Energy Hub (REH) regulation, specifying the target audience and the amount of support, to be approved by the municipal assembly.
- The activation of the REH by the Energy Directorate (DGEG), together with the Energy Distribution System Operator (DSO).

These administrative challenges can be partially overcome by establishing a close communication channel with the entities, reducing the licensing and activation waiting time, but mainly by networking with other municipalities and partners that face the same challenges and promoting simpler legislation.

Our target community has a large percentage of old-aged, low-schooled, and socially isolated beneficiaries, so the project needs a communication plan focused on these groups, creating appropriate graphical materials to be delivered to their homes to compensate for the low participation rate.

The Mentoring program is interesting, but it can only be implemented after the activation of the energy sharing. Local community organizations can support implementing this mentorship group.

It is difficult to contact the beneficiaries and convince them that this programme is free and helpful, as well as to build trust in the public promotion; therefore, the municipality must continue to work with the local community to recruit new members and foster a trusting relationship.

2.1.2. Impact Assessment and Success Metrics

Impact Assessment and Success Metrics

The Impact Assessment methodology was based on questionnaires filled by the participating households. There are two questionnaires (Q1 and Q2):

- **Q1:** The initial survey, distributed at the outset of each testing phase, was designed to evaluate the baseline conditions of households before their recruitment to Sun4All. By examining the responses to this questionnaire, pilot partners can gain valuable insights into the challenges faced by participating families. This information can then be used to fine-tune their engagement approaches and better address the specific needs of the community.
- **Q2:** The follow-up survey, distributed 10 to 12 months after the initiation of each testing phase, was designed to evaluate the Sun4All project's effectiveness in three key areas: mitigating energy poverty, promoting behavioural changes, and empowering participating households. By examining the data collected from this second questionnaire, Almada was able to refine the engagement approaches for the following activities. This analysis provides valuable insights into the project's impact and helps optimize strategies for future implementation.

The templates have been designed to ensure that questions are easily understandable and answerable, with particular attention paid to energy-related questions. This type of population assessment will continue to be used for future Sun4All recruitments.

The municipality will also use the following internal impact assessment metrics:

- Investments in sustainable energy triggered by the project (EUR).
- Reduction of greenhouse gas emissions (tCO2-eq).
- Improved living conditions (comfort, health) (Nº of households).
- Empowerment of women and men, affected by energy poverty (Nº of women and men benefiting from the project).
- Vulnerable Consumers participation in local community energy (Nº of VC participating).
- Trained key actors for energy poverty alleviation (Nº of trained women and men).

2.2. Stakeholder Analysis

Stakeholder Analysis

The model implemented in Almada (Figure 1):

Stakeholder Analysis

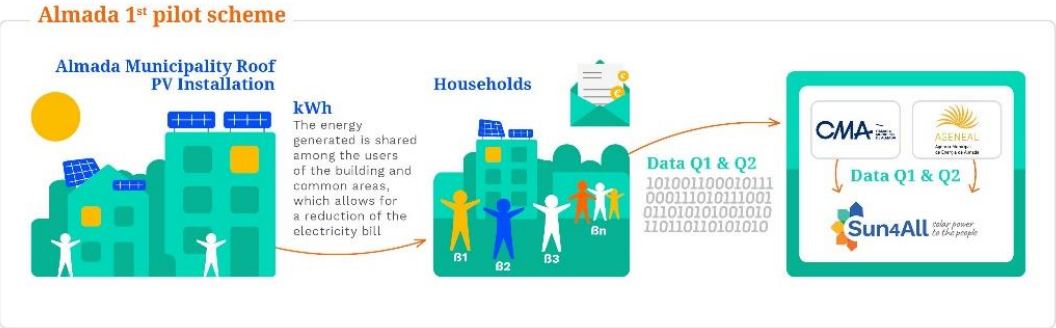


Figure 1 – Almada Pilot scheme

Being responsible for leading the implementation of the energy support scheme, the municipality of Almada (CMA) installs the solar panels and establishes the energy allocation for the beneficiaries.

AGN (AGN) is involved in supporting the Almada City Council in its responsibilities of managing the data and keeping the beneficiaries' list up to date at the collective self-consumption regulatory body. The municipality acts as an "intermediary" between the PV installation production and the end users/beneficiaries.

Besides organising thematic sessions with the community, CMA and AGN have also organised national webinars and bilateral meetings with stakeholders that are Potential Future REC Partners, to align expectations regarding the medium- and long-term possibilities of transforming REHs into RECs.

2.2.1. Identification of Key Stakeholders

Identification of Key Stakeholders

Stakeholder and their role in the implementation:

- **Beneficiaries:** They need to engage with the recruitment and activities proposed, to receive the energy support.
- **AGN – Local Energy Agency:** Municipal Energy Agency, responsible for the implementation, management, beneficiary recruiter, planning and organizing activities with the beneficiaries, providing technical support, managing workshops, involving the community, supporting CMA managing the data from the beneficiaries.
- **CMA – Climate & Environment Intervention and Sustainability Department:** Public Authority, responsible for the implementation, management, beneficiary recruiter, planning and organizing activities with the beneficiaries, providing technical support, managing workshops, involving the community, and developing the implementation of the financial support scheme, managing the data from the beneficiaries.
- **CMA – Social Housing Services:** Public Authority, owner of the buildings, contacts facilitator, beneficiary recruiter, involved in the activities with the

Identification of Key Stakeholders

beneficiaries and helping with the necessary support for the involvement with the beneficiaries.

- **CMA – Department of Communication:** Public Authority, responsible for the dissemination of the project in their channels like webpage and social media.
- **E-Redes:** Private Company, Portugal's energy distribution system operator, responsible for providing the suppliers access to the distribution network, installing an intelligent metering system; they are also responsible for collecting and managing the data to provide the corresponding benefits to the end users of the project, the vulnerable consumers.
- **DGEG – Directorate-General for Energy and Geology:** Public Authority, plays a key regulatory and administrative role in the implementation of collective self-consumption and energy communities, namely by processing and approving license applications for collective self-consumption projects, also providing guidance, and ensuring compliance with relevant legislation and policies.
- **Centro Social Paroquial Cristo Rei (CSPCR):** A local social association that is very familiar with the community and facilitates the place for meetings and workshops and activities with the beneficiaries.
- **IPQ – Instituto Português da Qualidade:** Public body, responsible for coordinating the Portuguese Quality System; potential future member of the REH.
- **SMAS – Serviços Municipalizados de Água e Saneamento:** Public body, responsible for Municipal water and sanitation services; potential future member of the REH.
- **CENSE – Center for Environmental and Sustainability Research:** Research centre focused on environmental and sustainability studies focused on energy and poverty topics; potential knowledge partner.
- **FCT NOVA – Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa:** Faculty of Science and Technology at NOVA University Lisbon, offering education and research in various scientific and technological fields; potential future member of the REH.
- **Coopérnico, Cooperativa de Energia:** Renewable energy cooperative in Portugal, promoting citizen participation in the energy transition; possible knowledge and implementation partner.

2.2.2. Analysis of Stakeholder Needs and Preferences

Analysis of Stakeholder Needs and Preferences

Categories of stakeholders:

- **Core Implementers** – This category includes the main organizations responsible for executing and managing the Sun4All model. They play a critical role in the implementation process, including planning, organizing activities, and providing technical support to beneficiaries. AGN – Local Energy Agency and CMA – Climate & Environment Intervention and Sustainability Department are key players in this group, overseeing recruitment, community involvement, and data management.
- **Supporting Public and Private Authorities** – These stakeholders provide essential regulatory and administrative support to ensure the project's success. Partners such as CMA – Social Housing Services, CMA – Department of Communication, facilitate communication with regional and local community; DGEG – Directorate-General for Energy and Geology and the ORD E-Redes, manage public and private resources and ensure compliance with relevant legislation. Their involvement is crucial for integrating Sun4All into existing frameworks, technical implementation, and addressing energy poverty effectively.
- **Community Partner** – The Centro Social Paroquial Cristo Rei (CSPCR) serves as a local community partner familiar with the needs of beneficiaries. This organization facilitates meetings and workshops, ensuring that community voices are heard and that beneficiaries receive necessary support throughout their engagement with the project.
- **Target Beneficiaries** – The Beneficiaries are individuals or households who engage with the Sun4All project to receive energy support. Their active participation in recruitment and proposed activities is essential for achieving the project's goals of reducing energy poverty and promoting renewable energy adoption.
- **Potential Future REC Partners** – This category includes organizations that may collaborate with Sun4All in the future. Stakeholders like IPQ – Instituto Português da Qualidade, SMAS – Serviços Municipalizados de Água e Saneamento, FCT NOVA – Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa are potential future members of renewable energy communities, producing energy to be shared.
- **Knowledge Partners** – Coopérnico and CENSE (Centre for Environmental and Sustainability Research), have potential roles as knowledge partners. Their expertise can enhance the project's sustainability and replicability across different regions.

In the future, if Renewable Energy Hubs (REHs) expand to Renewable Energy Communities (RECs), where private organizations can freely participate, together with municipalities, the members' universe can also be open to Businesses and other public and private entities.

Analysis of Stakeholder Needs and Preferences

National webinars and bilateral meetings have been organized with stakeholders that are Potential Future REC Partners, to align expectations regarding the medium- and long-term possibilities of transforming REHs into RECs.

2.3. Adoption Strategy

Adoption Strategy

Sun4All's central dissemination and communication strategy defines 3 main objectives that suit Almada´s reality:

- Position the Sun4All project scheme as a recognized and effective approach amongst stakeholders in the field of energy poverty alleviation and related policy decision-making through the dissemination of project results.
- Highlight energy poverty contexts and energy transition challenges in European cities and municipalities to raise awareness.
- Inform relevant actors, policymakers, and influential institutions about the Sun4All approach, its effectiveness, and meaningfulness for a socially fair energy transition in Europe – thus ensuring Sun4All's sustainability after the project completion.

Regarding dissemination and communication with beneficiaries and due to their difficulties (elderly people, with reduced mobility and low level of education) we aim to provide simple information in the local language based on a face-to-face informative session with no more than 15 people.

In Almada, Sun4All will contribute to the alleviation of energy poverty, support a socially fair energy transition, help cover vulnerable consumers' energy needs, support multiple policy goals, such as affordable energy, and ensure access to renewable energy for eligible households.

2.3.1. Strategic Objectives for Adoption

Strategic Objectives for Adoption

Almada has 2.314 municipal residences. This shows the city's stock of social and affordable housing managed by the municipality, which may benefit from Sun4All support.

The Sun4All initiative has offered valuable insights that can be applied to the public housing system in Almada. The lessons learned from this project can help address the key challenges that have hindered the widespread adoption of solar installations throughout the city.

Strategic Objectives for Adoption

The knowledge acquired from the Sun4All project will be integrated into existing plans and documents, such as:

- Almada's Local Climate Change Strategy.
- Sustainable Energy and Climate Action Plan (SECAP) for Almada.
- Municipal Energy Efficiency Initiatives and Projects.
- Protocols for Renovating Social Housing.

Additionally, it will support the achievement of several strategic goals for Almada, including:

- Increasing the city's solar energy capacity by 2030.
- Reducing energy poverty by 2030.
- Cutting greenhouse gas emissions in Almada by 40% by 2030.
- Attaining carbon neutrality by 2050.
- Increasing the amount of solar power generated by city-owned facilities by 2030.

The Adoption Plan will be detailed to ensure the effective implementation of the Sun4All scheme. This initiative is crucial for Almada as it seeks to provide resources across all sectors to promote renewable energy.

This plan aligns with the municipality's commitment to sustainable development and climate action and with the objectives to enhance energy efficiency and encourage renewable energy usage. The experiences gained from the pilot project in Almada will play a vital role in expanding these efforts throughout the municipality.

2.3.2. Target Audience and Beneficiaries

Target Audience and Beneficiaries

The universe of beneficiaries addressed is very specific, people living in the selected buildings have a large proportion of elderly, including some with mobility difficulties, the level of education is very low**,** and they have little capacity to devote to these issues in their daily lives. Among the beneficiaries recruited, few showed interest in joining workshops for sustainable thematic, but most of them agreed on receiving information about energy efficiency and energy literacy in their mailbox. In Almada, there are only key beneficiaries who receive both economic assistance (energy amount) and environmental benefits from participating in the energy shift.

Besides, because of the communication content survey, the mistrust of vulnerable consumers regarding the concept of benefitting at no cost was seen as a risk, so key messages were adapted, and it used simple, objective, and concise vocabulary, always in Portuguese (local) language.

During recruitment sessions, little receptivity to energy efficiency issues was noticed, probably due to beneficiaries' social context and low level of education. This has led to difficulties in disseminating information, so there was the need for face-to-face

Target Audience and Beneficiaries

explanation. Also, low propensity for new technologies was verified, hardly anyone has an email account (Figure 2).

Figure 2 – Mostly elderly beneficiaries-participants at a Sun4All Session

In the future, other beneficiaries may be considered, that are not inhabitants of municipal social housing buildings.

2.3.3. Communication and Engagement Plan

Communication and Engagement Plan

To inform both, beneficiaries, and the nearby communities, about events and updates of Sun4All, the pilot established working partnerships with the Social Housing Services and CSPCR.

The pilot also counted on the support of the municipality Department of Communication to reach out to households and general citizens who might want to be involved in the future or acquainted with the project, informing them about the activities in which they could take part.

As dissemination channels, the Almada pilot used the social media platforms of the Municipality and the webpage of AGN (https://ageneal.pt/pesquisar/sun4all). On the municipality webpage, there were published regular posts with news about the progress of the project (https://www.cm-almada.pt/projeto-europeu-sun4all).

From September 2022 and throughout 2024, workshops were held to strengthen the bonds created with the community, to further foster the energy and sustainability literacy of beneficiaries, and to monitor the development of the project as well as the expectations created.

These workshops address various topics surrounding energy, including themes such as energy efficiency, energy labels, energy bill reading, energy advice sessions. The main

Communication and Engagement Plan

objective of these actions was to provide the necessary tools and knowledge to both Sun4All beneficiaries and all interested citizen to improve their habits and consumption choices and to live more sustainable lives as a community (Figure 3, Figure 4, and Figure 5).

Figure 3 – Ageneal webpage promoting a technical visit to the pilot

Figure 4 – CMA webpage promoting a Session on Energy Bill Reading

Communication and Engagement Plan

Figure 5 – CMA Facebook promoting a Recruitment Session for Sun4All

Engagement process and Community work:

- For dissemination and outreach, the pilot relied on digital communication media such as the Facebook and Instagram channels of the Municipality of Almada (CMA), which count 58.000 followers. Likewise, the webpage of CMA and the website of AGN also participated in wide-reach dissemination activities, publishing regular posts about Sun4All, its content, and its objectives.
- To communicate with beneficiaries of Sun4All, AGN has created a specific email address (info@ageneal.pt) and a phone line (+351 925 486 886) to solve issues, and doubts and receive feedback. Generally, the pilot adopted a trust-based approach: prioritizing close in-person interaction, using the local language (Portuguese), with the beneficiaries to promote and create bonds of trust in the implementation of the project.
- To advertise the activities effectively, the pilot prepared flyers, a roll-up, and posters detailing key information about the project. Posters informing about new sessions were always affixed in buildings' common areas and at the Community Centre, where the main activities of dissemination and registration took place (Figure 6).

Communication and Engagement Plan

Figure 6 – Posters informing about a session

- As an incentive for good and sustainable daily practices, the Sun4All team in Portugal offered to each beneficiary a reusable bag made of cotton with Sun4All, CMA and AGN logos. Beneficiaries also received an efficient bulb during sessions on Energy Efficiency best practices (Figure 7).

Figure 7 – Reusable bag and flyers

- Alongside the materials already indicated, it was also prepared an agenda with information about the project to give to each person in each session. All the dissemination materials use the same visual communication, colours, and graphic elements, according to the infographic provided by ICLEI Europe. Encouragement sentences like "The success of this project depends on your participation" or "On behalf of the consortium of European partners of the Sun4All project, the Municipality of Almada, and AGN appreciate your collaboration" were also used. This methodology was created as an informative element encouraging participation.

2.4. Implementation and Framework

Implementation Framework

The implementation should follow these steps, further explained bellow:

- Expand the Renewable Energy Hub (REH).
- Create a replication toolkit.
- Provide training for all stakeholders involved.
- Replicate the model in the city.
- Finalize Licensing and Regulations.
- Foster Partnerships.
- Enhance Community Engagement.
- Continuous community engagement.
- Establish a permanent energy management office – One Stop Shop (OSS).

2.4.1. Action Plan for Result Adoption

Action Plan for Result Adoption

- Expand the Renewable Energy Hub (REH): Proceed with the installation of solar panels on municipal buildings near the Sun4All pilot housing complex, including the health center and schools. Coordinate with relevant stakeholders to integrate these new installations into the existing energy-sharing framework.
- Create a replication toolkit by developing a set of guidelines, best practices, and templates to help with the implementation of similar collective self-consumption projects.
- Provide training for all stakeholders involved, whether social workers, citizens, municipal technicians, and schools.
- Replicate the model in the city center by developing a detailed plan for leveraging the solar installation at the Forum Municipal Romeu Correia and other REH anchor buildings and identify and engage nearby residential buildings that could benefit from shared surplus solar energy.
- Finalize Licensing and Regulations, by creating and publishing internal regulations in the Diário da República for each REH and ensure all licensing requirements for the collective self-consumption initiative are fully met (Figure 8 and Table 1).

Action Plan for Result Adoption

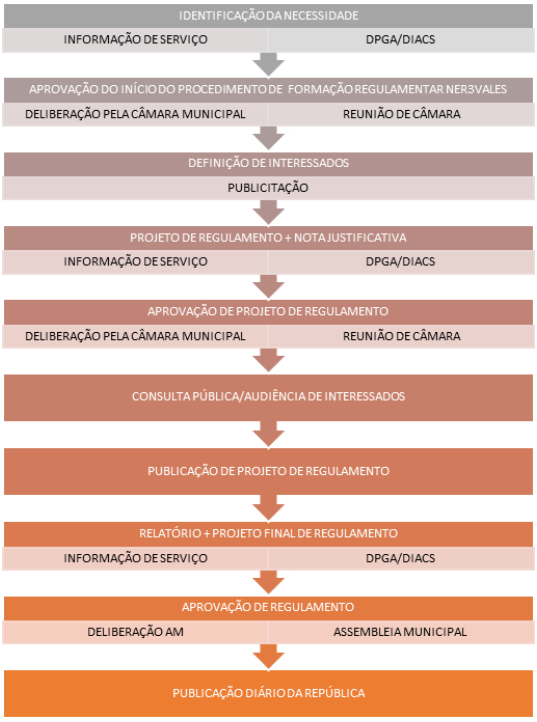


Figure 8 – Guideline steps for the Regulation approvement

		Maximum energy amount shared per month kWh			Corresponding estimated yearly discount (20cents/kWh) €		
House size (bedrooms)		T2	T3	T4	T2	T3	T4
Family size	1	70	80	90	168	192	216
	2	90	100	110	216	240	264
	3	110	120	130	264	288	312
	4	130	140	150	312	336	360
	5	140	150	160	336	360	384
	6	150	160	170	360	384	408
Comon areas		25			60		

Table 1 – Maximum amount of energy per household, established at the internal regulation

- Foster partnerships by establishing ongoing collaborations with local partners and maybe extend them to academic institutions and other municipalities to continue innovating in the field of renewable energy and collective self-consumption.
- Continuous community engagement by maintaining regular communication channels with the community to gather feedback, address concerns and promote ongoing participation in renewable energy initiatives.
- Enhance community engagement by organizing more sessions for residents and local businesses to increase awareness and participation in the collective self-consumption initiative.

Action Plan for Result Adoption
• Establish a permanent energy management office – One Stop Shop (OSS) – by creating a dedicated municipal office to oversee and further develop renewable energy initiatives in Almada.

2.4.2. Resources Allocation and Budget

Resources Allocation and Budgeting
To effectively implement the Sun4All project initiative and its financial support scheme in the pilot city, it is crucial to allocate a range of resources, including personnel, materials, technology, and funding. • Personnel are essential for the project's success. A dedicated team oversee implementation and communication with stakeholders, provide individual sessions and workshops on energy efficiency, recruit households and organize events. • Materials including educational resources like brochures and guides that explain the Sun4All project and provide energy-saving tips. Workshop materials such as presentation slides and flyers can be developed for various topics. Additionally, stocking energy-efficient appliances as rewards for participation can encourage community involvement. • Technology is vital for efficient project execution. Implementing project management software will help track progress and resource allocation. An energy-sharing platform should be created or adapted to manage solar subscriptions and distribute energy credits. A secure data management system will store beneficiary information and energy data, while communication tools like email marketing software and social media platforms will enhance community outreach. • Funding is another critical component. Sufficient funds should be allocated for solar PV installations on municipal buildings. Resources for communication, marketing and outreach efforts will promote the project within the community. In addition to these immediate resources, forming partnerships with local NGOs, educational institutions, and businesses can provide additional support and expertise. Establishing a volunteer program can enhance community engagement while reducing costs. Finally, creating a knowledge-sharing platform will allow municipalities to implement similar programs to exchange best practices and valuable resources. By strategically allocating these resources, the pilot city can successfully implement the Sun4All initiative, maximizing its impact on vulnerable households while promoting a transition to renewable energy adoption. This comprehensive approach will support the project's objectives and facilitate the sustainable adoption of the Sun4All financial support scheme within the community. To allocate budget and resources for expanding the Renewable Energy Hub (REH) by installing solar panels on municipal buildings near the Sun4All pilot housing complex,

Resources Allocation and Budgeting

including the health center and schools, the municipality will conduct a comprehensive assessment of the potential municipal buildings for solar panel installation. This includes evaluating roof conditions, sun exposure, and structural integrity of the buildings (Figure 9 and Figure 10).

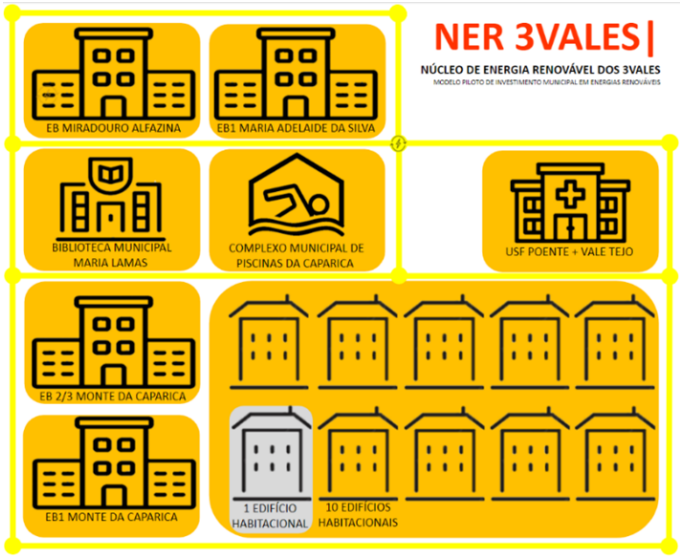


Figure 9 – From Sun4All to a Renewable Energy Hub

Figure 10 – From Renewable Energy Hub to Renewable Energy Community

2.5. Capacity Building and Training

Capacity Building and Training

Almada has plans to establish a permanent energy management office – One Stop Shop (OSS) – by creating a dedicated municipal office to oversee and further develop renewable energy initiatives in Almada and to promote energy efficiency measures by providing learning materials, capacity building and technical support.

This OSS will be responsible for organizing capacity building and training sessions for different stakeholders, offering comprehensive energy education and awareness programs to various segments of the community like ADENE's "Rota da Energia", including targeted sessions for citizens, schools, businesses, and municipal technicians.

Through informational sessions, training opportunities, and awareness campaigns, the program covers crucial topics such as climate change, energy consumption, energy

Capacity Building and Training

labeling, and efficiency measures, which can significantly enhance public understanding and promote sustainable practices. Additionally, by aligning with Portugal's commitment to the European Green Deal and providing information on energy programs and financing mechanisms, potentially also helping residents and businesses access resources for implementing energy-saving measures and advancing the city's goals in energy efficiency and renewable energy adoption.

These capacity-building sessions must involve the local associations and partners working with vulnerable households, to bring this knowledge to the ground.

Also, Almada intends to bring into the territory the project Ponto de Transição, an innovative pilot project created and funded by the Calouste Gulbenkian Foundation to combat energy poverty in Portugal. It operates as a one-stop shop model providing direct support to citizens regarding energy consumption and efficiency.

2.5.1. Training Programs for Stakeholders

Training Programs for Stakeholders

The successful implementation of the Sun4All Sustainable Adoption Plan in Almada requires comprehensive training programs tailored to various stakeholder groups. These programs aim to build capacity and develop essential skills for effective participation in the initiative.

Municipal Staff Training:

- Energy Poverty Assessment: Training on identifying and evaluating energy poverty indicators specific to Almada's context.
- Solar PV Technology: Technical workshops on photovoltaic systems, installation, management, and maintenance.
- Financial Scheme Management: Instruction on administering the Sun4All financial support scheme, including beneficiary recruitment.

Community Outreach Training for Social Workers:

- Engagement Strategies: Techniques for effective community outreach and communication about the Sun4All support scheme and energy efficiency measures.
- Cultural Sensitivity: Guidance on addressing diverse community needs and overcoming language or cultural barriers.
- Benefits Education: Training on explaining the economic and environmental benefits of solar energy and energy efficiency to potential beneficiaries.

Beneficiary Capacity-building Program:

- Energy Efficiency Workshops: Sessions focused on reducing energy consumption and maximizing the benefits of solar installations, among other topics.

Training Programs for Stakeholders

- Energy Rights and Literacy: Education on energy rights, billing, and understanding energy consumption patterns.
- Solar System Optimization: Practical training on how to monitor and maintain residential solar consumption optimized, resorting to web platforms, and reading energy bills.
- Visits to Solar Installations: Regular scheduled visits to existing solar installations, promoting demystification of the technology.

To inform both beneficiaries and the nearby communities about events and updates of Sun4All, the pilot established working partnerships with CMA Social Housing Services and the social association CSPCR near the pilot building to help the project by distributing posters and providing a room for meetings and informative sessions, at the Centro Juvenil dos 3 Vales. The pilot also counted on their support to reach out to more beneficiaries, informing them about the activities in which they could take part (Figure 11).

Figure 11 – Examples of sessions organized in collaboration with Social Housing Services at CSPCR installations

2.5.2. Capacity Building Initiatives

Capacity Building Initiatives

Espaço Cidadão Energia (Citizen Energy Spaces)

Based on Reform RP-r44, it aims to create one-stop shops for citizens on energy efficiency. The goal of this reform is to help citizens prepare and apply energy efficiency measures, implement renewable energy solutions, adopt sustainable behaviours in energy use, and improve their energy literacy.

The reform aims to create physical spaces – OSS – where citizens can get:

Capacity Building Initiatives

- Information and technical support, from interpreting energy bills to sustainable energy use and consumer rights.
- Advice, particularly regarding energy procurement, equipment acquisition, selection of energy efficiency and renewable energy solutions, and selection of commercial proposals for implementing solutions.
- Energy assessment of homes and investment proposals aimed at increasing thermal comfort and reducing energy bill costs.
- Advice on accessing public and private incentives and financing instruments, both national and local.
- Collection of user data to be shared with the National Energy Poverty Observatory.

In the context of the Sun4All project and related energy initiatives in Almada, technicians from the Almada Municipality and AGN are receiving training on various energy-related matters. This training is likely part of the broader "Espaços Cidadão Energia" (Citizen Energy Spaces) initiative, which aims to create 50 one-stop shops at a national level until March 2025, and train 300 qualified professionals to perform different roles for the citizen energy counters, by the end of 2024 (Figure 12).

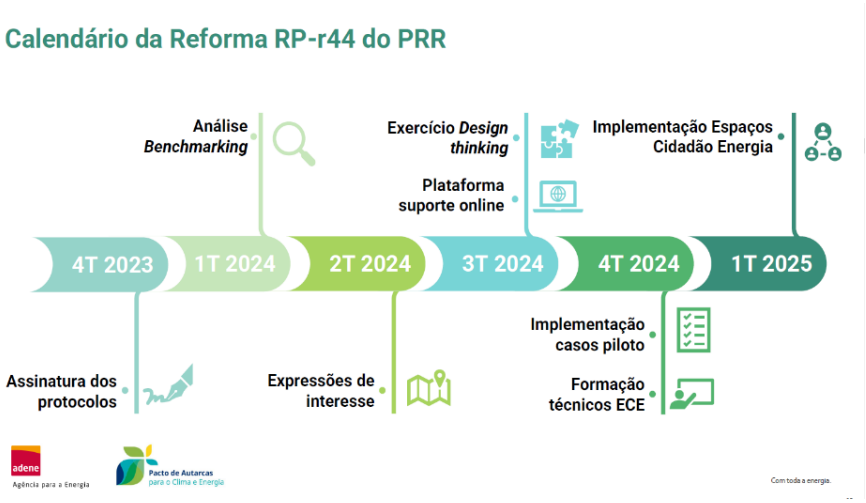


Figure 12 – Timeline for the implementation of OSS – Espaço Cidadão Energia

Coopérnico training

Coopérnico is a renewable energy cooperative in Portugal that focuses on promoting sustainable energy practices and citizen involvement, offering several programs and initiatives providing support and guidance to their members and the community. Namely, the POWERPOOR project:

- Encourages small and large-scale actions, such as energy efficiency interventions and the creation of energy communities, empowering citizens to combat energy poverty.
- It offers free training for Energy Supporters and Energy Community Mentors, facilitating the sharing of experiences and knowledge about renewable energy

Capacity Building Initiatives

and energy efficiency by creating a network of Supporters and Mentors to identify families in energy poverty.

- Promotes behavioural changes in energy use and suggest low-cost energy efficiency measures.
- Involves citizens and organizations in creating a new renewable and decentralized energy paradigm.
- Encourages active citizen participation in renewable energy projects.
- Establishes Local Groups to be Coopérnico's voice in communities.
- Promotes activities such as workshops, information sessions, and participation in local events.

While not a traditional mentoring program, these Coopérnico initiatives aim to educate, empower, and engage citizens in the transition to a more sustainable and fair energy model. The focus is on knowledge sharing, community support, and practical involvement in renewable energy projects (Figure 13).

Figure 13 – Coopérnico, renewable energy cooperative

Ponto de Transição

After its pilot phase in various locations, this new project funded by the European Commission's Energy Poverty Advisory Hub (EPAH) and led by RNAE (National Network for Energy Agencies), will soon be operating in Almada.

It uses a repurposed and renovated shipping container that serves as a mobile service center. It provides free services including advice on electricity and gas bills, information on public funding for home energy renovations, and support in filling out applications. Offers free energy assessments of homes to identify improvement opportunities. Utilizes "transition agents" selected from the local community and trained to provide support and advice on basic energy concepts.

Capacity Building Initiatives

Ponto de Transição demonstrates an innovative approach to addressing energy poverty through localized, community-based interventions, providing a model for future initiatives in this field.

Ponto de Transição will work as a pilot in Almada for 6 months as a mobile One Stop Shop (OSS) (Figure 14).

Figure 14 – Layout of Ponto de Transição

Rota da Energia

Rota de Energia is an initiative launched by ADENE, Portugal's national energy agency, to enhance energy literacy nationwide. The program combines in-person and remote educational sessions, targeting diverse audiences from school children to adults and professionals. Its primary objectives are to demystify energy concepts, promote understanding of energy efficiency and renewable energy sources, and encourage sustainable behaviours in daily life.

The initiative operates through a network of partnerships with local authorities, schools, and community organizations, allowing it to reach a wide range of communities throughout Portugal. By providing practical knowledge and tools, Rota da Energia empowers citizens to make informed decisions about their energy consumption, understand their energy bills, and contribute to national energy and climate goals. The program also aligns with broader European initiatives for sustainable development and climate action, positioning Portugal as an active participant in the global transition to a more energy-efficient and environmentally conscious society.

In Almada, Rota da Energia will be providing sessions to the 4 types of audiences, Technicians, Citizens, Schools, and Businesses (Figure 15).

Capacity Building Initiatives

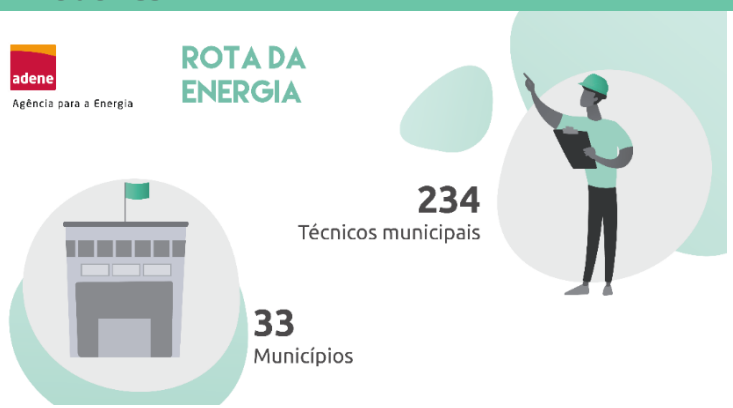


Figure 15 – Rota da Energia in numbers in Portugal

2.6. Institutional Integration

Institutional Integration

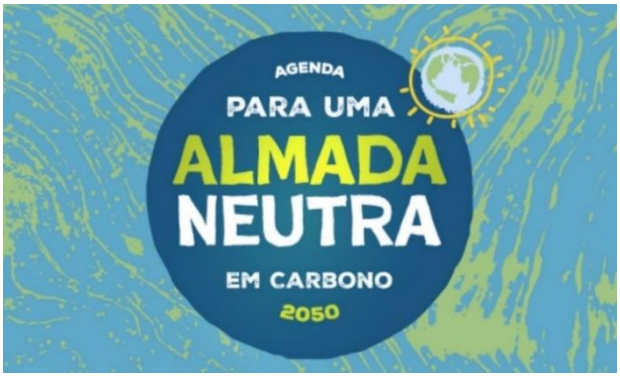
Key institutional steps to ensure long-term sustainability are:

- Expanding the Renewable Energy Hub (REH): Proceed with the installation of solar panels on municipal buildings near the Sun4All pilot housing complex, including the health centre and schools. Coordinate with relevant stakeholders to integrate these new installations into the existing energy-sharing framework (Figure 16).

Figure 16 – Phases for the First Renewable Energy Hub in Almada

Institutional Integration
• Replicate the model in the city centre by developing a detailed plan for leveraging the solar installation at the Forum Municipal Romeu Correia building and identify and engage nearby residential buildings that could benefit from shared surplus solar energy. • Enhance Community Engagement by organizing more sessions for residents and local businesses to increase awareness and participation in the collective self-consumption initiative.

2.6.1. Integration of Results into Existing Policies and Practices

Integration of Results into Existing Policies and Practices
Almada municipality is integrating the Renewable Energy Hubs strategy into its' Climate Plan 2030 and Almada's Carbon Neutrality Agenda, plans which are due to being finished in 2024. These will establish several NERs to be implemented by 2030 and 2050 (Figure 17).    *Figure 17 – Almada's Carbon Neutrality Agenda logo* It is worth mentioning that a support scheme like Sun4All, entitled "Sol para Todos", has been approved as a Resolution, by the National Assembly. This "Resolução da Assembleia da República n.º 61/2023" focuses on: • Creating the "SOL PARA TODOS" (Sun for All) program, allowing excess energy from self-consumption renewable sources to be donated to families experiencing energy poverty, with benefits for participating micro producers. • Establishing incentives for renewable energy communities, particularly renewable energy cooperatives. • Simplify the process for selling excess energy produced from renewable self-consumption units, encouraging the installation of photovoltaic panels on residential and non-residential buildings. However, this program resolution has not been endowed with a budget within the 2024 State Budget, despite the parties' efforts in proposing a €25 million budget for implementation.

2.6.2. Collaboration with Public Agencies and Institutions

Collaboration with Public Agencies and Institutions

The municipality has worked with many agencies and institutions to develop and promote the Sun4All scheme, such as the local Energy Agency AGN, the Energy Agency Network RNAE, the National Energy Agency ADENE, among other regional agencies, and many other relevant public and private institutions, such as:

- **DGEG - Direção-Geral de Energia e Geologia:** Licensing entity of solar installations for individual and collective self-consumption. DGEG is developing the platform where beneficiaries must be registered by the municipality to join a collective self-consumption.
- **ERSE – Entidade Reguladora dos Serviços Energéticos:** Independent energy regulator in Portugal responsible for regulating electricity, natural gas, LPG, petroleum-derived fuels, biofuels, and electric mobility network operations. This entity is responsible for providing ease of management of the collective self-consumptions, by categorizing the Sun4All model a pilot, beneficiating of innovative tools and support.
- **E-REDES:** Electricity distribution system operator in Portugal, managing the national electricity distribution network. EREDES is the developer of the platform where beneficiaries can check their consumptions reports.
- **Coopérnico cooperative and CENSE research centre.** These are knowledge partners that can support CMA studying and understanding which system change is needed, and help bringing these conclusions to national legal authorities.

2.7. Monitoring and Evaluation

Monitoring and Evaluation

To facilitate the monitoring and evaluation process, regular meetings will be organized with the Almada City Council, which will gather and consolidate information from various stakeholders involved in the Sun4All initiative.

In terms of utility performance, several essential metrics will be monitored to ensure the effective execution of the Sun4All program in Almada, resorting to the ORD energy management platform, and with the collaboration of the social housing department.

Regular reviews of these metrics will yield insights into utility performance and highlight areas needing improvement, ensuring that the project's goals are successfully achieved in Almada. This monitoring framework will be essential for the success of the Sun4All initiative within the municipality, particularly for the pilot installations in Monte da Caparica.

2.7.1. Performance Monitoring and Tracking

Performance Monitoring and Tracking

The ongoing evaluation of objectives will be conducted by the Almada City Council. Key indicators that will be consistently tracked include:

- % share of energy shared with beneficiaries in each hub (using E-Redes digital platform)
- The number of users benefiting from photovoltaic (PV)
- The status of installations (such as: in progress, legalized, operational, etc.)
- The amount of renewable energy generated and attributed to each user (kWh)

2.7.2. Feedback Mechanisms and Continuous Improvement

Feedback Mechanisms and Continuous Improvement

- **Thematic Workshops:** Regular workshops with beneficiaries will be a good moment to gather direct input, tips, and complaints in a proximity setting. These sessions will provide valuable insights into the program's impact and areas for improvement.
- **General Assemblies:** As part of the newly established collective self-consumption initiative, regular general assemblies will be held. These meetings will serve as a platform for members to voice suggestions and for technicians to collect both direct and indirect feedback.
- **Internal Technical Meetings:** Periodic meetings with social housing technicians and other stakeholders will be conducted to gather specialized feedback and insights.
- **Regular assessments and adjustments:** The city will conduct regular evaluations of the program's performance, processes, and outcomes.

2.8. Conclusion

Conclusions

The Sun4All project in Almada has demonstrated significant progress towards addressing energy poverty and promoting a just energy transition. The development of the Sun4All Sustainable Adoption Plan has contributed significantly to Almada's progress towards a just transition by:

- Empowering vulnerable consumers to participate in the energy transition.
- Improving energy literacy among residents.
- Reducing energy costs for participating households.
- Demonstrating the feasibility of community solar projects.

Conclusions

Key follow-up actions to further tackle energy poverty in Almada include:

- Expanding the Renewable Energy Hub (REH) to include more municipal buildings, such as health centres and schools.
- Refining outreach strategies to achieve higher rates of beneficiary recruitment.
- Developing a comprehensive energy management system to integrate new solar installations with the existing energy sharing framework.
- Continuing and expanding energy literacy programs and workshops.
- Exploring additional funding sources and partnerships to sustain and scale the project.

The Sun4All project in Almada has not only addressed immediate energy poverty concerns but has also laid the groundwork for a broader just energy transition in the municipality. By adapting the Sun4All scheme to local contexts and focusing on social housing residents, Almada has created a replicable model that can be extended to other areas of the city and potentially to other municipalities.

The project's success in exceeding PV installation targets and financial investments while engaging the community effectively demonstrates the viability of community solar solutions in addressing energy poverty. As Almada moves forward, the lessons learned and structures established through the Sun4All project will be invaluable in shaping future energy policies and initiatives, ensuring a continued commitment to sustainable, equitable energy access for all residents.

2.8.1. Summary of Key Findings

Summary of Key Findings

1) Almada seamlessly integrated Sun4All into its innovative Municipal Renewable Energy Hubs framework.
2) The city achieved a significant milestone by successfully formalizing collective self-consumption arrangements.
3) Comprehensive energy literacy programs were implemented to empower and educate beneficiaries.
4) Strong collaboration with local stakeholders and social services enhanced project reach and effectiveness.
5) The project's success promoted sustainability and inspired future municipal solar investments across Almada.
6) Despite progress, there's a need to improve beneficiary recruitment to reach sceptic segments of the population.
7) Enhancing communication strategies for diverse beneficiary groups remains a priority for broader engagement.
8) Almada is actively preparing to replicate the successful Sun4All model in the city centre and other areas.

Summary of Key Findings

9) The municipality is sharing knowledge with other cities to promote broader adoption of the Sun4All approach.

2.8.2. Outlook and Recommendations

Outlook and Recommendations

Almada's success in integrating Sun4All into its Municipal Renewable Energy Hubs framework provides a strong foundation for expanding this model. Future policies should focus on creating more such hubs across the city, potentially mandating their inclusion in new urban development projects.

The success of the energy literacy programs suggests a need for their continuation and expansion. Future actions should include integrating these programs into school curricula and community centre activities to ensure long-term impact and wider reach.

The effective collaboration with local stakeholders and social services demonstrates the importance of a multi-faceted approach. Future policies should formalize these partnerships, perhaps through the creation of a dedicated "Energy Poverty Alleviation Task Force" that brings together various city departments and community organizations.

The project's success in promoting sustainability and inspiring future municipal solar investments should be used as a case study to attract more funding and investments. The city could develop a green bond program specifically for expanding solar energy projects.

The need for better communication with diverse beneficiary groups highlights an area for further investigation. A research study could be conducted to understand the communication preferences and barriers of different demographic groups, informing the development of tailored outreach strategies.

As Almada prepares to replicate the Sun4All model in the city centre and other areas, it should develop a comprehensive "Replication Roadmap". This document will outline the steps, potential challenges, and necessary resources for implementing the model in different urban contexts.

Almada's role in sharing knowledge with other cities positions it as a leader in sustainable energy solutions. The city should consider hosting an annual conference on urban energy poverty solutions, inviting policymakers from across Portugal or Europe to learn from the city's experience and potentially influence national and EU-level policies.

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3. Sun4All Sustainable Adoption Plan for Barcelona, Spain

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
ALEB	Barcelona Local Energy Agency
CAP	Climate Plan
DSO	Distribution System Operator
EAP	Energy Advisory Points
GHG	Greenhouse Gases
IMHAB	Municipal Public Housing Institute
PAEC	Barcelona Climate Emergency Action
PV	Photovoltaic
RD	Royal Decree – Legal norm
TERSA	Waste Treatment and Selection, S.A.

3.1. Barcelona Pilot Achievements and Outcomes

Barcelona Pilot Achievements and Outcomes

The purpose of the Barcelona Pilot has been to establish and implement innovative mechanisms that provide renewable energy access to already-identified energy-poor households in Barcelona. The initiative has addressed energy poverty through a holistic strategy that has focused on empowerment, self-sufficiency, and community engagement. By leveraging the city's infrastructure, such as public housing and public spaces, the project has created sustainable energy solutions that do not rely on traditional energy bill payment methods but instead have integrated citizens into the broader energy transition.

The scope of the Barcelona Pilot has covered two main schemes:

- **Scheme 1: Public housing self-consumption installations.** This scheme has involved the installation of photovoltaic (PV) systems on public housing buildings

Barcelona Pilot Achievements and Outcomes

across Barcelona. The goal has been to enable self-consumption of renewable energy for all residents. These residents have already gone through the housing agency selection criteria, and they have been identified as energy-poor households. This scheme also has focused on empowering households by reducing their dependency on traditional energy suppliers, by helping them understand their energy rights, and by lowering their energy costs through locally generated renewable energy.

- **Scheme 2: PV Pergolas in public spaces.** The second scheme is still in the planning and implementation phase, it has not been possible to be implemented during the timeframe of the project. It involves the construction of PV pergolas in various public spaces around the city. These pergolas will serve as community-based energy hubs, providing renewable energy directly to nearby energy-poor households. This scheme will expand the reach of the Sun4All project beyond individual housing units, creating a network of renewable energy sources throughout the city that benefits multiple households.

The Barcelona Pilot scope has also included engaging local communities, fostering partnerships between public and private electricity sectors, and promoting policies that support sustainable energy practices to tackle energy poverty.

The expected outcomes of the Barcelona Pilot have included a measurable decrease in energy poverty among participating households in Barcelona, by improving access to affordable renewable energy. The initiative has led to a significant increase in renewable energy adoption within public housing and public spaces, aligning with the city's broader energy transition goals. As a result, energy-poor households have become more empowered, gaining knowledge and rights of their energy production, and actively participating in the energy transition.

Furthermore, the project was expected to create scalable and replicable models for addressing energy poverty, which could be applied in other cities and regions within Spain and across Europe. The initiative has also helped develop a supportive policy framework that encourages renewable energy adoption while providing protections and incentives for energy-poor households. This framework emphasizes the importance of integrating energy-poor households into renewable energy projects and, more importantly, focus on simplifying self-consumption activation procedures and ensuring energy rights are upheld. Overall, the Barcelona Pilot has helped establish a decentralized energy infrastructure that benefits vulnerable populations while supporting Barcelona's sustainability and climate objectives.

3.1.1. Summary of Key Sun4All Project Results

Summary of Key Sun4All Project Results

The Barcelona Pilot has achieved significant results, particularly in the successful implementation of the first scheme, which focuses on public housing self-consumption

Summary of Key Sun4All Project Results

installations. The overall **investment** for the 3 PV facilities was **111.673€,** with a total **installed power of 72,51 kWp.**

The primary achievement has been the high participation rate among selected energy-poor households: a total of **113 households have benefited from the scheme**, out of 117 households living in the selected buildings, demonstrating strong community engagement and interest in renewable energy solutions. The **estimated savings** as result of the project are **107 MWh**, which **represent on average 22% of the energy consumption.**

This success is underscored by the fact that participants have not only obtained economic savings on their energy bills but have also become more resilient to energy crises due to the extensive knowledge and understanding they have gained throughout the project. This empowerment of households is a key indicator of the project's success, as it aligns with the broader objective of fostering a holistic approach to tackling energy poverty.

While the second scheme, involving the installation of PV pergolas in public spaces, is still in the development phase, the experiences gained from the first scheme have streamlined the processes, making future implementations smoother and more efficient. The actual challenges and complexities of the project are focused on legal matters and political willingness and prioritization to push forward the project.

One of the main challenges faced during the pilot was the resistance encountered from the distribution company, due in part to the fact that they were also developing their own internal procedures to allow the shared self-consumption to happen. This made the activation of shared self-consumption unnecessarily difficult. The company imposed procedural barriers that delayed the activation process, and when the activation was finally achieved, they stopped issuing bills to the participating households. This situation posed a significant risk to the project, as it threatened to undermine the trust that had been carefully built with the pilot beneficiaries. However, this risk was successfully mitigated through clear and transparent communication with the participants. By keeping them well informed and involved at every step, the project maintained the trust and confidence of the community, ensuring the continued success of the initiative.

Overall, the Barcelona Pilot initiative has navigated these challenges effectively, resulting in strong community participation, increased energy resilience, and valuable insights that will ensure a smooth development of the second scheme and future projects.

3.1.2. Impact Assessment and Success Metrics

Impact Assessment and Success Metrics

The impact assessment of the Barcelona Pilot is a critical component for ensuring that the project meets its objectives of reducing energy poverty and empowering citizens through renewable energy solutions. The purpose of the impact assessment is to systematically evaluate the effectiveness of the project by analysing key performance indicators such as participation rates, attendance at educational activities like workshops, dropout rates, the successful activation of shared self-consumption systems, and energy savings achieved by participants. These metrics provide both quantitative

Impact Assessment and Success Metrics

and qualitative insights into the project's progress and allow for the identification of areas that may require adjustments during the implementation. The evaluation methods include interviews, data analysis and bill monitoring conducted at regular interval throughout the project.

To assess the overall impact of the project, two comprehensive questionnaires were administered to participants at different stages, offering valuable feedback and insights into the project's effectiveness and areas for further improvement.

3.2. Stakeholder Analysis

Stakeholder Analysis

The coordination and implementation of the Sun4All Barcelona Pilot has been primarily led by **public sector entities**, including:

- the Municipal Public Housing Institute (IMHAB).
- the Local Energy Agency.
- the City Council.

These organizations have driven the project forward, ensuring that public housing integrates photovoltaic systems, that energy operations are managed effectively, and that the initiative aligns with municipal sustainability goals.

However, the **private sector** also played a critical role, given its substantial influence and potential resistance to such projects. The involvement of private stakeholders, such as construction companies, utility providers, and the Distribution System Operator, is essential for overcoming barriers and ensuring the successful adoption of shared self-consumption schemes.

Effective communication between the public and private sectors is therefore crucial for navigating challenges and achieving the project's objectives.

3.2.1. Identification of Key Stakeholders

Identification of Key Stakeholders

The Sun4All Pilot City initiative in Barcelona has involved a diverse group of stakeholders, each playing a crucial role in the successful implementation and impact of the project.

- **The Municipal Public Housing Institute (IMHAB)** is a central stakeholder, responsible for overseeing the integration of photovoltaic (PV) installations into public housing buildings, in which the project beneficiaries reside. IMHAB collaborates closely with construction companies, responsible of the construction of the building and the PV systems. These companies are tasked not only with the construction but with the actual delivery and installation of the PV systems, as well as ensuring its first running stages. This construction company, under the

Identification of Key Stakeholders

supervision of IMHAB, ensures that the technical aspects of the project are executed to the required standards and set timelines, thereby enabling the seamless implementation of the self-consumption.

- **TERSA,** a public-owned company managing energy operations, played a vital role in the project by coordinating and managing the energy generation aspects such as PV installations. **Currently, it is the company tasked by ALEB with maintaining and operating the municipal photovoltaic installations.**
- **Distribution System Operator (DSO)**, who manage the Distribution of renewable energy to the participating households, though a Shared self-consumption agreement. TERSA works in tandem with the DSO to facilitate the connection of the PV systems to the grid.
- **The electric utility companies** have been also involved, primarily in managing the transition to new/updated contracts for the households and ensuring the integration of self-consumption benefits into their bills. The Energy Agency provided expert guidance and support, offering strategic advice to optimize efficient procedures and coordination throughout the project.
- **The City Council of Barcelona** is another key stakeholder, providing governance, policy support, and overall strategic direction for the initiative. Their involvement ensures that the project aligns with the city's broader sustainability goals and energy transition strategies. Also, the knowledge and lessons learned from Sun4All will be transferred to some of the City Council's services and programmes such as the Energy Advisor Points (PAEs) or workshop programmes to citizens such as Carrega't d'Energia.
- Overall, the **Barcelona Local Energy Agency (ALEB),** in charge of defining and implementing the energy policy for the city, has acted as the primary coordinator, bringing together all these stakeholders to ensure smooth communication, collaboration, and alignment of objectives. Through ALEB's leadership, the project has benefited from a cohesive approach that integrates the technical, administrative, and regulatory aspects necessary for the successful reduction of energy poverty in Barcelona.

3.2.2. Analysis of Stakeholder Needs and Preferences

Analysis of Stakeholder Needs and Preferences

The success of the Barcelona Pilot hinges on addressing or at least have extensive knowledge of the diverse needs of its stakeholders, each of whom played a crucial role in the project's implementation and impact.

- **IMHAB:** Focused on maintaining and enhancing public housing while integrating sustainable practices to improve energy efficiency.
- **Electric Utility Companies and Distribution System Operator:** Prefer minimal involvement and disruption from distributed renewable energy projects, as they may resist changes that impact or interfere with their existing operations.

Analysis of Stakeholder Needs and Preferences

- **Barcelona Social Service Department**: Worked to alleviate the impact of energy poverty on beneficiaries, ensuring access to affordable and reliable energy solutions.
- **Barcelona Local Energy Agency:** Sought to advance energy transition projects and support the adoption of renewable energy solutions.

3.3. Adoption Strategy

Adoption Strategy

Barcelona city council wrote its first CAP, the Climate Plan, in the year 2018. Four main axes were designed:

1) Mitigation
2) Adaptation
3) A fair transition
4) Citizen action

Alongside the Climate Emergency Declaration of January 2020, some goals were reinforced to accelerate and boost climate action.

- Solar energy is the only renewable source available in the city. A lot of spaces are feasible in roofs and public spaces. First goal was to fivefold solar energy power installed in 2018 by 2030 to contribute to the necessary energy transition. Also, the social axis of the plan had a big goal, which is to eradicate energy poverty in the city. Therefore, energy transition must reach every corner of the city regardless of economic and social backgrounds. At this point, Sun4All was a big opportunity to tackle these challenges.
- Recently, in the framework of the "100 hundred carbon neutral and smart cities" European Mission, mitigation of climate change goals, has been increased to at least 80% of GHG emissions reduction by 2030. As Barcelona received the EU Mission label in March 2024, a new solar energy government measure was issued by Barcelona City Council. New solar energy goal in city-owned installations is now 27,2 MWp, which implies to fivefold solar power installed in 2023. Also, general citywide goal is to reach 1 GWp installed by 2030. Projects as Sun4All are very necessary, as city goals imply that successful and scalable models must be implemented to be reached.

3.3.1. Strategic Objectives for Adoption

Strategic Objectives for Adoption

Sun4All work provided a valuable experience to replicate the model in all the public housing system. As explained in the Final Implementation Report, the lessons learned

Strategic Objectives for Adoption

can overcome the main barriers that considerably slow down the process and thus prevent generalisation of solar installation across the city can be overcome.

The Sun4All project knowledge will be incorporated into existing Plans or working documents such us:

- Barcelona Climate Emergency Action (PAEC).
- Climate City Contract.
- Solar energy government measure.
- Refurbished social housing buildings protocol.

Moreover, it will also contribute to the fulfilment of the following strategic objectives of Barcelona City Council:

- To fivefold solar energy installed in the city by 2030 (2018 as base year)
- Eliminate energy poverty by 2030.
- Reduce 50% of GEH emissions in the city by 2030.
- Reduce 80% of GHG emissions in the city by 2030.
- To reach 1 GWp installed PV power at city level.
- To fivefold city-owned PV power by 2030 (2023 as base year) to reach 27,2 MWp.

The Adoption Plan will be explained in more detailed, to ensure the implementation of Sun4All scheme as it is strategic to the city to deliver tools across all the sectors to generalise renewable energy, being social housing a good key to lead by the example.

3.3.2. Target Audience and Beneficiaries

Target Audience and Beneficiaries

The **primary beneficiaries** of the Barcelona Pilot were **vulnerable families** that already reside in IMHAB buildings. These households typically have low knowledge about the electrical sector, available utility options, and their energy rights. Their primary concerns revolve around immediate financial and practical issues rather than environmental benefits, which, although of interest, are secondary to their immediate needs. This is why it is so important that their needs are considered when working with families in vulnerable situation. Sun4All project has helped residents to manage their energy bills more effectively and therefore reduce the cost of their bills.

Secondary beneficiaries were:

- **IMHAB.** It has benefit from two points of view. On the one hand, the initiative has reduced and simplified the workload of IMHAB in activating self-consumption. On the other hand, it has improved the satisfaction of tenants who have welcomed having reference persons to resolve all their doubts and provide support throughout the entire process of activating self-consumption.
- **Barcelona Social Services.** It has benefit because as families gain greater independence, both economically and in terms of energy knowledge, this reduces

Target Audience and Beneficiaries

the pressure on social services, allowing them to focus on other pressing issues, and alleviates the burden on energy advisory points, as fewer families require assistance with their energy-related concerns.

3.3.3. Communication and Engagement Plan

Communication and Engagement Plan

The communication and engagement plan for the Sun4All project was developed to ensure effective implementation, clear dissemination of information and successful engagement. It was specifically designed considering the needs of the beneficiaries.

After the Sun4All project experience, it has been possible to evaluate which communication channels have been most useful with the beneficiaries as well as the best engagement strategies. The most important points to consider have been:

- **Primary Beneficiaries:** For the primary beneficiaries, clear and accessible information is the key. Using user-friendly channels like messaging apps and phone calls facilitate straightforward and efficient communication. Communications should be concise and direct, avoiding unnecessary meetings. When meetings are necessary, they should be informal, efficient, and engaging, such as small gatherings with refreshments. This approach will ensure that beneficiaries remain informed and engaged without feeling overwhelmed, fostering a positive experience throughout the adoption process. All in all, the steps are as follows:

    1) Prepare clear and accessible information.
    2) Use user-friendly communication channels.
    3) Host informal and engaging meetings (only when necessary).
    4) Keep communications concise and direct.

- **Secondary beneficiaries:** Effective communication within public bodies requires a coordinated approach through an interdepartmental coordination team. In the case of Barcelona, this team facilitates seamless information flow between the Municipal Public Housing Institute, Barcelona Local Energy Agency, City Hall, and other public bodies or programmes. Regular, structured meetings and updates will ensure that all public entities are aligned with the project goals, timelines, and responsibilities. This approach will help in addressing interdepartmental issues promptly and maintaining consistent support across different government sectors.

The **Engagement Plan** with the beneficiaries will be applied in **parallel with the Adoption Plan (section 3.4.1)** that will be followed in each new building.

- **For Primary Beneficiaries:** The communication with these beneficiaries will begin on the day of the key handover of each dwelling, specifically since phase 2 of the Adoption Plan. It will remain active throughout the activation process of

Communication and Engagement Plan

the self-consumption contract until the verification of its effective application in the electricity bill.

- **For Secondary Beneficiaries:** The communication with these beneficiaries will begin earlier, since phase 1 of the Adoption Plan, because the importance of working on good coordination between all secondary beneficiaries and stakeholders involved in the implementation of the protocol.

In the **periodic monthly follow-up meetings** between ALEB and IMHAB, the **engagement plan will be evaluated as it is used**, to ensure the continuous improvement of the plan and that existing barriers can be resolved.

3.4. Implementation and Framework

Implementation Framework

The adoption of the Sun4All scheme in Barcelona fits within an institutional context characterized by **two key policies**:

- Public housing policy, promoted by the Municipal Institute of Housing and Renovation of Barcelona (IMHAB), which aims to facilitate access to affordable and sustainable housing for citizens, especially for the most vulnerable groups.
- Policy to promote distributed renewable generation, led by the Barcelona Energy Agency (ALEB), which seeks to encourage the use of renewable energy, such as solar energy, to move towards a more sustainable and decentralized energy model.

Additionally, it fits and aligns with municipal policies that address energy poverty, aiming to ensure access to affordable energy for all. The Sun4All program, not only contributes to improving housing conditions by offering clean energy but also supports the fight against energy poverty, promoting a more just and sustainable energy transition.

3.4.1. Action Plan for Result Adoption

Action Plan for Result Adoption

To apply the Sun4Aall scheme and be able to activate the self-consumption systems for IMHAB buildings, the following action plan has been developed based on the results and experience of the project. This action plan defines a **methodology step-by-step** to be followed by the different actors involved in the action plan. The **steps included in the methodology** are:

1) The process begins with a close collaboration between ALEB and IMHAB to discuss the new buildings and organize the necessary actions.
2) Completion of the Construction Work (both building and PV installation) done by the construction company and coordinated by ALEB and IMHAB.

Action Plan for Result Adoption

3) The City Council legalizes the photovoltaic (PV) installation. The procedures to legalize the installation begin before the construction work on the building is completed by the construction company. Once the PV installation is registered, the next step involves notifying the Distribution System Operator (DSO). This notification ensures that the system is properly connected to the grid and is ready for activation. The DSO's acknowledgment is crucial for moving forward with the activation.
4) ALEB/IMHAB (depending on the building) prepares all the information about the PV installation (power, energy generated, etc.). This information will also be used to activate the contracts.
5) IMHAB prepares the handover of the keys, collecting the data of the beneficiaries who will live in each apartment.
6) ALEB prepares the welcome kit to be delivered to new beneficiaries, which includes relevant information regarding the PV installation, and the documents to be signed to authorize ALEB to carry out procedures with the utility companies to activate self-consumption.
7) Key handover: In addition to the information related to the rental/purchase contract and other documentation required by IMHAB to hand over the keys, the beneficiaries also sign consent forms, formally agreeing to participate in the shared self-consumption arrangement and activate the contract with the utility.
8) Following the DSO's confirmation, ALEB or a delegated actor will engage with the relevant utility companies for each beneficiary to proceed with activating the self-consumption contract. Communication with the utilities includes providing all necessary details and documents to enable the activation of the self-consumption systems.
9) Finally, after the PV system is up and running, the possibility of conducting follow-up assessments or providing training may be considered to evaluate the suitability of the beneficiaries' energy bills and whether the beneficiaries are eligible for aid or subsidies on their electricity bills in addition to the self-consumption benefits. This would help ensure that self-consumption is being correctly applied and that beneficiaries are receiving the intended financial benefits. Any issues identified during these assessments would be addressed promptly. After that, all the documentation regarding the PV installation and the self-consumption contract will be delivered to beneficiaries to be used for them in future procedures with new utilities.

It is crucial to outline that the **communication with utilities and the Distribution System** hinges on having reliable and efficient contacts within each major utility company. When interacting with these stakeholders, it is essential to have dedicated staff who can navigate regulatory frameworks, such as RD 244/2019, and advocate for the project's needs. Demonstrating perseverance and determination in communications will be crucial for overcoming resistance and ensuring smooth integration of renewable energy solutions. Building relationships with these contacts will help address challenges promptly and keep the project on track (Figure 1).

Action Plan for Result Adoption

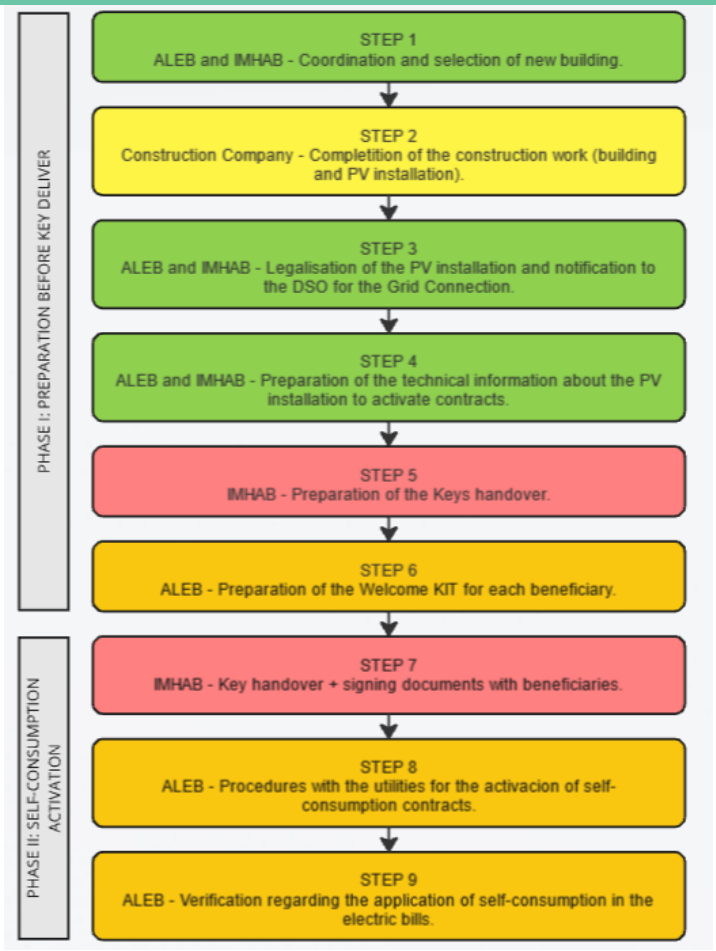

Figure 1 – Protocol for each new building process

The application of this adoption plan will be used individually for each new IMHAB building in which it is necessary to start a self-consumption facility. The **duration of all the steps** detailed above to implement the protocol from start to finish will be **at least one year**, and possibly extendable depending on the barriers that are detected. The implementation plan for each action is detailed below (Figure 2).

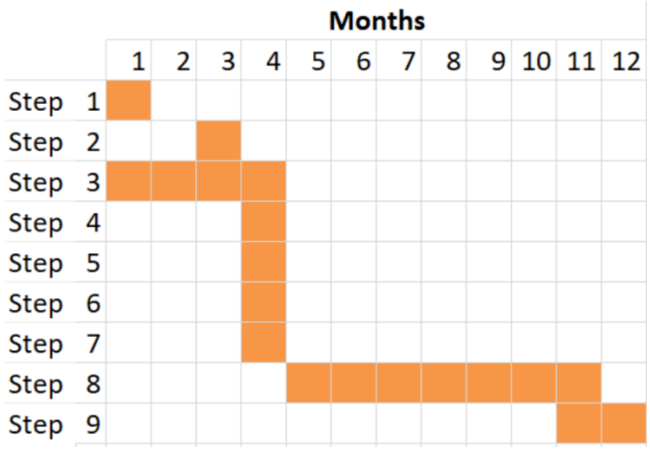

Figure 2 – Gantt scheme of timings needed for each new building process

Action Plan for Result Adoption
In the **periodic monthly follow-up meetings** between ALEB and IMHAB, **the protocol will be evaluated as it is used**, to ensure the continuous improvement of the procedure and that existing barriers can be resolved.

3.4.2. Resources Allocation and Budget

Resources Allocation and Budgeting
Once the knowledge transfer necessary to implement the project protocols has been completed by all stakeholders, the process will be managed using internal resources. However, it is important to note that the protocol cannot be fully implemented in buildings that are under construction or already in use. In such cases, a tendering process will be initiated to address the specific needs of the beneficiaries, some of whom may require extensive support. In Barcelona, a tendering process for beneficiary support will be conducted during the transition to full protocol implementation. Afterward, internal resources will be sufficient to manage the process.

3.5. Capacity Building and Training

Capacity Building and Training
Effective capacity building and training are crucial for the successful implementation and sustainability of the Sun4All scheme. This section outlines the strategies for empowering both public bodies and beneficiaries, ensuring they have the knowledge and skills required to support and benefit from the initiative. By providing targeted training and resources, ALEB aims to enhance operational efficiency and promote long-term success in reducing energy poverty and integrating renewable energy solutions.

3.5.1. Training Programs for Stakeholders

Training Programs for Stakeholders
The training programs will be carefully designed to address the specific needs of both public bodies and beneficiaries, ensuring a comprehensive understanding and effective participation. Central to these programs will be bilateral meetings with stakeholders, which serve as the foundation of capacity-building efforts. These meetings will be essential for identifying each party's unique needs and barriers, sharing crucial information, and addressing knowledge gaps. The training sessions will cover key topics such as regulatory frameworks, the activation of self-consumption systems, and beneficiary engagement strategies. By focusing on

Training Programs for Stakeholders

these areas, the training programs ensured that all participants are equipped with the necessary knowledge to contribute to the successful implementation of the Sun4All scheme.

3.5.2. Capacity Building Initiatives

Capacity Building Initiatives

The training initiatives will be tailored to meet the distinct needs of two primary audiences:

- **For public bodies**, the programs concentrated on enhancing their understanding of stakeholder roles, project timelines, and potential barriers. The goal is to align strategies across departments and organizations, ensuring seamless collaboration and effective project implementation. Public officials will receive guidance on overcoming challenges and leveraging opportunities to maximize the Sun4All scheme impact.
- **For the beneficiaries**, the training will be focused on practical knowledge, particularly regarding renewable energy systems, energy rights, and managing shared self-consumption contracts. These sessions will be designed to be accessible and engaging, enabling beneficiaries to confidently navigate the complexities of the energy sector and fully benefit from the Sun4All scheme. By empowering these participants, the programs not only facilitate smoother implementation but also contribute to the long-term success of the initiative.

3.6. Institutional Integration

Institutional Integration

Integrating the Sun4All project outcomes into existing institutional frameworks is key to ensuring both the long-term sustainability and impact of the initiative. This process involves aligning the project's results with the established policies and operations of relevant public bodies and organizations in Barcelona.

A pivotal element in this integration is the role of Energy Advisory Points (PAEs). Barcelona's Energy Advice Points are a municipal service implemented to tackle energy poverty and offer energy advice to all citizens. The aim is that the PAEs will add a new service providing essential support to beneficiaries, assisting them in activating and managing their self-consumption systems. By utilizing these already funded and operational public bodies, the Sun4All scheme will be supported by existing infrastructure, thereby enhancing the program's viability and continuity. Energy Advisory Points will offer ongoing assistance, resolve issues, and facilitate the smooth functioning of the self-consumption systems.

Institutional Integration
On the other hand, Carrega't d'Energia is a program managed by Barcelona Climate Change Office that offers series of workshops on different energy-related topics to citizens or entities and are done mostly in public spaces around the city. It stands for about 60-80 workshops per year. The knowledge gathered during the project has been integrated to some of the workshops and will remain in the future as part of their catalogue of workshops.

3.6.1. Integration of Results into Existing Policies and Practices

Integration of Results into Existing Policies and Practices
As explained in section 3.3.1. chapter, Sun4All goals and outcomes contributed to the general objectives of Barcelona City Council in the climate change mitigation, solar energy policy and the fight against energy poverty. These goals are, nowadays, to reduce GHG emissions 80% by 2030, to fivefold 2023 solar installed power by 2030 and to eliminate energy poverty situations citywide. Sun4All pilot project and the expected outcomes of its wide adoption. The Municipal Institute of Housing and Renovation (IMHAB) policy is to expand solar energy as a service included in its social rental package to all its buildings. To do that, the described protocols must be in place. In them, IMHAB and ALEB will ensure that each necessary step is delivered on time. On ALEB's side, the main policy is to boost solar energy in the city, as the main vector to contribute to the energy transition available in the city. This plan will help to go further in this objective. Also, Energy Advisory Points will be in coordination with ALEB and IMHAB to be sure everything works on the beneficiaries' side. This is possible with internal resources thanks to the learnings obtained in the pilot that allowed to protocolize what and when must be done.

3.7. Monitoring and Evaluation

3.7.1. Performance Monitoring and Tracking

Performance Monitoring and Tracking
The monitoring of the objectives will be carried out continuously by ALEB, in collaboration with IMHAB. Some of the indicators that will be regularly monitored include: • Number of users with access to PV. • Status of the installation (in progress, legalized, operational, etc.). • Renewable generation per user (kWh).

Performance Monitoring and Tracking

To achieve this, regular meetings will be established with IMHAB, which will centralize and compile information from the different stakeholders.

Regarding utilities performance, to effectively monitor their tasks in the continuation of the Sun4All scheme implementation, several key metrics will be tracked:

- The number of contracts with activated self-consumption systems will be closely monitored to assess the extent of adoption.
- The time required for utilities to activate these self-consumption agreements, as efficiency in this process is critical for smooth implementation.
- The timeframe for receiving bills that accurately reflect the self-consumption setup will be evaluated.
- Ensuring that bills are promptly and correctly adjusted is essential for maintaining beneficiary satisfaction and confidence in the system.

Regular analysis of these metrics will provide insights into utility performance and identify areas for improvement, helping to ensure that the project's objectives are met effectively.

3.7.2. Feedback Mechanisms and Continuous Improvement

Feedback Mechanisms and Continuous Improvement

To receive feedback from the users, IMHAB has a post-sales service that beneficiaries can contact in case of any issues. This will also be one of the channels that they can use if there are problems with the service. Additionally, during the initial phases when the Sun4All financial scheme is being tested, ALEB will also provide a user support service for any questions or issues related to PV generation and shared self-consumption, including issues with energy billing. Additionally, ALEB and IMHAB will hold periodical bilateral meetings to monitor the implementation of the Sun4All scheme.

Regarding DSO and utilities, maintaining a strong relationship with them is essential for the success of the Sun4All project, and this requires ongoing feedback. Regular bilateral meetings will be held to discuss progress, address challenges, and share insights, ensuring that both parties remain aligned. Key milestones, such as the number of activated self-consumption contracts and the timely application of billing adjustments, will be periodically reviewed to identify areas for improvement. This structured feedback loop allows for prompt adjustments and fosters a collaborative approach, enhancing the efficiency and effectiveness of the partnership with utilities.

3.8. Conclusion

Conclusions

The project has facilitated the development and testing of a protocol designed to ensure that, in the future, tenants of IMHAB buildings will have access to photovoltaic energy from the moment they move into their new homes. This means they can immediately start benefiting from the advantages of solar power.

The protocol lays out a clear framework for coordination among the various stakeholders involved, specifying the necessary steps and the appropriate timing for each actor to contribute. This collaborative approach ensures that all aspects of integrating photovoltaic systems into new housing are addressed efficiently, enabling a seamless transition to renewable energy from day one.

3.8.1. Summary of Key Findings

Summary of Key Findings

The most important points that must be considered to ensure success in the implementation of the action plan are:

- The legalization process for the installation may encounter delays due to circumstances outside the control of IMHAB and ALEB. These potential setbacks could impact the overall timeline and must be considered when planning the step-by-step actions required for the project.
- Different energy providers have varying protocols for activating shared self-consumption for their users. This variation needs to be recognized when advising users.
- Direct communication and effective channels are crucial for addressing any issues vulnerable users may face with their energy supplier. This is especially important in situations of energy poverty, where users may struggle with complex technical/bureaucratic matters.

3.8.2. Outlook and Recommendations

Outlook and Recommendations

The main recommendations to follow all the learnings of the Sun4All initiative are:

- To mitigate the impact of potential delays in the legalization process, it is crucial to ensure effective planning and coordination among all parties involved. Establishing contingencies and managing expectations are vital for addressing any unforeseen challenges.
- To develop and standardize protocols for activating shared self-consumption across different energy providers. This will help streamline the process and ensure consistent advice and support for users, regardless of their energy provider.

Outlook and Recommendations
• To establish direct contact channels with beneficiaries to report any issues they encounter regarding their energy supply. Given the complexity of resolving such issues, accessible and straightforward support is essential, especially for those in situations of energy poverty.

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4. Sun4All Sustainable Adoption Plan for Coeur de Savoie, France

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Glossary

Keywords	Definition
Coeur de Savoie - CCCS	Cœur de Savoie is in France at the foothills of three mountain ranges and serves as the gateway to Savoie from Grenoble, near Chambéry and Albertville. It comprises 41 communes within the Alpine valley, encompassing parts of two established Regional Natural Parks (Bauges and Chartreuse) and one in development (Belledonne).
DSO	A Distribution System Operator (DSO) is an entity responsible for operating, maintaining, and developing the distribution network that delivers electricity from the transmission system or local generation to end-users. DSOs ensure the reliability, efficiency, and quality of the electricity supply, manage grid connections for consumers and producers, and facilitate the integration of renewable energy sources. The DSO in France is Enedis.
Energy poverty	It is defined as a situation where a household or an individual is unable to afford basic energy services (cooling, lighting, mobility, and power) to guarantee a decent standard of living due to a combination of low-income, high-energy expenditure and low energy efficiency of their homes".
OPAC	OPAC is the social landlord for the beneficiaries of the 2nd model in Coeur de Savoie. OPAC meaning in French "Office public d'aménagement et de construction"
PMO	The legal form of the legal entity within which the participants in the collective self-consumption operation are associated. In French, PMO stands for "Personne Morale Organisatrice". There is no set legal form, but a legal balance needs to be struck in terms of the statutes of each participant and their compatibility with the activities of a PMO.
Self-consumption operation	Solar self-consumption refers to the use of electricity generated by a solar power system directly at the site where it is produced, rather than exporting it to the grid. This method maximizes the utilization of locally generated solar energy, reducing reliance on external power sources and potentially lowering electricity costs. It is particularly beneficial for households and businesses seeking to enhance energy independence and efficiency.
Vulnerable households	Households who either do not have access to energy services or making use of these energy services undermines their possibility to access other basic services.

4.1. Coeur de Savoie Pilot Achievements and Outcomes

Coeur de Savoie Achievements and Outcomes

The participation of the Community of Communes Cœur de Savoie as a pilot city in the Sun4All project underscores its essential role in advancing renewable energy access and addressing energy precarity locally. The purpose of this pilot involvement was to serve as an early adopter of Sun4All's financial support scheme, aiming to adapt and fine-tune the program's initiatives to the French and local context. By leveraging its existing commitment to solar energy and its comprehensive Climate Air Energy Territorial Plan, Cœur de Savoie was ideally positioned as pilot city to test and validate these innovative solutions.

The scope of Cœur de Savoie's participation has included analysing the effectiveness of financial aids, such as subsidies for energy-efficient home renovations and reductions in energy bills, which are funded by revenues from local solar installations. This approach ensured that the financial support is both sustainable and directly beneficial to households in need. The objectives were clear: to reduce energy costs for vulnerable households, increase local solar energy production, and foster community engagement in the energy transition.

In terms of activities, the pilot city implemented a dual approach: providing immediate financial relief and promoting long-term energy awareness. Eligible households received tailored financial assistance, which not only alleviates their immediate energy burdens but also encourages investment in sustainable home improvements, or changes of habits to consume solar energy. Additionally, Cœur de Savoie conducted educational workshops and personalized energy-saving consultations to citizens and beneficiaries with the knowledge to sustain these improvements.

The expected outcomes from these activities are multifaceted.

Firstly, there is a tangible reduction in energy bills for participating households, enhancing their financial stability. Secondly, the community benefits from increased local solar energy production, contributing to a greener energy mix. Lastly, through educational initiatives and community engagement, there is a cultural shift towards greater environmental awareness and proactive energy management. Most of the previous training and information activities have also been open to all Coeur de Savoie citizens. They have been very successful and the Sun4All project has been useful in sharing knowledge and incentives on energy transition with a large part of the territory's population.

Cœur de Savoie adapts the Sun4All financial support scheme to local characteristics by closely collaborating with local associations and social centres to identify and reach eligible households. This ensures that the program is inclusive and responsive to local needs. Furthermore, the pilot city ensures that all activities are aligned with local priorities by integrating feedback from community members and continuously monitoring the impact of the initiatives. This adaptive approach ensures that Sun4All's implementation was and will be both effective and relevant, paving the way for broader adoption across other regions in France and Europe.

4.1.1. Summary of Key Sun4All Project Results

Summary of Key Sun4All Project Results

In the Community of Communes Cœur de Savoie, the implementation of the Sun4All project has yielded significant achievements and insights into addressing energy precarity through solar energy solutions. As of now, the project has successfully supported 87 households (in July 2024), primarily through financial aid for energy-efficient home renovations and reduced energy bills, funded by local solar installations.

The two infographics synthesise the models implemented to tackle energy precarity and support households in Coeur de Savoie (Figure 1 and Figure 2).

INFOGRAPHIC 1

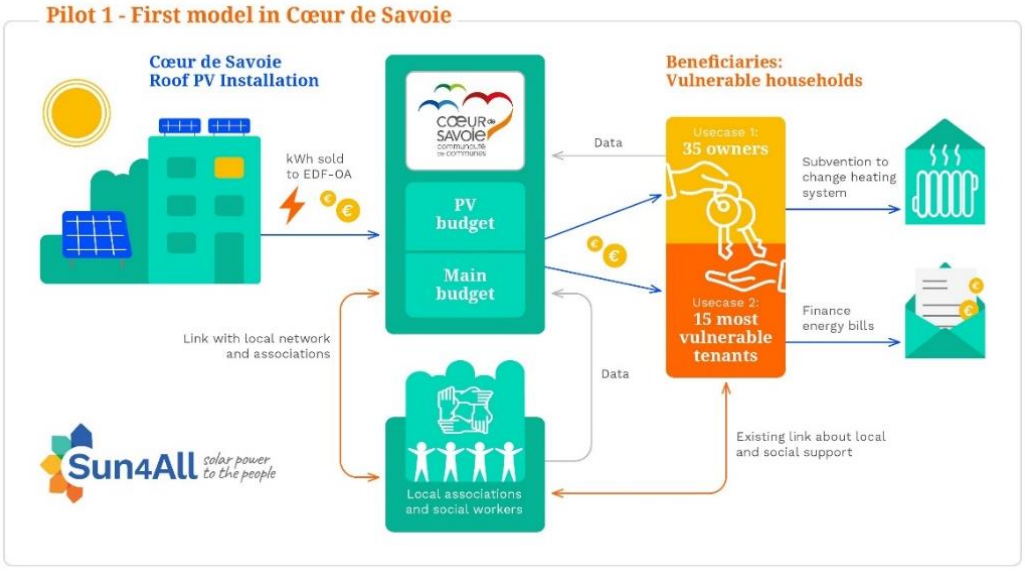


Figure 1 – First model in Coeur de Savoie

Summary of Key Sun4All Project Results

INFOGRAPHIC 2

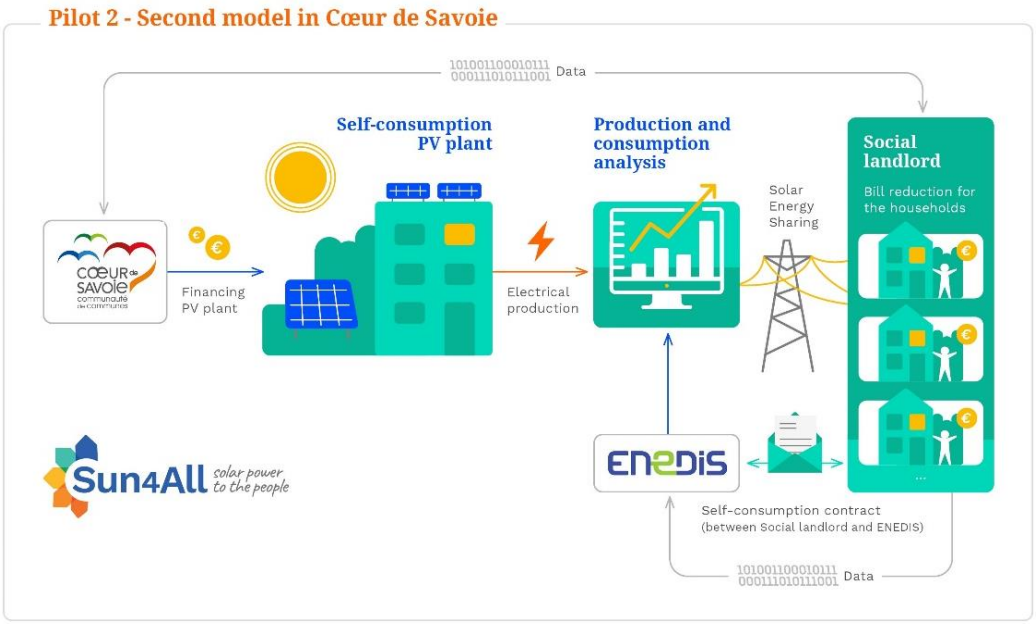


Figure 2 – Second model in Coeur de Savoie

Despite the success of this model implementation, several challenges have been identified. Key barriers include the complexity of bureaucratic processes, particularly in establishing Self-consumption operation. It has posed some difficulties for Coeur de Savoie to build the right model with the right partner. And still it has posed difficulties for beneficiaries for their membership, especially those with language barriers, or difficulty accessing digital technology.

To mitigate these challenges, the pilot city has on one hand, to study legal frame to find the right model, enhanced communication channels with utility companies and distribution system operators (DSOs) to use the new potential for developing collective self-consumption operations. On the other hand, CCCS has simplified documentation procedures for beneficiaries. Other recruitment methods were also used, such as door-to-door visits to buildings and walk-in sessions.

Additionally, logistical issues such as workshop attendance and participant recruitment across dispersed territory and communities have required customized solutions, including diversified communication methods (e-mail, post mail, door to door, recruitment session) and adapting workshop formats to accommodate family and work schedules. Despite these obstacles, the commitment of the pilot city and its partners has helped to overcome these challenges, and to ensure that Sun4All initiatives remain relevant to local needs and encouraging sustainable energy practices within the community.

Political will was another key factor in the implementation of the Sun4All project in Coeur de Savoie. The ongoing commitment and support of local authorities and elected members was essential in aligning policies with the project's objectives. Political will

Summary of Key Sun4All Project Results

facilitated resource allocation and improved collaboration between stakeholders, enabling smoother implementation of project initiatives. This proactive attitude underlined Coeur de Savoie's commitment to sustainable energy solutions and reinforced the project's impact in combating fuel poverty and promoting the adoption of renewable energy at local level.

4.1.2. Impact Assessment and Success Metrics

Impact Assessment and Success Metrics

In Cœur de Savoie, two different models were implemented in two phases. Each phase lasted approximately one year (Table 1).

1st model

Beneficiaries	RENOVATION WORK GRANTS *J'écorénov'*	REDUCTION OF INVOICES *Ecoénergie*	Total files Sun4All
Number of beneficiaries	35 files	15 files	**50 files**
Amount of aid	17 800€	3 000€	**20 800€**
Equivalent solar production (approx.)	161 800 kWh	27 300 kWh	**189 100 kWh**

Table 1 – Results of the first model in Coeur de Savoie

The total amount of subsidies from solar energy is equivalent to 32% of the annual production of La Chavanne (the 500kWp Cœur de Savoie photovoltaic power plant) (Figure 3).

Figure 3 – Solar Power Plant of La Chavanne – Own by Coeur de Savoie, it covers a large carpool parking

The first model was developed over a period of 1 year, with beneficiaries recruited on a rolling basis. An internal procedure was used to monitor beneficiaries' files, and the payment of their aid was monitored by the administrative department of Cœur de Savoie.

Impact Assessment and Success Metrics

Impact was measured in terms of the number of people who joined the program, and then in terms of the energy savings that their support will bring.

For households undergoing renovation, the gain was easy to estimate.

For households benefiting from the home visit and the bill reduction financed via solar energy, the gains were less easy to objectify. Some objective and KPI indicators were defined by the consortium to manage evaluation method (Table 2).

2nd model

Beneficiaries	Self-consumption project – Saint Pierre d'Albigny
Number of beneficiaries (16/07/2023)	37 beneficiaries
Number of investments (solar PV)	~50 000 €
Solar power	36 kWp
Solar production (9 month)	110,9 MWh
Self-consumption rate	70%
Average monthly discount (per households)	10-15€ / month
Activities and workshops on site	3 activities dedicated + recruitment session

Table 2 – Results of the second model in Coeur de Savoie

Note: The figures are representative of the first nine months of energy sharing. As the self-consumption project is evolving (numbers of participants, energy production of seasons), the average figures are constantly changing.

The solar power plant used for the project to share energy with vulnerable households is currently operated based on approximately 1 household ≈ 1 kWp. In France, this is equivalent to an average saving of 10-15€ per household.

The consumption rate of the solar production is satisfying compared to average rate in self-consumption project. There seems to be scope for sharing more good practices with beneficiaries on how to shift consumption to optimise this rate of self-consumption. Information campaigns have been carried out and are planned to raise household awareness of solar energy consumption.

Despite a strong communication programme and a lot of time invested in recruitment, the Sun4All project target (50 households) was difficult to achieve.

The implementation and sharing plan focused on 4 buildings where only 70% of residents seemed likely to sign up to the self-consumption project. There are several reasons for this:

- the buildings chosen are buildings where the accommodation is allocated to people in transit, often waiting for other accommodation elsewhere in Savoie.
- distrust of social landlords, Coeur de Savoie's main partner in this project.

Impact Assessment and Success Metrics

- the complexity of the energy supply market, with many private sector offers leaving little room for Coeur de Savoie experimentation with SUN4ALL and collective self-consumption.

Timeline details is available in the chapter "Strategic Objectives for Adoption".

4.2. Stakeholder Analysis

Stakeholder Analysis

The stakeholders of the program were a combination of all the partners Coeur de Savoie required to make the development of the use cases possible.

In the Community of Communes Cœur de Savoie, the Sun4All program has engaged a diverse array of stakeholders crucial to its success and impact. Key departments within Cœur de Savoie, including Energy Transition, Finance, Communication, and Housing, played essential roles in coordinating, and implementing the Sun4All financial support scheme. These departments have provided strategic oversight, have allocated resources, and have ensured regulatory compliance to facilitate the integration of solar energy solutions and the support to energy-efficient initiatives.

In its initial phase, the program also relied on the collaborative efforts of local associations, social workers, and the Social Department, who contributed to identifying and supporting households most in need of energy assistance. Their grassroots involvement helps usually to adapt the program offerings to local socio-economic realities.

As the program progressed into its second year, additional stakeholders such as the Social Landlord and DSO became new partners. They contributed expertise in managing housing and utility infrastructures, ensuring the integration of solar installations on the local electricity network and energy savings for social housing residents.

Elected members of Cœur de Savoie provided governance and advocacy, advocating for policy adjustments and community support for sustainable energy transitions. Meanwhile, the involvement of the company responsible for designing and constructing the PV plants, alongside experts from the National Institute of Solar Energy (INES), ensured technical excellence and innovation in solar energy implementation.

Collectively, these stakeholders form a robust network, working to address energy poverty, and promote renewable energy adoption, and foster community resilience in Cœur de Savoie. Their collaborative efforts highlight the importance of multi-sectoral partnerships in achieving sustainable development goals and advancing local energy transition initiatives effectively (Figure 4 and Figure 5).

Stakeholder Analysis

For the first model, the stakeholders were as follows:

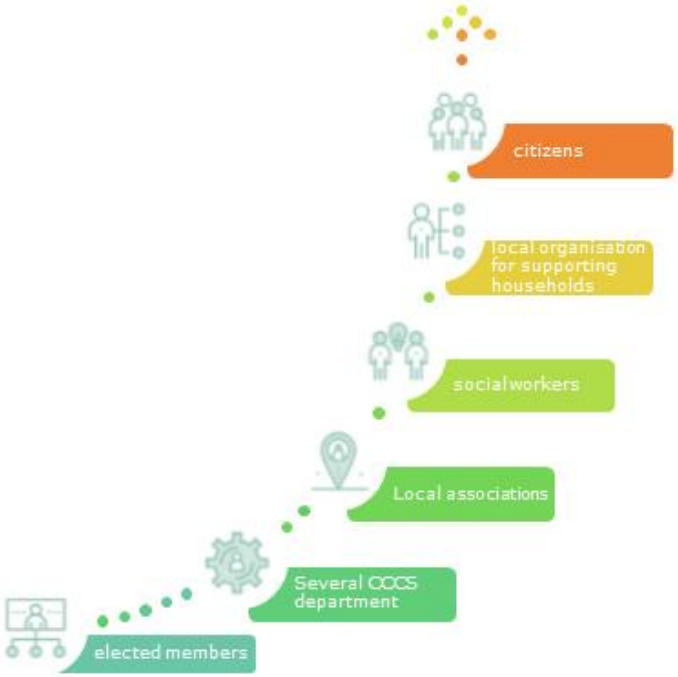


Figure 4 – First model stakeholders' scheme

For the second model, the stakeholders were as follows:

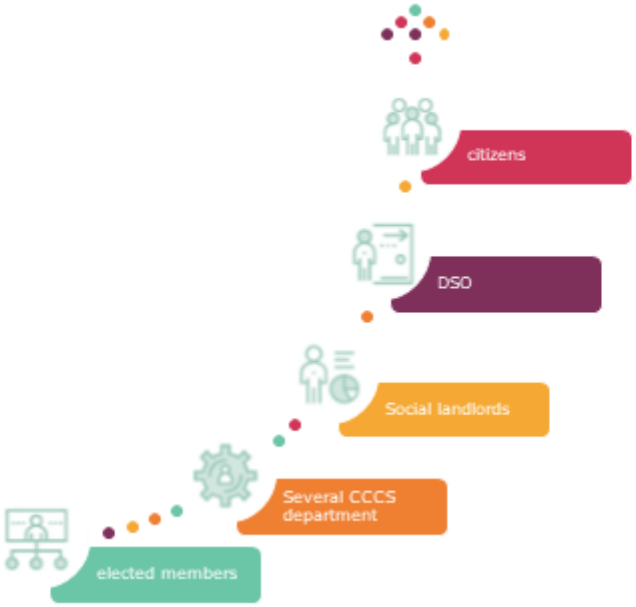


Figure 5 – Second model stakeholders' scheme

4.2.1. Identification of Key Stakeholders

Identification of Key Stakeholders

The stakeholders involved in the **first Sun4All implementation phase** in Coeur de Savoie and their role is described below.

- **Elected Members:** They provided political validation for economic support and administrative backing regarding the legal framework.
- **Several Departments from Coeur de Savoie:** Administrative, financial, Communication, energy transition and housing department provided internal support regarding beneficiaries' files and subsidies. They have also contributed to construct communication tools tailored to the recipients and the European program (such as roll-ups) and to create the model for the local inhabitants.
- **Local associations:** Have played a crucial role in facilitating contact with low-income households, enabling us to meet their members and raise awareness about solar energy and the Sun4All program initiatives within the community. These associations have been instrumental in bridging the gap between our project and the residents, helping us engage them in discussions and activities aimed at promoting solar energy adoption and highlighting the benefits of Sun4All initiatives in the region.
- **Social workers:** Played a large role in connecting Coeur de Savoie with low-income households, regularly communicating with the households they assist and providing them with information on how they can participate in the Sun4All program. They explained constantly how this engagement in Sun4All empowers them to better manage their energy consumption.
- **Social Landlord:** They collaborated on the self-consumption project and assist in selecting targeted buildings for implementing Sun4All actions. Additionally, they acted as the organizational legal entity, managing beneficiary entry and exit from the self-consumption operation and liaising with the DSO to oversee energy sharing.
- **The local organization SOLIHA:** Supported low-income households in various ways. Like social workers, SOLIHA facilitated connections with these households, regularly communicating with them to provide information about participating in the Sun4All program. They emphasized how involvement in Sun4All empowers residents to effectively manage their energy consumption. Additionally, SOLIHA assisted households with administrative procedures and applications for renovation and adaptation works, catering not only to energy needs but also to broader housing improvements. Through these multifaceted roles, SOLIHA played a crucial part in enhancing both energy efficiency and housing conditions for vulnerable households in the region.
- **Citizens and vulnerable households:** They participated in the Sun4All project both as beneficiaries and as active members, engaging in various events, workshops, and recruitment sessions.

Identification of Key Stakeholders

The stakeholders involved in the **second Sun4All implementation phase** in Coeur de Savoie and their role is describe below.

- **Elected Members:** They provided political validation for economic support and administrative backing regarding the legal framework.
- **Several Departments from Coeur de Savoie:** Administrative, financial, Communication, energy transition and housing department provided internal support regarding beneficiaries' files and subsidies. They have also contributed to construct communication tools tailored to the recipients and the European program (such as roll-ups) and to create the model for the local inhabitants
- **Social Landlord:** They collaborated on the self-consumption project and assisted in selecting targeted buildings for implementing Sun4All actions. Additionally, they acted as the organizational legal entity, managing beneficiary entry and exit from the self-consumption operation and liaising with the DSO to oversee energy sharing.
- **DSO (Distribution System Operator):** They provided administrative and legal support for the creation of the self-consumption project and agreements. It is called ENEDIs in France.
- **Citizens and vulnerable households:** They participated in the Sun4All project both as beneficiaries and as active members, engaging in various events, workshops, and recruitment sessions.

Lastly, Cœur de Savoie has also set up a special position dedicated to implementing the programme in the area.

This position is responsible not only for mobilising stakeholders, but also for managing the operational implementation of actions in Cœur de Savoie and liaising with SUN4ALL beneficiaries.

4.2.2. Analysis of Stakeholder Needs and Preferences

Analysis of Stakeholder Needs and Preferences

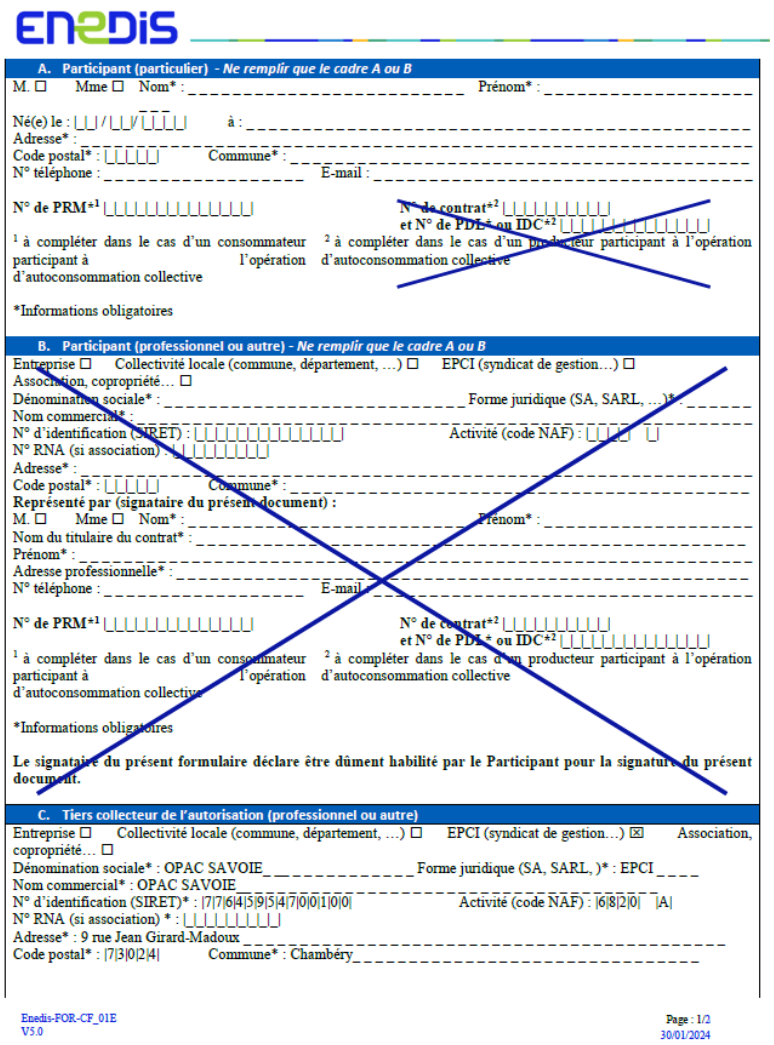
Workshops have been created within local work integration structures and associations to raise awareness among residents about the Sun4All program and the various forms of assistance available.

About recruitment, a reporting form is needed for social workers to declare the situations of vulnerable households.

Additionally, for the self-consumption program, a membership procedure must be established to include all social housing tenants targeted by Sun4All. To join, they must complete and sign a pre-filled document, adding their contact details and their agreement to access their consumption information. The consumption information is essential to allocate solar energy to them if they consume when solar energy is being produced.

An example of the document to join the program (Figure 6).

Analysis of Stakeholder Needs and Preferences



ENEDIS

A. Participant (particulier) - *Ne remplir que le cadre A ou B*

M. ☐ Mme ☐ Nom* : _____ Prénom* : _____

Né(e) le : |_|_| / |_|_| / |_|_|_|_| à : _____

Adresse* : _____

Code postal* : |_|_|_|_|_| Commune* : _____

N° téléphone : _____ E-mail : _____

N° de PRM*1 |_|_|_|_|_|_|_|_|_|_|_|_|_|_| N° de contrat*2 |_|_|_|_|_|_|_|_|_|_|

et N° de PDL* ou IDC*2 |_|_|_|_|_|_|_|_|_|_|_|_|_|_|

1 à compléter dans le cas d'un consommateur participant à l'opération d'autoconsommation collective

2 à compléter dans le cas d'un producteur participant à l'opération d'autoconsommation collective

*Informations obligatoires

B. Participant (professionnel ou autre) - *Ne remplir que le cadre A ou B*

Entreprise ☐ Collectivité locale (commune, département, …) ☐ EPCI (syndicat de gestion…) ☐

Association, copropriété… ☐

Dénomination sociale* : _____ Forme juridique (SA, SARL, …)* : _____

Nom commercial* : _____

N° d'identification (SIRET) : |_|_|_|_|_|_|_|_|_|_|_|_|_|_| Activité (code NAF) : |_|_|_|_| |_|

N° RNA (si association) : |_|_|_|_|_|_|_|_|

Adresse* : _____

Code postal* : |_|_|_|_|_| Commune* : _____

Représenté par (signataire du présent document) :

M. ☐ Mme ☐ Nom* : _____ Prénom* : _____

Nom du titulaire du contrat* : _____

Prénom* : _____

Adresse professionnelle* : _____

N° téléphone : _____ E-mail : _____

N° de PRM*1 |_|_|_|_|_|_|_|_|_|_|_|_|_|_| N° de contrat*2 |_|_|_|_|_|_|_|_|_|_|

et N° de PDL* ou IDC*2 |_|_|_|_|_|_|_|_|_|_|_|_|_|_|

1 à compléter dans le cas d'un consommateur participant à l'opération d'autoconsommation collective

2 à compléter dans le cas d'un producteur participant à l'opération d'autoconsommation collective

*Informations obligatoires

Le signataire du présent formulaire déclare être dûment habilité par le Participant pour la signature du présent document.

C. Tiers collecteur de l'autorisation (professionnel ou autre)

Entreprise ☐ Collectivité locale (commune, département, …) ☐ EPCI (syndicat de gestion…) ☒ Association, copropriété… ☐

Dénomination sociale* : OPAC SAVOIE_ Forme juridique (SA, SARL,)* : EPCI

Nom commercial* : OPAC SAVOIE

N° d'identification (SIRET)* : |7|7|6|4|5|9|5|4|7|0|0|1|0|0| Activité (code NAF) : |6|8|2|0| |A|

N° RNA (si association) * : |_|_|_|_|_|_|_|_|_|

Adresse* : 9 rue Jean Girard-Madoux

Code postal* : |7|3|0|2|4| Commune* : Chambéry

Enedis-FOR-CF_01E V5.0 Page : 1/2 30/01/2024

Figure 6 – Document to fill by the beneficiaries/participants to the SUN4ALL collective self-consumption

The need of other stakeholders such as OPAC de Savoie for example, is to communicate and exchange about users' data. They need to define an agreement about data protection from their tenants. A specific document and strategy have been drawn up to protect all beneficiary data. This includes the protection of storage files for the duration of the project and the definition of data archiving procedures.

4.3. Adoption Strategy

Adoption Strategy

In Coeur de Savoie, the implementation of the models was impulse by several existing subjects.

Adoption Strategy

In Coeur de Savoie, the implementation of the Sun4All models was driven by several existing factors. The region benefits from abundant sunshine and is highly committed to the development of both solar thermal and photovoltaic energy. This strong foundation makes it an ideal setting for the successful deployment of the Sun4All program. Additionally, presenting the initiative to elected officials required careful planning to demonstrate how the benefits of such actions provide greater stability for households in the area and improve their quality of life, ensuring that the officials approve these models. Leveraging existing programs, such as assistance for household renovations, social worker support, and the involvement of associations dedicated to vulnerable populations and social landlords, allows for the development of models that offer solutions through collaborative efforts with all these stakeholders already operating in the area.

It is crucial to consider three key points:

- Relying on existing organizations, associations, and programs in the area.
- Engaging policymakers and convincing them of the action's merit and positive impact.
- Surrounding oneself with the right partners to compile the necessary technical, solar energy, social, financial, and administrative expertise.

4.3.1. Strategic Objectives for Adoption

Strategic Objectives for Adoption

For the pilot city of Coeur de Savoie, the Sun4All programme was implemented according to the following plan (Table 3).

	Development stage	Phase 1: Use case 1	Phase 2: Use case 2
Scheduled dates	Oct. 2021 – Oct. 2022	Oct. 2022 – Oct. 2023	Oct. 2023 – Oct. 2024
Effective dates	Oct. 2021 – Nov. 2022	Nov. 2022 – Dec. 2023	Oct. 2023 – (Oct. 2027)
Content	Research into models to be developed to bring solar energy to low-income households	Programme to help finance either: Renovation work (J'éco rénove) Energy bills and a sociotechnical visit (Ecoenergy)	Collective self-consumption operation. Same for use case 1 and 2 for the first year of implementation. Atelier des Quais in Saint Pierre d'Albigny in collaboration with social landlord
European objectives	Building Sun4All models	50 beneficiaries	50 beneficiaries

Strategic Objectives for Adoption			
RESULT (at 30/06/2024)	Deliverable 2.1 Blueprint model for SUN4ALL program	50 beneficiaries	37 beneficiaries

Table 3 – Implementation plan in Coeur de Savoie

For the first model, the specific objective was to develop an administrative document for gathering beneficiary information and obtaining their agreement to participate in the Sun4All project, while also outlining the roles of each stakeholder, particularly within the administrative and finance departments of Coeur de Savoie.

In the second pilot, the specific goal was to initiate energy sharing by October 2023 at the latest and establish necessary documentation to streamline membership for vulnerable households.

Cœur de Savoie had to work with the social landlord and the DSO to gather all the information needed to launch the energy sharing programme.

This included defining the choice of buildings to be supplied with solar energy, the potential number of beneficiaries, an estimate of the amount of energy distributed, as well as recruitment and communication methods.

Following the implementation of Sun4All collective self-consumption in Saint Pierre d'Albigny, energy sharing has proved effective and functional for participating households, who receive an average €15 reduction in electricity bills per month. Energy sharing has been validated by elected representatives for 4 years and will be voted on again after the municipal elections (2026).

A replication of the operation is planned for the commune of Montmélian (part of coeur de Savoie) with the same characteristics (partners and size of solar installation).

Today, Coeur de Savoie is a much sought-after speaker at various local and national events about collective self-consumption and the role of local authorities (collective self-consumption day, TEPOS day, anti-precarity day, energy collectives' day).

4.3.2. Target Audience and Beneficiaries

Target Audience and Beneficiaries

This section presents the results of identifying the target audience and beneficiaries for the adoption of the Sun4All project initiative and its financial support program.

- **Identification of the Target Audience**: The target audience was defined as households experiencing energy poverty, as specified in France by the law of July 12, 2010, known as Grenelle 2: *"A person is in a situation of energy poverty if they have particular difficulties in obtaining the energy supply necessary to meet their basic needs in their home due to inadequate resources or housing conditions."* The target audience's characteristics, roles, and relationships concerning the Sun4All initiative and financial support program were determined before launching the recruitment session.

Target Audience and Beneficiaries

- **Determination of Beneficiaries**: The primary beneficiaries are households in energy poverty. Potential beneficiaries were recruited across the entire territory using a dispersed communication plan for Model 1, with a criterion that energy bills exceed 8% of their reference taxable income. For Model 2, recruitment was and is still focused on the commune of Saint Pierre d'Albigny within four targeted social housing buildings. These buildings, heated with electric radiators and equipped with electric water heaters, result in high energy bills for tenants. Beneficiaries were categorized according to the model from which they benefit, and the spin-offs are of a social, economic, and environmental nature, as well as in terms of comfort.
- Additionally, citizens of the territory were also involved as targets of the program through various actions and workshops. These activities focus on themes such as energy transition, raising awareness about energy savings, better understanding of their energy bills, and visiting photovoltaic power plant. These engagements aim to empower and involve the broader community in the goals of the Sun4All project.

4.3.3. Communication and Engagement Plan

Communication and Engagement Plan

The implemented **action plans** are structured as follows:

- Model 1 involved organizing local events, distributing flyers, and presenting Sun4All at local association gatherings.
- Model 2 focused on recruiting potential beneficiaries from four buildings through various methods such as mail, SMS, letters, door-to-door visits, and recruitment stands at building entrances. It also incorporated communication flyers to effectively inform vulnerable consumers about Sun4All and its benefits.

The pilot city employed diverse **communication channels** to inform residents of Coeur de Savoie about Sun4All initiatives and how they can join the program (still running until 2026 at least).

The channels used were the Cœur de Savoie web site, the municipal newsletters of Cœur de Savoie communes, the Cœur de Savoie local information magazine, social media**,** and posters in public places.

Moreover, the Communication Departments of Coeur de Savoie and the social landlords collaborated to develop flyers and mailings aimed at reaching potential beneficiaries and raising awareness of the program among the general population. Posters were also available in building lobbies.

Some communication tools are mandatory under the law on collective self-consumption in France, so there will be kept.

In the future possible replication, the recruiting pitch could be adjusted so that "only the first 50 households to sign up" will be able to benefit from free solar energy (Figure 7).

Communication and Engagement Plan

Figure 7 – Flyer to recruit beneficiaries for the Self consumption project

Creation of a comic book

In addition to traditional communication methods, a comic has been produced. It aimed at raising awareness among a wide audience. Scheduled for completion by October 2022, the comic has been distributed during Sun4All workshops and at CCCS or INES events. "Emma's Destiny" is a comic book designed to raise readers' awareness of climate issues and offer them practical solutions through a constructive narrative. The story, deliberately imagined with a positive vision of the future, takes place in 2065 in a society that has been able to adapt and take action to meet the challenges of climate change. Included at the end is a technical dossier detailing how to act.

The comic book was very well received by the local population**,** and it is intended to continue using it as key communication material to raise awareness among a wide audience (Figure 8).

Communication and Engagement Plan

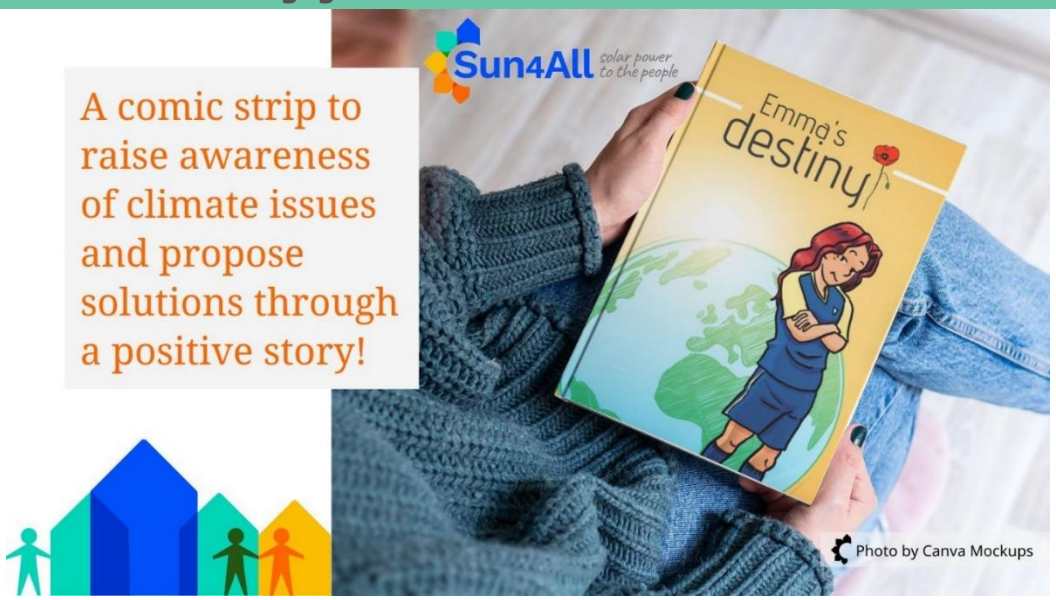


Figure 8: Comic strip for renewable energy development

4.4. Implementation and Framework

Implementation Framework

The implementation process in Coeur de Savoie began with analysing data on energy precarity within the territory, followed by engaging with potential stakeholders to identify common objectives.

As explained in the *Local requirements to benefit from the Sun4All programme*, a public project deliverable, the local framework for energy expenditure in Coeur de Savoie was specific due to geographical and climatic conditions and the fact that 50% of households had incomes below the income threshold for social housing.

But the advantage of the Communauté de communes was that it already had seven solar installations on the roofs of Cœur de Savoie buildings, such as kindergartens, gymnasiums and offices.

Once the pilot and the consortium had identified a use case adapted to their territory, and more specifically to Cœur de Savoie, at local level, the next step was to establish the legal and administrative framework required for effective implementation.

A study of the regulatory framework was also necessary, with the support of various partners and regions involved in the fight against energy insecurity and collective self-consumption.

Then this was a two-stage process. First, a political commitment must be made, and as one of the objectives of the elected representatives of the CCCS was to provide solutions for households in fuel poverty, the Sun4All project was on the right track. Next, the pilot needed to create a legal framework that was suitable for implementing these solutions.

Implementation Framework

From an administrative point of view, Cœur de Savoie had to create a form for beneficiaries to complete, including Sun4All requirements such as the questionnaire, specific data protection between Sun4All programme members and a commitment to take part in at least one energy-related activity/workshop organised for beneficiaries. This form was a commitment between Coeur de Savoie and the beneficiaries.

This specific form used by beneficiaries to join the collective program is added to the lease signature documents when there is a change of tenant. This method of recruiting new tenants is being pursued and will be used in future collective self-consumption projects with social landlords.

This same implementation process will be used for each possible replication.

4.4.1. Action Plan for Result Adoption

Action Plan for Result Adoption

To ensure broad dissemination and effective engagement throughout the Sun4All programme in Coeur de Savoie, a comprehensive information campaign was launched. This campaign utilized various channels including CCCS's institutional website and newsletter, INES's website and LinkedIn account, and local newspaper publications. These efforts not only announced upcoming workshops and PV plant visits but also facilitated discussions on key topics such as energy transition, housing renovation, energy poverty, and solar energy development. Monthly or quarterly releases ensured consistent outreach and information flow to the community.

Recruitment actions were essential in reaching potential beneficiaries. Social workers, supported by local associations with established community ties, distributed Sun4All flyers and explained the project directly to households in need. Interested households were encouraged to contact the CCCS-Sun4All office for membership. For those who did not initiate contact, CCCS-Sun4All officers proactively reached out to explain the programme and assist with registration.

The initiative targeted 100 vulnerable households, offering financial aid for energy renovations, bill payment assistance, personalized energy-saving advice, and collective self-consumption programs. Throughout the project, CCCS worked closely with stakeholders to identify and support these households, ensuring they received assistance to improve their energy efficiency and reduce costs.

While the implementation of the initial use case 1 had posed difficulties due to the recruitment of dispersed households throughout the territory, the CCCS had prepared an alternative recruitment strategy. This chosen approach took advantage of existing public funding mechanisms for housing renovation, by directing eligible households towards participation in Sun4All through partnerships with the entity (SOLIHA) responsible for implementing the OPAH in the Coeur de Savoie area. Recruitment efforts continued throughout the programme, ensuring that participation remained inclusive and comprehensive. In fact, model 1 offers a reduction in bills aimed at tenant households or homeowners who do not have the financial resources to carry out renovation work.

Action Plan for Result Adoption

For the second model of Sun4All implementation in the pilot territory, the beneficiaries were more centralized, allowing for recruitment to be conducted on a building-by-building basis, like the approach used in the other Sun4All pilot city.

The action plan for model 1 will lead to the implementation of a support service for vulnerable households, through home visits to provide them with a case-by-case solution tailored to their needs and income, and follow-up over a period of 3 to 6 months.

The action plan for model 2 will be implemented in the same way, with a few changes to communication methods (see 4.3.3 section).

4.4.2. Resources Allocation and Budget

Resources Allocation and Budgeting

To better define the necessary resources for effectively implementing the Sun4All financial support scheme adoption activities, the following information regarding the implementation of the Sun4All project initiative in Coeur de Savoie during the pilot phase may be useful:

Financial resources are allocated by Coeur de Savoie to the development of the programme: for example, the financing of socio-technical visits and photovoltaic installations, or the solar energy produced and given free of charge to the beneficiaries of the local and European Sun4All programme (Table 4).

Model	Expenses	Public subsidies		
Model 1 for owners	Renovation work subsidies (J'écorénove)	17 800€	-	-
Model 1 for tenants	Energy bills and a sociotechnical visit (Ecoenergie)	3000 € + 10 032 €	Savoie Department subsidies (CTS[2])	5 016€
Model 2	Photovoltaic power plant	49 000€	DETR[3]	39 000€

Table 4 – Financial items expenses and subsidies

In the second model, for the free electricity supplied to households, CCCS has invested in the solar power plant and uses the solar energy for its own buildings. The additional

[2] CTS is These are departmental contracts for sustainable investment and a commitment to the future. The Savoie Department is committed to supporting local authority projects for local development, planning and services to the population by granting them a global budget.

[3] The DETR is a government grant for rural areas. It is used to support investment projects.

Resources Allocation and Budgeting

unused energy is donated to tenants in vulnerable buildings in the surrounding area. The loss of income for CCCS is estimated at around 5,000 euros a year.

The agreement with OPAC is a duration of 4 year of sharing energy with the tenants of the social housing.

In case of replication, the solar power plant could be financed in part by the landlord, or in part by companies or town of the Coeur de Savoie area. This would change the status of collective self-consumption, which would become "open", i.e. with other partners than the public authority and the social landlord. This status would involve another administrative matters and organisation.

4.5. Capacity Building and Training

Capacity Building and Training

To effectively plan and connect the need for capacity building and training with the pilot city project stakeholders, their roles in project implementation, and the pilot city actions to empower them, a structured and integrative approach is essential.

The following table outlines the key contacts and stakeholders involved in the Sun4All program developed in Cœur de Savoie. It details their specific actions for the program, the interactions conducted with them, and their connection to the pilot territory. This comprehensive overview provides insight into how each stakeholder contributes to and supports the program's implementation and success.

Identifying the key stakeholders involved in the implementation of the Sun4All program, along with their roles and functions, enables a clearer understanding of their knowledge development and empowering needs, and allows for more efficient planning of capacity building and training initiatives in the future (Table 5 and Table 6).

Stakeholders PARTNERS	Function in Sun4All implementation	Sun4All pilot city actions to empower them
Savoie Social Department	Promote the implementation of Sun4All programmes in the region	Meeting to present the Sun4All program and the various actions (workshop, recruitment…)
Social workers	Promote Sun4All programme to the households they support	Regular meetings to present the programme and tools for sharing information on households potentially eligible for the programme
Elected members	Specific dialogue with the people involved in their communities, validation of	Approval by the Community Council of the models envisaged,

Capacity Building and Training

	aspirations for the development of an experimental and innovative programme, provision of venues for workshops and event.	and the development planned in the Sun4All blueprint.
Local association	Promote Sun4All programme to their beneficiaries	Regular meetings to present the programme and tools for sharing information on households potentially eligible for the programme
Social landlord	Collaboration with Coeur de Savoie to communicate and recruit potential beneficiaries in their own buildings. management of tenants joining and leaving the Self consumption operation	Several meetings to organise the self-consumption model as a collaborative partner. Creation of a specific agreement.

Table 5: Stakeholder roles in the Sun4All program

Stakeholder ADRESSEE	Objectives in Sun4All	Sun4All pilot city actions
Beneficiaries	Recruited residents who take part in the Sun4All programme. Ensuring it meets their specific needs and empowers them on issues such as the energy transition, carbon footprint and controlling energy bills at home.	Meeting to present the Sun4All program and the various actions (workshop, recruitment session, PV visit, specific theme theatre, solar cooking…)
Citizens of Coeur de Savoie	Promote the Sun4All programme to households in the area to disseminate the programme and its support measures.	Regular meetings to present the programme and tools for sharing information on households potentially eligible for the programme.

Table 6 – Roles of target stakeholders in the Sun4All program

4.5.1. Training Programs for Stakeholders

Training Programs for Stakeholders

With all our partners and stakeholders, we tested the same improvement method to check whether the partnership is bearing fruit and whether we are achieving our objectives.

Connecting training programs for stakeholders with evaluating the effectiveness of a partnership and assessing whether objectives are being achieved requires a systematic approach. Here's how you can structure this process (Figure 9).

Training Programs for Stakeholders

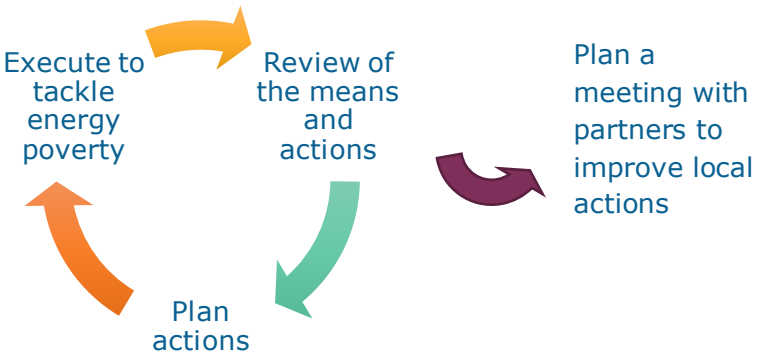


Figure 9 – Schematic representation of action modes

This way of working to ensure that the project runs smoothly is a mutual gain for all the structures involved.

For example, regarding the communication actions implemented to recruit the beneficiaries of collective self-consumption, several communication measures were implemented and tested before arriving at the right means of recruitment.

First, the local authority went through OPAC, the social landlord, who has the appropriate means of communication for its tenants (e-mail, posters, local relations officer...).

Then the Cœur de Savoie community of municipalities decided to run a post mail campaign to reach households that were sometimes far removed from digital tools.

The local authority then set up door-to-door recruitment campaigns and stands at the foot of the building to reach tenants directly, create a relationship of trust and convince the tenants who were the furthest removed from dialogue with their social landlord.

What is more, as there is undeniable mistrust between tenants and landlords, it is important to choose the right pitch and presentation for the programme in the first instance to maximise support for the energy-sharing scheme.

The PMO's role has enabled OPAC to embark on its first collective self-consumption operation, thereby gaining the confidence needed to develop self-consumption on its own or with other local authorities in the region. The PMO ("Personne Morale Organisatrice" in French) is the legal entity within which the participants in the collective self-consumption operation are associated.

Once the collective self-consumption system has been launched, with its development and operating plan, each partner fulfils the role defined by the method described in Figure 9, and its administrative commitments.

4.5.2. Capacity Building Initiatives

Capacity Building Initiatives

To improve the knowledge and skills of households in precarious situations, the pilot territory, with the help of INES, has implemented a series of workshops, conferences, and activities on topics such as energy, solar photovoltaic, energy savings, renovation, etc. These workshops took place during both phases of the program's implementation. Various workshop formats were offered to reach different households, spark interest, and meet individual needs.

To ensure the sustainable adoption of the Sun4All financial support scheme, it is recommended to maintain and further develop the existing capacity-building initiatives (Table 7).

Type of workshop	Description
Eco-action workshop	Participatory workshop about energy in the home and potential energy savings. The aim of these workshops is to exchange best practice between participants and to bring in new ideas if they have not been mentioned.
Film screening on the theme of energy	Screening of a film, followed by a debate on the subject addressed in the film (in this case, young people's actions to combat global warming).
Workshop or information stand on solar energy	Stand or public meeting aimed at welcoming the citizens of the Cœur de Savoie area to present them with technical information on solar energy. The presentation also aims to present the FALSE/TRUE about PV solar energy, panels, and their impact.
Solar cooking workshop	This workshop brings together beneficiaries to discover several solar-powered "machines", including cookers and jar sterilisers. A meal is shared during the workshop.
Renovation works informative session	The aim of these information sessions is to inform households about the possibilities for assistance and support in carrying out renovation work.
Cultural show or conference	Present a cultural work, a theatrical performance, or a theatrical conference about energy, transition, or sustainable development.
Door to door	The door-to-door sessions are a recruitment phase based on creating a regular presence and a relationship of trust with residents.
Comic book	In addition to traditional communication methods, a comic has been produced. It aimed at raising awareness among a wide audience. For more detail see 4.3

Table 7 – Workshop descriptions

About stakeholders, we held information meetings with Coeur de Savoie partners, solicited new partners and went to meet them in their structures and at departmental forums to present the program's objectives and the roles they could play in building a lasting dialogue on the topic of energy with the individuals they support.

Capacity Building Initiatives
The community of practice helped the pilot and the technical partner INES to create first dialogue with other inspirational territories and to initiate tools to better understand the frame and context of the Sun4All program implementation in Coeur de Savoie and how it can be replicated in other territories in France. Moreover in a few events in France lot of exchanges permitted to expose the Sun4All concept to other municipalities, social landlord, association, citizen group for solar energy deployment, etc.

4.6. Institutional Integration

Institutional Integration
As explained above (see chapter "Action Plan for Results Adoption"), the Cœur de Savoie pilot area has drawn on existing tools and processes to create models and experiment with long-term solutions that are consistent with the area's needs, both in terms of combating fuel poverty and meeting its PCAET objectives. Coeur de Savoie relies on the renovation platform developed in the Coeur de Savoie region to support households in their energy-efficient home renovations. This platform provides specific support with an operator (SOLIHA) for low-income and very low-income households who are eligible for specific local grants. This operator is a partner of Coeur de Savoie and helps us to recruit beneficiaries from among their public. Social centres and social assistants are also important partners in the area, as they are responsible for supporting households in vulnerable situations, via the social competence of the Savoie department. Other partners in the implementation of a collective self-consumption project are the grid operator (DSO) and the social landlord. Each of these players has an important role to play in the development of a social ACC operation. The players involved in the project are bound by an agreement. ENEDIS is responsible for distributing the solar energy in proportion to the consumption of each participant, and OPAC acts as the representative of the tenants and the link with them to communicate and develop the self-consumption. Those roles will stay the same during all the implementations and the collective self-consumption.

4.6.1. Integration of Results into Existing Policies and Practices

Integration of Results into Existing Policies and Practices

Matching the programme with local issues and needs

Given the figures for precariousness in the Coeur de Savoie region, many households are looking for solutions to improve their daily lives.

Alignment of the programme with the objectives of the PCAET

Given the figures for the objectives of the PCAET, local authorities are looking for a regional project to move practices towards a fair ecological transition.

Develop the Sun4All model in other municipalities of the Coeur de Savoie territory (40 municipalities)

Though another project of energy sharing, Coeur de Savoie wants to replicate the second model implemented in Saint Pierre d'Albigny. This model should be the same size of energy sharing and open to 50 beneficiaries as well. It should be launched in 2025.

4.6.2. Collaboration with Public Agencies and Institutions

Collaboration with Public Agencies and Institutions

Through the study and proposals work prepared with the Jacques Delors institute, we were able to discuss the subject of self-consumption and the regulation of community energy and self-consumption in order to propose a mixed model on the subject of the creation of a collective self-consumption operation with a social aim for the benefit of households in energy poverty and also the creation of a group dynamic thanks to the workshops and activities that allow the different beneficiaries to meet.

The organisations taking part in the fruitful dialogue are local references in solar energy and advice to households and individuals, such as HESPUL and ASDER.

Meeting other private companies working in this field, or other municipalities and organisations involved in this type of project, was and is still a good way of understanding all the models that can be implemented to successfully achieve the Sun4All objectives.

For example, the Rencontres TEPOS is a yearly meeting at which all French municipalities with a strong commitment to renewable energy are represented. It is a good opportunity to present the project and learn from them.

- The national days of self-consumption are also an opportunity f**or the replication of self-consumption, we will probably use the same monitoring tool, but this will depend mainly on the outcome of the public tender after consultation.** unity to meet actors committed in the development of collective self-consumption in its various forms, social or otherwise.

The presentation of the Sun4All programme at the AURACLE meeting (a network of citizen structures for solar energy) is another opportunity.

Collaboration with Public Agencies and Institutions

In addition, the collaboration with the various partners (INES, OPAC) and their network is an asset in terms of better understanding the needs of the region and having precise technical expertise on solar energy and energy poverty.

4.7. Monitoring and Evaluation

Monitoring and Evaluation

After the work of institutional integration, regulatory frame and implementation possibilities Coeur de Savoie define the right models to test on the territory.

For the **first model** the crucial point is working with local partners and involve all the stakeholders about renovation work and social treatment.

For the **second model**, crucial point is to design the right PV plants, to benefit from the strategic location, as there will be within a maximum of 2km of distance to gather the vulnerable households targeted by Sun4All. This prerequisite is necessary to comply with French regulation on self-consumption.

Within 6 months of energy sharing, households are getting an average reduction of 10-15% on their bills.

4.7.1. Performance Monitoring and Tracking

Performance Monitoring and Tracking

The results of the implementation of Sun4All are monitored for model 1, which provides support for households through subsidies from solar energy revenues. The gains are estimated based on the final performance of the homes of residents who received support for the work.

For households that have received support to reduce their bills and receive advice at home, the estimated gains are based on an overall European study on the subject, which puts the gains achieved through this type of advice at 5% (Figure 10 and Table 8).

- An adaptation is planned for the continuation of the first model on the home support and bill payment assistance part (Ecoénergie). The follow-up will be repeated 3 months after the visit to review the progress of bills and the implementation of concrete measures with the household.
- As for the 2nd energy-sharing model, the benefits obtained by households are tracked precisely using an online tool, with individual access for each household.

Performance Monitoring and Tracking

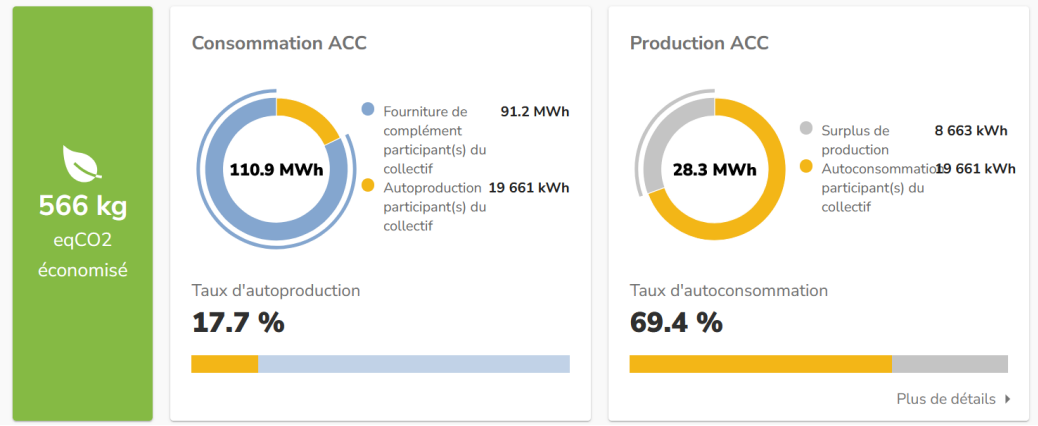


Figure 10 – Monitoring online tool of solar energy data

Results of SC	Planned	Actual
Number of beneficiaries	50	37
Estimated savings	70-80€/year	140-160€/year

Table 8 – Results of the second model (August 2024)

In addition, households benefiting from solar energy are supported in adapting their consumption to solar energy production. We need to put in place a method for supporting households through the process of change. This requires the advice and tools of a specialist company working in conjunction with the landlord. Advice is given by e-mail, posters in the entrance hall and door-to-door sessions both on the tariffs chosen (off-peak or basic tariffs) and on the best periods for solar consumption.

Access to this tool for beneficiaries is sometimes complicated by the cultural, language and digital barriers faced by vulnerable households. The solution is to develop door to door session and information points at the foot of the building.

Implementing this household advisory service requires a great deal of human time, as well as specific tools for monitoring or forecasting production.

Once this tool has been set up with the landlord (December 2023), it will be maintained for the duration of the energy-sharing agreement.

For the reproduction of self-consumption, the same monitoring tool can be used, but this will depend mainly on the outcome of the consultation with the public authorities.

4.7.2. Feedback Mechanisms and Continuous Improvement

Feedback Mechanisms and Continuous Improvement

For exchanges with stakeholders, regular meetings are scheduled with each entity or during meetings on a local forum to exchange with each stakeholder and validate the functioning of their mission within the program and what can be improved.

Feedback Mechanisms and Continuous Improvement

For the **second model**, a continuous link with the landlord is necessary to monitor the entry and exit of beneficiaries, and to track the energy consumption of solar energy and the resulting reduction in bills.

Households are having problems reducing their bills in relation to the share that their traditional energy suppliers must charge them.

The share of solar energy consumed by households is sometimes billed by complementary network energy suppliers, and so a claim is necessary to regularise these situations.

This requires individual support for the households so that they can benefit from the reduced bill thanks to the solar energy they consume.

The tools used by the social landlord are a great help in monitoring the production and consumption of each household as closely as possible.

4.8. Conclusion

Conclusions

The Sun4All project aims at facilitating access to renewable energy, economics and environmental benefit for vulnerable households which suffer from energy poverty. The program objective needs to be inclusive, fair, and sustainable.

Development and implementation of the first model

- **Renovation assistance program:** The aim of this program is to help home-owning households renovate their homes using revenue from solar energy produced by Cœur de Savoie. It has the advantage of helping households out of energy poverty over the long term, with a reduction in consumption of 25% to 70%.
- **Energy bill payment assistance program:** The aim of this program is to support vulnerable households who are tenants or homeowners and who are unable to undertake any work. These households are limited in their ability to act on their buildings/housing, so the focus is on their day-to-day consumption.

These households therefore benefit from bill payment assistance financed by revenues from solar energy produced by Cœur de Savoie, and a socio-technical home visit to help them achieve sustainable bill reductions. This program has the advantage of being inclusive, aiding households in energy poverty and renting.

The results of this program are estimated savings, as it is not always possible to track changes in bills. A European study has shown that households that have benefited from this type of aid generally save 5% on their bills.

Development and implementation of model 2

Bill reduction program with collective self-consumption:

Conclusions

- It offers households a direct reduction in their bill with a means of acting on the optimization of their energy consumption during solar production. The better they consume during solar periods, the greater the reduction they'll get. This model has the advantage of genuinely including beneficiaries and empowering them to become involved in the energy transition through their virtuous, carbon-neutral energy consumption.
- All households, via the different models, are made aware of solar energy and can participate in the community of beneficiaries by coming to workshops and shows on the theme of energy transition, sustainable development, and solar energy.

In terms of investment and results, the models are quite different (Table 9 and Table 10).

MODEL 1:	Number of subsidies	Solar production allocated to Sun4All
Renovation work subsidies (J'écorénove)	17 800 €	161 800kWh
Energy bills and a sociotechnical visit (Ecoenergie)	3 000 €	27 300kWh
TOTAL	20 800 €	189 100 kWh (32% of annual production of La Chavanne solar power plant)

Table 9 – Subsidies and benefits Model 1

MODEL 2	Investment in the solar power plant	Number of subsidies	Solar production allocated to Sun4All
Solar energy sharing	49 000€	3 862€ / year (estimated over 10 month)	12 009 kWh (42% of the production of Atelier des Quais solar power plant)

Table 10 – Subsidies and benefits Model 2

Consistency of results with initial model forecasts:

The initial model forecast planned 4 518€ of global savings for the beneficiaries. Based on the 10 months of sharing, the annual saving will be 4 634€ for the first year.

The key takeaways from the project emphasize the significance of maintaining strong relationships with beneficiaries, particularly during periods of benefit delays. It also underscores the necessity of appropriately sized photovoltaic installations to deliver meaningful financial assistance. The project highlighted the importance of political commitment and the advantages of leveraging existing resources, skills, and local networks experienced in social issues to effectively launch and sustain these initiatives. These insights will be valuable in planning the next steps and shaping the future of the Sun4All program in Coeur de Savoie.

4.8.1. Summary of Key Findings

Summary of Key Findings

- Consistency with SECAP and renewable development
- Influence of Political support
- Difficulties to recruit beneficiaries in SC operation and social buildings
- Automatic participation to SC operation with social landlord
- Low and strong advising request from some beneficiaries (technical visit at home)
- Work with various stakeholder to enhance and gather skills (social, technical solar, legal frame...)

4.8.2. Outlook and Recommendations

Outlook and Recommendations

There are a few possible schemes and use cases for developing and implementing a system to combat energy poverty using renewable energies, and solar energy.

The **business model** is an important phase of development. It enables the stakeholders to commit to their role to tackle energy poverty.

- Each model has its advantages and limitations in terms of the solutions offered to residents.
- It must be adapted to the area, the existing framework, and the needs of the population.
- It is important to draw on existing programs, tools, and skills in the region and in the organizations concerned to build this type of project.
- Use the local existing social network to develop beneficiaries.
- Combining similar or complementary programs brings efficiency. For example, in the case of recruitment at Coeur de Savoie for the 1st pilot, which was partly linked to another program called OPAH (Opération Programmée d'Amélioration de l'Habitat), that can be translated as «Housing improvement program».
- The most important thing to bear in mind is the need for a political will firmly anchored in the fight against energy poverty and the development of renewable energies.
- But also, the parameters of inclusivity, so that no-one is left out and all types of households are included among the potential beneficiaries.

In the Cœur de Savoie region, a solar energy sharing operation like the second pilot will be implemented in the Montmélian area and within a 10 km radius. Other recruitment, communication and awareness-raising methods will be tested on a new group of citizens with financial and thermal comfort needs.

Outlook and Recommendations

The **legal framework** for self-consumption is highly volatile in France, as it can be in neighbouring countries. This opens new opportunities as regulations change. For example, the self-consumption radius is changing from 2km to 10km for the rural area of the heart of Savoie.

The usefulness of a **monitoring tool** to follow solar production and consumption:

- The tools used to track and monitor household consumption and solar production make it possible not only to optimise energy production to maximise energy donations, but also to better advise households on their consumption habits.
- In France, for pilot 2, Coeur de Savoie is working with the operator in charge of the tool to test a set of functions for forecasting production and sending consumption advice to beneficiaries.
- The added value of a bottom-up approach.
- Adopt a diversified approach to recruiting and monitoring beneficiaries: an efficient process that is as automated as possible for most potential beneficiaries, complemented by a tailored approach for more vulnerable households with literacy or numeracy difficulties.

Use adapted **communication tools** for beneficiaries. Repeatedly soliciting potential beneficiaries for answers or going door to door.

4.9. References

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5. Sun4All Sustainable Adoption Plan for Rome, Italy

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
DSO	Distribution System Operator
CER	Italian for REC – Renewable Energy Community

Abbreviations and acronyms	Definition
DPSS	Department of Social Policies and Health – Roma Capitale
EPOV	European Energy Poverty Observatory
FCL	Federconsumatori Lazio
FTSL	Forum Terzo Settore Lazio
GSE	Gestore Servizi Energetici – national public authority managing RES incentives including those dedicated to RECs
OIPE	Italian Observatory on Energy Poverty
RECS	Solidarity Renewable Energy Community

Glossary

Keywords	Definition
Distribution System Operator (DSO)	A Distribution System Operator (DSO) is an entity responsible for operating, maintaining, and developing the distribution network that delivers electricity from the transmission system or local generation to end-users. DSOs ensure the reliability, efficiency, and quality of the electricity supply, manage grid connections for consumers and producers, and facilitate the integration of renewable energy sources. The DSO in Rome area is ARETI partner of ACEA group
Energy poverty	It is defined as a situation where a household or an individual is unable to afford basic energy services (cooling, lighting, mobility, and power) to guarantee a decent standard of living due to a combination of low-income, high-energy expenditure and low energy efficiency of their homes
Municipi di Roma Capitale	The municipalities of Rome Capital (known as municipi in Italian) are administrative divisions responsible for local governance within the city of Rome. There are 15 municipalities in total, each handling services such as urban planning, waste management, public transportation, and social services within its area
Roma Capitale	Roma Capitale is the special territorial entity, endowed with autonomy, which administers the municipal territory of the city of Rome as the capital of the Italian Republic
Self-consumption operation	Solar self-consumption refers to the use of electricity generated by a solar power system directly at the site where it is produced, rather than exporting it to the grid. This method maximizes the utilization of locally generated solar energy, reducing reliance on external power sources and potentially lowering electricity costs. It is particularly beneficial for households and businesses seeking to enhance energy independence and efficiency

Keywords	Definition
Third Sector	The Third Sector (Terzo Settore) refers to a broad group of organizations that are neither part of the public administration nor driven by profit motives, playing a vital role in social and community services. These entities operate in sectors such as social welfare, health, education, culture, environmental protection, and sports, among others
Vulnerable households	Households who either do not have access to energy services or making use of these energy services undermines their possibility to access other basic services

5.1. Rome Pilot Achievements and Outcomes

Rome Pilot Achievements and Outcomes

The model is implemented based on local community work plans called RECS (Solidarity Renewable Energy Community). Municipal photovoltaic plants generate income, part of which is allocated to the beneficiaries of the Sun4All pilot project. Forum Terzo Settore (FTS) is the municipality's associate partner, which will manage the distribution of economic benefits provided as a direct offset to the cost of the energy bill for each RECS beneficiary. This model is designed to promote the transformation of the local initiative into the launch of an association registered as a formal REC, while the solidarity approach represents the reference framework. Existing municipally owned photovoltaic plants are adopted by communities and RECS energy sharing is simulated.

The approval of the operational rules (by GSE – Ministry of Finance) for the REC in Italy dates to April 2024, 5 months before the end of Sun4All project. So, the 11 Community groups had their workshops, meetings and training focusing on the simulation of a REC based on the public PV plants already existing in their neighbourhood and producing energy savings and incentives for the Municipality. The business model during the project is based on the reuse of the income from the existing municipal to simulate the future RECS for each community-group. This model consented to deliver concrete benefits to the 200 participants during the project, while the post-project Business Model should be based on the effective incentives collected by the RECS (see page 106). Recently the Municipality assigned new economic resources for installing 15 PV plants to dedicate to RECS and at M36 one of this PV plant is operating; all the others are in the technical design phase. These PV plants could be assigned to the RECs registered in proximity that will apply for them; the rules for these assignments have been discussed (within the *Tavolo Tecnico Interdipartimentale sulle CER*) considering the Sun4All approach and therefore setting the fight against energy poverty as one of the rewarding criteria in the future tenders.

In the following figure, a diagram of the project objectives for the Rome pilot divided into the two phases of activity: 11 Groups/Communities that can evolve into as many formal RECS.

Rome Pilot Achievements and Outcomes

The entire pilot project in Rome is divided into two phases (100 + 100 households), but the entire process is designed in the first pilot project and the selection process is carried out entirely in the first pilot phase (Figure 1).

Figure 1 – The implementation phases of the Rome pilot of engagement activities

The implementation plan for the Rome pilot was structured in several sub-phases:

First, 200 families were selected from the "Bonus Energia" beneficiaries (24,000 in total) to target those most in need and to grant a fair distribution of the beneficiaries' groups in the town. In this phase SAP contributed with a spatial urban analysis of the Energy Poverty phenomenon in Rome.

Next step was dedicated in engaging various stakeholders, including departments such as the Rome Municipality, Social Housing, Environment, Financial, and Legal/GDPR Departments. Other key stakeholders were the Faculty of Sociology at Sapienza University of Rome, several grassroots associations, and other LOS signatory partners like the local energy utility (ARETI/ACEA), the Energy Efficiency Incentives Authority (GSE), Banco dell'Energia Foundation and Federesco Association.

These stakeholders, spanning institutional, technical, educational, third sector, and civil society sectors, were essential in engaging households, enforcing trust levels, with a focus on addressing the needs of those in energy poverty and empowering them to participate in the energy transition.

Communication was managed by Roma Capitale's Department of Social and Health Policies, in collaboration with third-sector organizations. A consent form was distributed to beneficiaries for data management, followed by informational flyers and a pre-selection questionnaire via mail and WhatsApp. Selected individuals were also asked to schedule a telephone appointment. The level of responsiveness, interest and of active participation has been considered one of the most important criteria to confirm the selection of beneficiaries.

The Rome Pilot aimed to support the implementation of relevant SECAP policies approved by Roma Capitale, including energy poverty mitigation and the development of inclusive, solidarity-based energy communities in collaboration with the Observatory on Energy Poverty (OIPE), Forum Terzo Settore lazio (FTSL), Federesconsumatori Lazio and Banco dell'Energia.

Rome Pilot Achievements and Outcomes

During the phase of the Workshops (44 done, mostly in presence) the strategy was mainly based on capacity building and knowledge enforcement on energy savings and sharing topics, collecting energy data, discussing on concrete solutions for domestic savings and introducing the REC model.

With the scientific support of the interdepartmental research centre CITERA Sapienza University of Rome, it was possible to integrate the analyses and data relating to energy poverty and to the beneficiaries' distribution with the availability of photovoltaic systems managed by Roma Capitale operating on the roofs of school buildings. This work was done analysing proximity between the 176 systems and the potential beneficiaries living near the schools. The capacity building process implemented during the workshops series was based on simulated RECs, calculating the average foreseen benefit per households, and delivering them to the beneficiaries before the end of the project.

Finally, with a delay of 13 months on the foreseen date, in April 2024 the implementing decrees for the creation of RECs and the methods and rates for accessing state incentives were issued in Italy. This delay influenced the presentation of operational models of RECs postponing the effective development for creating or joining formal registered REC. To support in the last phase a follow up strategy to facilitate the integration of the Pilot community groups with local RECs, a mutual agreement was defined with Sun4U project, led by Federesco, focusing on the support to the REC social aggregation in the Area of Rome. 5 on 11 of the Sun4all groups could meet local groups of citizens interested in creating REC with a Solidarity approach. These last activities will grant an effective continuation of group activities and discussions and may lead to the inclusion of a certain number of Sun4all beneficiaries with operating registered RECS (Figure 2).

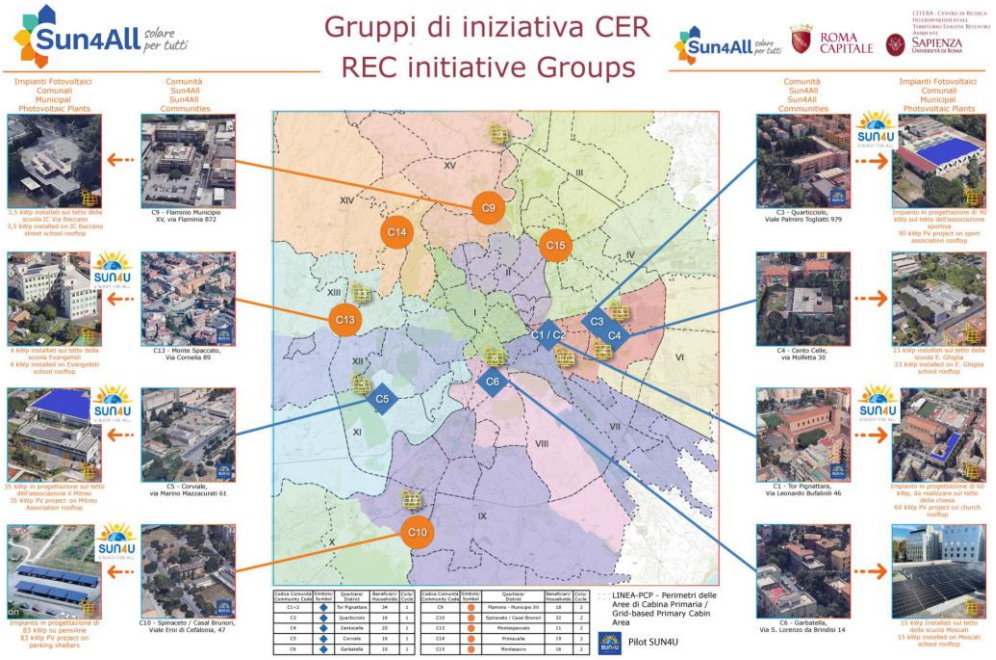


Figure 2 – Map of the Rome Pilot with the 11 Community-Groups including all the beneficiaries of the Sun4All project. 5 Groups have been taken in charge by the new project Sun4U to grant a support in realizing the formal RECS

5.1.1. Summary of Key Sun4All Project Results

Summary of Key Sun4All Project Results

Greater involvement of civil society by public bodies, regions, municipalities, etc., in decision-making processes where effective solutions can be found to combat energy poverty and improve energy efficiency.

- The complex phenomenon of energy poverty, if combined with the process of establishing RECs, better if in solidarity, presents many barriers of a social, economic, and specific knowledge nature.
- After two years of meetings, it was possible to note the great interest of citizens in conditions of energy poverty. Above all, the lack of simple and effective information on the issues of domestic energy saving. At the end of the workshops, we found satisfaction with what Sun4All had transmitted and the beneficiaries always asked if there would be other meetings.

The contribution of the Department of Social Policies of Rome Capital was fundamental, above all its ability to involve since the selection phase the Third Sector associations that best know the social and urban realities in all their facets and are present in the selected territories.

It is important to involve associations in the process of establishing CERs, especially by welcoming citizens who do not have the economic means to access them. Any economic request to families in economic vulnerability represents an insurmountable barrier in their involvement in RECs. on the other side, clarifying since the beginning that participating to REC could help economically these families is a focal point to convince them to participate to the workgroup process.

LESSONS LEARNT

One of the most important lessons learned from the project was the correlations to be created between the two pillars of the project: the social component and the technological component.

Without direct knowledge of the urban territories and the micro-communities present in them, it is not possible to involve vulnerable citizens. The relationship of trust that the citizens first establish with the organisation or association that intends to involve him in participatory and community activities is fundamental. Knowing how to read the "communities" present in the territories is the most important step, as the energy community can grow if the sense of community pre-exists, the trusted relationships are already in place. For the Pilot of Rome, this approach was essential to involve or intercept groups of people who do not yet share a path that includes them in the community. Intercepting these social cells through existing relationships of trust in neighbourhood associations, discussion groups often present on social media (Facebook, websites, Chat Wapp) represents the incubation phase of a community. The involvement of social networks such as Forum Terzo Settore Lazio (FTSL) and Rete Romana dell' Economia Sociale e Solidale (RESS) network was very useful. It was possible to involve many grassroot associations who have been operating for years in the 15 municipalities of Rome Capital.

Summary of Key Sun4All Project Results

The second lesson learnt is the need of social integration to create inclusive RECS. The vulnerable families grouped for the project purposes cannot manage to create their own RECS, even if they could be supported in the formal step to register the REC, they will not have enough resources, in time and money, to launch an operating REC. Its development needs an Animator core, or at least one person that can administer the association ensuring a complex series of activities. Furthermore, the financial support to build a first PV plant can be considered exceptional and the public incentives will not cover the up-front investment. This means that the RECS should be created and managed by a group of citizens ready to include and integrate in the project some vulnerable families, but able to ensure enough time and resources to develop the RECS.

From July 26 to August 25, 2022, the VII Municipality of Roma Capitale launched a public consultation to gauge the willingness of citizens and businesses to form Renewable and Solidarity Energy Communities.

The VIII Municipality of Rome, following the suggestions from various local stakeholders, is proposing a survey to assess and gather the willingness of citizens, associations, schools, shopkeepers, and local businesses to start processes for establishing Renewable and Solidarity Energy Communities (CERS).

This is a participatory initiative aimed at the shared use of energy resources, combating energy poverty, and managing common goods.

On July 26, 2024, the Executive Committee of Roma Capitale approved the Regulation "For the provision of areas and photovoltaic solar systems of Roma Capitale in favour of renewable and solidarity energy communities." This politic will allow the city to pursue the environmental and social goals set at the beginning of the administration, which are now achievable following the approval of the Government's implementing decrees on energy communities. After approval by the Executive Committee, the final step is now approval by the Capitoline Assembly.

The regulation outlines two procedures for establishing Renewable Energy Communities (CER) on the municipal buildings of Roma Capitale:

1) **n.15 PV plants realized by the municipality on 15 defined schools and offered to local RECS.**

The first involves systems owned by the city, as there are many projects that include installing photovoltaic solar panels, which will lead to a reduction in both bills and emissions. This opportunity arises when the buildings are closed, as creating an energy community will allow for the sharing of energy fed into the grid and benefit from the incentives provided by the ministerial decree. With the procedure established by the regulation, it will also be possible to involve Third Sector Entities in forming the CER and promoting projects with social and environmental goals through the resources generated.

2) **All public roofs are offered in concession for local RECS.**

Summary of Key Sun4All Project Results

The second procedure concerns projects directly proposed by Third Sector Entities (ETS) to install solar panels on the roofs of municipal buildings and establish Renewable Energy Communities, which will also pursue social and environmental projects.

More in general the Municipality Strategy for improving RES in Rome has been recently confirmed.

"*Rome is the first city in Italy to enhance its rooftops for renewable and solidarity energy communities through a specific regulation,"* explained Mayor Roberto Gualtieri. *"This regulation provides clear procedures and precise goals. With the funds from the PNRR (National Recovery and Resilience Plan) and the CIS (Strategic Investment Contracts), we will be able to quadruple the megawatts on the rooftops of schools and offices in Roma Capitale by 2026. Today we are approving an important milestone in our program, which combines environmental and climate change goals with those of strengthening the social fabric and supporting families in need.*"

Involved parties and procedure details

Third Sector Entities registered in the National Single Registry (RUNTS) may be involved in the projects. The procedure for selecting the promoters and the projects to be carried out follows the co-design process outlined in the Third Sector Code.

The process is managed by the Municipalities, with the support of the Roma Capitale structures, starting from the Social Department and the Climate Office, to identify projects that, in the spirit of subsidiarity, pursue public interest goals. For example, projects that help families in conditions of energy poverty, reduce bills for structures like foster homes, or restore public spaces through tree planting initiatives.

The approval of the regulation allows the city to be ready to establish CERs on many buildings that will see the installation of solar systems on their roofs in the coming years.

Currently, around 1.9 MW are installed on the roofs of schools and offices in Roma Capitale. With the projects funded by PNRR resources, the city plans to install about 8 MW of new solar systems by 2026. The projects proposed by Third Sector Entities will also contribute to the goal of solarizing the roofs of municipal buildings, which number over 1,200 for schools alone, in addition to offices, gyms, libraries, museums, and social housing buildings (Table 1).

	Comm-S4A	Cluster areas	Municipal District	Workshop 1	Workshop 2	Workshop 3	Workshop4 behavioural changes and CER simulation Webinar	PV plant visit
1st Pilot	1	TOR PIGNATTARA Group1	V	11/11/2022	06/12/2022	29/03/2023	03/05/2024	15/12/2023
	2	TOR PIGNATTARA Group2	V	11/11/2022	06/12/2022	29/03/2023	03/05/2024	15/12/2023
	3	QUARTICCIOLO	V	09/03/2023	25/05/2023	08/06/2023	03/05/2024	15/12/2023

Summary of Key Sun4All Project Results

	4	CENTOCELLE	V	20/04/ 2023	25/05/ 2023	08/06/20 23	03/05/2024	15/12/ 2023
	5	CORVIALE 1	XI	19/04/ 2023	24/05/ 2023	09/06/ 2023	03/05/2024	15/12/ 2023
	6	GARBATELLA 1	VIII	15/06/ 2023	12/07/ 2023	11/09/ 2023	03/05/2024	25/05/ 2024
2nd pilot	9	FLAMINIO - Municipio XV	XV	29/09/ 2023	10/11/ 2023	19/01/ 2024	13/09/2024	25/05/ 2024
	10	SPINACETO 1 Scuola Renzini	IX	29/05/ 2023	10/10/ 2023	13/12/ 2023	13/09/2024	25/05/ 2024
	11	SPINACETO 2 / CASAL BRUNORI	IX	15/06/ 2024	13/09/ 2024	13/09/ 2024	13/09/2024	25/05/ 2024
	13	MONTESPACCATO	XIII	24/11/ 2023	26/02/ 2024	20/03/ 2024	13/09/2024	25/05/ 2024
	14	PRIMAVALLE	XIV	07/03/ 2024	18/03/ 2024	22/03/ 2024	13/09/2024	25/05/ 2024
	15	MONTESACRO	III	06/05 /2024	12/06/ 2024	18/06/ 2024	13/09/2024	25/05/ 2024

Table 1 – Engagement activities conducted in the 12 communities/clusters of the Rome pilot in the 2 years of the project. C11 Group attracted mainly participants non-beneficiaries, all the other 11 Community-Groups were mainly participated by beneficiaries

During the workshops, especially in the first phase, beneficiaries expressed interest in being informed about the project's activities. In some communities/clusters, weeks passed between the first and second workshops. It was therefore decided together with Forum Terzo Settore Lazio and Federconsumatori Lazio to activate a WhatsApp chat for each community to communicate information relating to the project directly and quickly. For each community, beneficiaries were asked during the first workshop to provide their consent to be included in the chat and to be contacted exclusively for information relating to the project, regarding Events and the Assessment and Suggestions for the Energy Efficiency of the households.

The table below shows the members for each of the communities/clusters (Table 2 and Figure 3).

Community WhatsApp Chat	Members
Tor Pignattara	31
Quarticciolo	11
Centocelle	18
Corviale	19
Garbatella	8
Flaminio	18
Spinaceto Renzini	14
Spinaceto/Casal Brunori	7
Montespaccato	20

Summary of Key Sun4All Project Results

Primavalle	14
Montesacro	13
Total	**173 ***

Table 2 – Members for each of the communities/clusters

(*) *The beneficiaries selected during the engagement phase were 200. During the engagement activities there were some withdrawals for various reasons. The 173 reported in the table are those who participated in at least one of the four planned workshops, filled out the questionnaire and delivered at least one electricity bill.*

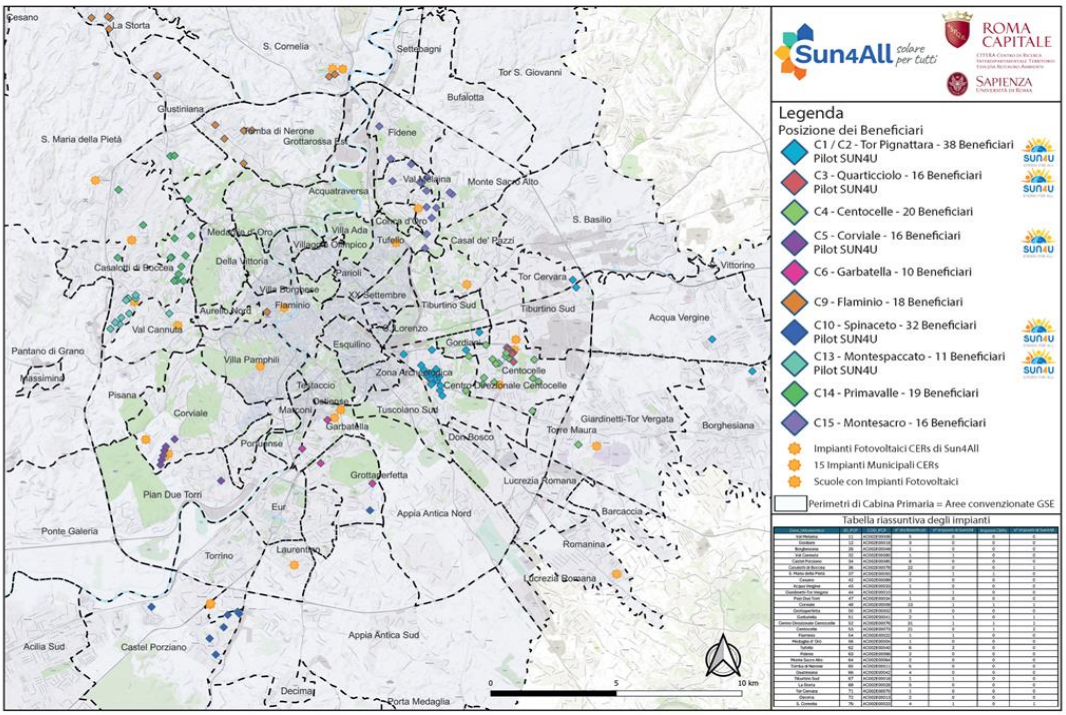


Figure 3 – Map of the Beneficiaries Households in the Rome Pilot. For each Community the proximity PV plants on public school roofs are represented

Messages regarding new calls for national or local social bonuses have been inserted into the Pilot chat.

In recent months, the electricity sales market has changed in Italy, opening to the liberalization of contracts. Articles and information useful for orienting oneself with the new rules have been reported in the chats, especially for those who find themselves in conditions of social and economic vulnerability.

Summary of Key Sun4All Project Results

The Project's activities were promoted through the web pages of the Roma Capitale website dedicated to Sun4All:

ROMA

Amministrazione Dati e statistiche Servizi Attualità Partecipa Contatti

Home > Attualità > Informazioni di servizio > Tutte le informazioni di servizio

Comunità Energetiche Solidali, giornata conclusiva del progetto europeo "Sun4All"

2 lug 2024

Mercoledì 10 luglio l'evento finale a Palazzo Valentini.

Si terrà a Roma mercoledì **10 luglio**, presso Palazzo Valentini, l'evento conclusivo del **progetto europeo Sun4All**: **comunità energetiche per una transizione energetica equa e solidale**, finanziato dal programma "Horizon 2020" e coordinato da EcoServeis (Spagna).

L'Italia ha partecipato con due partner: Roma Capitale - Dipartimento delle Politiche Sociali e Salute e CITERA - Centro di Ricerca Interdipartimentale Territorio Edilizia Restauro Ambiente dell'Università Sapienza di Roma.

Sun4All, in linea con il Piano d'azione per l'Energia e il Clima della città, ha sviluppato **un modello formativo e finanziario per includere le famiglie vulnerabili nella transizione energetica** attraverso la partecipazione alle Comunità Energetiche Rinnovabili Solidali.

Il pilot di Roma ha visto il coinvolgimento di **200 nuclei familiari in 10 territori** diversi della città, grazie al supporto del Forum del Terzo Settore del Lazio.

L'incontro avrà luogo dalle 9 alle 12.30 presso la Sala David Sassoli, in Via Quattro Novembre 119/a.

Scarica il programma

Scarica le schede relative l'Efficienza Energetica Domestica

Summary of Key Sun4All Project Results

The project was also supported by the Metropolitan City of Rome

Home > Media e Comunicazione>Notizie>Progetto Sun4all. Biolghini: "Città metropolitana a sostegno delle fasce sociali più bisognose"

Progetto Sun4all. Biolghini: "Città metropolitana a sostegno delle fasce sociali più bisognose"

10 Luglio 2024

A Roma oltre 100 mila famiglie vivono in condizione di povertà energetica, vivendo in condizioni di difficoltà nel poter riscaldare gli ambienti dove vivono, raffreddarli nei mesi estivi, senza corrente elettrica e acqua calda.

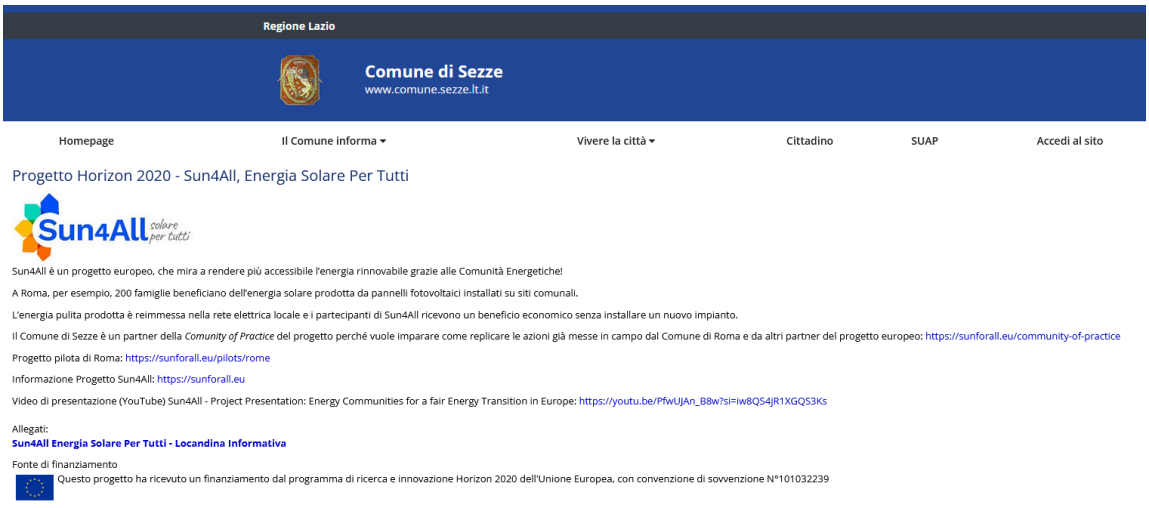
Per questo è partito un **progetto pilota che ha coinvolto 200 nuclei familiari in 10 municipi, grazie al supporto del Forum del Terzo settore del Lazio**.

La Città metropolitana di Roma ha supportato questa esperienza perché Roma, è una delle quattro città pilota di **Sun4all**, il progetto che coinvolge Portogallo, Spagna e Francia in questa sperimentazione di energie, sociali e culturali per contrastare questa ingiustizia sociale.

"Assieme alla riqualificazione urbana, vogliamo mettere nelle condizioni tutte le persone, di vivere in condizioni dignitose. Per questo abbiamo sposato questo progetto per iniziare un percorso necessario per riempire di contenuti una politica che non lasci indietro nessuno.

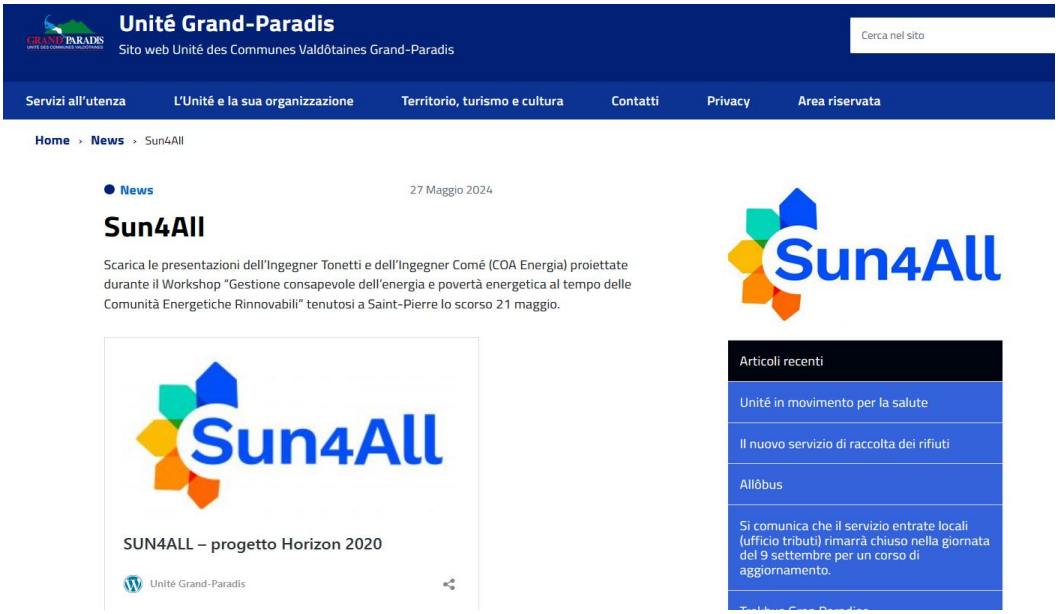
https://www.cittametropolitanaroma.it/notizia/progetto-sun4all-biolghini-citta-metropolitana-a-sostegno-delle-fasce-sociali-piu-bisognose/

The promotion was also conducted on the websites of the two mentee cities of the Community of Practice: Comune di Sezze



Summary of Key Sun4All Project Results

And Unité des Communes valdôtaines Grand-Paradis



5.1.2. Impact Assessment and Success Metrics

Impact Assessment and Success Metrics

The training modules of the workshops, each lasting a maximum of 120 minutes, were held on the dates shown in the following table and the following contents were presented (Table 3).

Event	Date	
36 Workshops (32 on 30 May 2024) (34 on 18 June 2024)	11 November 2023	–
2 Webinar WS4	3 May 2024	September 2024
2 site visit per pilot/phase	15 December 2023	25 May 2024
2 capacity building for mentors (not planned in Sun4All) 1 F2F, 1 Webinar	3 November 2023	15 March 2024
F2F IEA with presentation of energy efficiency cards	15 May 2024	–

Table 3 – Scheme of the training modules

The Sun4All Project has provided for the figure of the mentor who was selected among the beneficiaries who participated in the first phase of the project in the Rome pilot. The mentor must involve beneficiaries of the communities of the second phase of the project and provide support to the partners of the Rome pilot in promoting the Sun4All themes.

The second meeting at the CITERA Sapienza University of Rome research centre on 27 November 2023, was attended by 2 of the mentors of the Sun4All project. They were

Impact Assessment and Success Metrics

illustrated the activities to be promoted in the Garbatella and Montespaccato communities of the Rome pilot.

They were asked to support the pilot work group in drafting the questionnaires and collecting electricity bills. They were asked to participate in subsequent workshops and visits to photovoltaic systems and animate the community chats activated on WhatsApp. Their contribution is considered very important because, in addition to already knowing the objectives of the project having participated in the workshops in their communities, they have chosen as mentors to be more active in dissemination towards other beneficiaries and participants.

During webinars and online activities, the Slido interaction tool was used to encourage proactive participation. This tool proved to be very useful. By creating surveys with a few simple questions, it is possible to obtain responses that help assess the level of knowledge beneficiaries have acquired throughout the engagement. Such a tool is particularly useful when it is not possible to have participants attend in person.

5.2. Stakeholder Analysis

Stakeholder Analysis

Between October and November 2022, five meetings were held to present the project to the Forum Terzo Settore Lazio (FTSL) and Federconsumatori Lazio (FCL) and to define the program of engagement activities in the territories of some of the fifteen municipalities of Rome Capital. These meetings were held with the participation of the team from the Department of Social Policies and Health of Rome Capital together with FTSL and FCL.

5.2.1. Identification of Key Stakeholders

Identification of Key Stakeholders

The Sun4All Rome pilot is structured to implement the following tasks:

1. Preselection criteria: Georeferencing of the 400 potential beneficiaries and assignment to the PV system / school.
2. Selection of 200 beneficiaries/end-users through a procedure for selection beneficiaries coordinated by the DPSS of RCP.
3. Promotion and citizen engagement: activities carried out by experts, with competencies in socio-territorial animation.
4. Energy Poverty definition and monitoring (KPI).

Communication addressed to beneficiaries and other new participants.

In the first phase, being able to proceed only with the simulation of formal RECS, we proceeded by assigning, or rather by having each group adopt, one or more existing

Identification of Key Stakeholders

municipally managed plants and simulating their RECS structure with the use of the related incentives.

This approach led to the following criteria for the selection of photovoltaic plants:

- 154 photovoltaic plants owned by the Municipality.
- 17 photovoltaic plants associated with S4A RECS.
- Principle of proximity between photovoltaic plant and beneficiaries.
- Peak power/Energy.
- Roof of school building.
- Operating plant.
- Accessible for visits.
- Preference for O&M with concessionaire.

Roma Capitale selected 700 households in energy poverty as potential beneficiaries of the Sun4All project, between September to November 2022. Sapienza University identified the pilot urban areas associated to municipal PV plants to be adopted for each community-group, so limiting to 267 the families to be contacted to reach the target of 200 households, twice the project objective (100 for each 2 pilots). The beneficiaries have been organized by proximity clusters to form 12 RECS (Solidarity Renewable Energy Communities), adopting 17 photovoltaic plants already in operation on the school roofs to simulate the energy sharing.

The first pilot is achieving the engagement plan for 5 Communities involving 100 vulnerable families. It started on 1st December 2022 and will finish by 30th of November 2023. Regarding the workshops, 15 have already been delivered on energy transition issues and good practices for home energy. Also, 7 mentors have been engaged in the webchat to support the participation process.

The selection of municipalities and neighbourhoods in the municipality of Rome in which to meet citizens was based on two primary social objectives: bringing the Sun4all project to those municipalities where the phenomenon of energy poverty is highest, reaching the micro-communities present through the support of grassroots Associations and the third sector. This activity allowed us to build the engagement strategy of the Rome pilot through a customized workflow. It was possible to build a unitary vision of the needs of the territory of Rome and its urban micro-communities by integrating the Top-down approach with the contribution of DPSS and CITERA, with the Bottom-up approach thanks to the contribution of the third sector. Clusters were organized to form 12 CERS (Solidarity Renewable Energy Communities), each of which adopts photovoltaic systems on public schools managed by Roma Capitale.

Clusters have been organized to form 12 CERS (Solidarity Renewable Energy Communities), each of which adopts photovoltaic systems on public schools managed by Rome Capital.

The RESS network Rete Romana dell'Economia Sociale e Solidale has made it possible to reach and inform about the activities of Sun4All. The stakeholders who have been operating for years in the 15 municipalities of Rome Capital are:

Identification of Key Stakeholders

- Associations, social or work cooperatives.
- Solidarity purchasing groups.
- Social enterprises.
- Urban gardens.
- Committees for the protection of common goods.
- Associations of parents of open schools.
- Activists and collectives who carry out social and territorial programs.
- Ecclesial realities.
- Researchers and students of related issues.
- Experiences of active citizenship.

Rete RESS has represented an experience that through its mission of aggregation has made it possible to reach and speak to those groups of citizens who already share a community path and who represent accelerators for the creation of RECs, especially social and solidarity-based ones.

The lesson learned from this journey was that the approach of a continuous workflow from the Bottom Up of citizens and communities on the territory to the Top down of public administrations is a winning strategy to implement the themes of projects such as Sun4All.

Urban garden and REC

The combination of urban gardens and renewable energy communities in Rome represents a new frontier of urban sustainability: a synergy between nature, technology, and citizen participation that is transforming the way we live and manage our resources. A particularly interesting area is the integration of these energy communities within the city's urban gardens, combining urban agriculture with clean energy production.

The urban gardens of Rome have historically played a crucial role in creating green spaces, local food production, and improving quality of life.

Urban gardening in Rome began to flourish around 2010, primarily as a response to the city's inadequate management of public spaces. The initiative was spearheaded by projects like Zappata Romana, which documented and connected various community gardens across the city. The number of these gardens increased from approximately 40 to 200 within a few years, reflecting a strong citizen-driven movement to reclaim neglected public areas for communal use and sustainable agriculture.

Recently, however, these spaces have taken on a new dimension: renewable energy generation. With the introduction of solar panels, small wind turbines, and energy storage solutions, urban gardens are becoming not only food producers but also centres for self-production and sharing of clean energy.

Many urban gardens feature structures like shelters or buildings, which are ideal for installing photovoltaic panels. The energy produced can be used for agricultural activities (such as irrigation systems, lighting, etc.) and for the surrounding community. Excess energy generated by the urban gardens can be shared with nearby residents through a

Identification of Key Stakeholders

local grid. This allows community members to reduce their energy costs and lower CO_2 emissions.

Integrating REC into urban gardens brings numerous benefits, extending beyond energy production. The creation of decentralized energy communities reduces the need for energy from the national grid and makes local communities more resilient to potential energy crises.

Shared management of energy and food resources encourages active citizen participation, fostering a sense of belonging and responsibility. Additionally, these projects often involve low-income families, offering them more affordable access to energy.

Urban gardens become not only green spaces but also innovative centers for energy production, contributing to the revitalization of often marginalized areas of the city.

The future of renewable energy communities in Rome's urban gardens looks promising. With the support of local policies, aligned with the objectives of the National Integrated Energy and Climate Plan (PNIEC) and European directives, there are significant opportunities for expansion. Pilot models taking shape could serve as examples for other Italian cities, creating a network of sustainable energy communities that not only produce food and enhance urban biodiversity but actively contribute to the energy transition.

5.2.2. Analysis of Stakeholder Needs and Preferences

Analysis of Stakeholder Needs and Preferences

The Sun4All model has allowed us to experiment with about 200 beneficiaries in conditions of energy poverty a multidisciplinary model seeking integrated solutions between the social emergency of energy poverty and the sustainability of a solidarity energy efficiency through the RECs.

It was possible to concretely involve the following stakeholders in the Sun4All model:

- The Climate purpose office of Rome Capital.
- Departments and offices of social services of the 15 municipalities of Rome Capital.
- The Third Sector.
- Citizens' associations.
- Universities and research centres.
- The managers of electricity distribution systems (DSO).

The following Table 4 shows the results achieved thanks to the engagement activities coordinated by the interdepartmental research centre CITERA Sapienza University of Rome and with the support of the mentors provided by the Sun4All project.

Analysis of Stakeholder Needs and Preferences

Pilot/ Phases period	Community	Cluster areas	Municipal District	Questionnaires	Bills collected
1st Pilot/ phase	1	TOR PIGNATTARA	V	41	20
	2	TOR PIGNATTARA	V	66	6
	3	QUARTICCIOLO	V	29	6
	4	CENTOCELLE	V	27	27
	5	CORVIALE 1	XI	24	24
	6	GARBATELLA	VIII	9	4
2nd phase	9	FLAMINIO	XV	30	47
	10	SPINACETO 1 Scuola Renzini	IX	23	33
	11	SPINACETO 2 / CASAL BRUNORI	IX	1	0
	13	MONTESPACCATO	XIII	25	32
	14	PRIMAVALLE	XIV	36	41
	15	MONTESACRO	III	18	31
TOTAL BENEFICIARIES				**329**	**271**
1st Pilot/phase				**196**	**87**
2nd Pilot/phase				133	184

Table 4 – Results achieved with the engagement activities in the 12 communities/clusters

The cross-analysis of the behavioural data of the questionnaires and that of domestic energy consumption allowed us to develop the Individual Energy Advice of the beneficiaries.

The activity of collecting the questionnaires was very onerous but returned a quantity of data and information useful for characterizing barriers and opportunities.

5.3. Adoption Strategy

Adoption Strategy

The strategy to be implemented must have the objective of creating conditions to allow a just and fair transition in line with the promise of "leaving no one behind" by including all citizens, especially the most vulnerable and poor who are most at risk of being excluded.

The Covenant of Mayors for Climate and Energy has defined as the third pillar of its objectives, in the PAESC, "universal access to safe, sustainable and fairly priced forms of energy supply".

Adoption Strategy

Starting from these considerations, the Rome pilot will implement what is foreseen in the PAESC of Rome Capital currently in force.

The policies to combat energy poverty can be classified into:

- **Protection policies:** these are short-term interventions that provide aid in the form of subsidies to low-income citizens and that allow access to energy to reduce household energy expenditure (e.g., bonuses or social tariffs).
- **Promotion policies:** medium-long term interventions to provide those living in energy poverty with the tools to escape from a condition of indigence by improving the energy efficiency of homes (regulations, tax breaks, energy performance certificates, energy tutors, etc.).

5.3.1. Strategic Objectives for Adoption

Strategic Objectives for Adoption

All the involved stakeholders – institutional, technical, educational, third sector and civil society – will contribute to the engagement of households, paying specific attention to the needs of the energy-poor, and to the importance of empowering them to be active actors in the energy transition.

Roma Capitale intends to decline, at a local level, the creation of national one-stop shops for clean energy, foreseen in European regulations as one of the PAESC actions contributing to the achievement of the objectives of the National Integrated Climate Energy Plans and, therefore, of the EU Climate Energy targets for 2030.

The intervention by the Capitoline Administration aims to disseminate best practices and knowledge of actions that can be summarized as follows:

- Contribute to the reduction of climate-altering emissions both in the relevant territory and in delocalized territories (decarbonization pillar of the PAESC).
- Allow Roman citizens to enjoy, directly and indirectly, the positive economic effects (incentives, savings, and revitalization of the local economy) and better quality and healthiness of the air (reduction of emissions of fine dust, nitrogen oxides, carbon monoxide). In this sense, it is necessary to facilitate investments in sustainability and the adoption of conscious and sustainable behaviours for individual citizens, families, and companies.
- Alleviate energy poverty, which is the social pillar of PAESC (universal access to secure, sustainable, and affordable energy).
- Renewable Energy Communities (CER) in Rome will be integrated into schools through a series of strategic initiatives aimed at promoting the use of renewable energy, reducing energy costs, and fostering social cohesion. Here's how they will be implemented:

Roma Capitale will launch 15 pilot projects, one for each municipality, using the rooftops of public buildings, including schools, to install photovoltaic systems. These systems are designed to meet the energy needs of the schools and share the produced energy with

Strategic Objectives for Adoption

members of the energy communities, with a particular focus on supporting families in need.

Funding and Coordination

The city administration will finance these projects through its own resources and coordinate their implementation via SIMU (Infrastructure and Urban Mobility Service) in collaboration with the municipalities. This approach aims to ensure that schools directly benefit from the solar installations.

Educational Integration

The CERs will not only provide energy but will also serve as educational tools. Participating schools will engage in awareness and training programs on the use of renewable energy, helping to foster a culture of sustainability among students.

Collaboration with Local Entities

The CERs will be created through collaboration between citizens, local entities, universities, and third-sector associations. This synergy will not only facilitate project implementation but also ensure that the economic benefits from energy production are reinvested in social and inclusion activities within the neighbourhoods.

Simplification of Procedures

Roma Capitale is working to simplify the procedures for installing solar systems, making it easier for schools and communities to actively participate in creating CERs. This includes agreements with banking institutions to facilitate credit access for families wishing to join these initiatives.

Social Goals

In addition to economic and environmental benefits, CER projects in schools have clear social objectives. The profits generated from the produced energy will be reinvested in support activities for families in energy poverty and in educational programs, creating a virtuous cycle that benefits the entire community.

5.3.2. Target Audience and Beneficiaries

Target Audience and Beneficiaries

Roma Capitale selected 700 households in energy poverty as potential beneficiaries of the Sun4All project, between September to November 2022. Sapienza University identified the pilot urban areas associated to municipal PV plants to be adopted for each community-group, so limiting to 267 the families to be contacted to reach the target of 200 households, twice the project objective (100 for each 2 pilots). The beneficiaries have been organized by proximity clusters to form 12 RECS (Solidarity Renewable Energy Communities), adopting 17 photovoltaic plants already in operation on the school roofs to simulate the energy sharing.

The first pilot is achieving the engagement plan for 5 Communities involving 100 vulnerable families. It started on 1st December 2022 and will finish by 30th of November

Target Audience and Beneficiaries
2023. Regarding the workshops, 15 have already been delivered on energy transition issues and good practices for home energy. Also, 7 mentors have been engaged in the webchat to support the participation process. The second pilot continued the engagement activities as defined in the first part and the overall picture of which is shown in the following table. Given the experience of the first pilot which highlighted great difficulties on the part of the beneficiaries in participating in the workshops in the summer months, in the second pilot it was decided to hold a workshop for the Spinaceto 1 Renzini and Spinaceto 2 Casal Brunori communities on 13 September 2024. During the second pilot, an intense activity was carried out to collect the Q1 and Q2 questionnaires. The minimum requirements for having a beneficiary profile are to have the completed questionnaire (the online mode with a GForm was also activated in the second pilot) and at least three bills. However, some beneficiaries contacted or who participated in a workshop could no longer be found. For each community, an engagement campaign was imposed aimed at informing and training beneficiary households in conditions of socio-economic vulnerability who received the National Energy Bonus. An achievable goal is to involve the urban gardens located in the territory of Rome Capital. Through meetings, webinars, and specific engagement activities, good practices can be shared with the municipalities of Rome to encourage the creation of new communities of citizens who are more aware of the benefits of locally produced food and the use of renewable energy sources, such as solar power. In this way, communities of citizens are formed in public spaces, sharing energy while also including segments of the population in conditions of social and economic vulnerability.

5.3.3. Communication and Engagement Plan

Communication and Engagement Plan
The experience of the Rome pilot for an efficient Communication and Engagement Plan has highlighted the following points to consolidate: • Communicate complex issues such as energy efficiency and RECS in simple language. • Build a relationship of trust with individual beneficiaries and communities already existing in the territories with the support of associations and the third sector. • Train personnel to be employed in the Energy Desks planned in each of the 15 municipalities of Rome Capital. • Create information materials aimed at vulnerable socio-economic groups such as the Domestic Energy Efficiency Cards created by the research centre CITERA Sapienza University of Rome (Figure 4).

Communication and Engagement Plan

Figure 4 – Domestic Energy Efficiency Cards in 2 languages produced for the beneficiaries of the pilot and for international dissemination

During the workshops, especially in the first phase, beneficiaries expressed interest in being informed about the project's activities. In some communities/clusters, weeks passed between the first and second workshops. It was therefore decided together with Forum Terzo Settore Lazio and Federconsumatori Lazio to activate a WhatsApp chat for each community to communicate information relating to the project directly and quickly. For each community, beneficiaries were asked during the first workshop to provide their consent to be included in the chat and to be contacted exclusively for information relating to the project.

Messages regarding new calls for national or local social bonuses have been inserted into the chat.

In recent months, the electricity sales market has changed in Italy, opening to the liberalization of contracts. Articles and information useful for orienting oneself with the new rules have been reported in the chats, especially for those who find themselves in conditions of social and economic vulnerability.

An effective engagement campaign must consider the cultural and linguistic barriers to be addressed for effective communication. The tools should:

- Use simple language.
- Easy to manage tools.

Communication and Engagement Plan

- Provide targeted responses to small problems.
- Long-lasting.
- Easily upgradable.
- Avoid abandonment by beneficiaries.

The management of these activities must be supported by contact groups able to interact with beneficiaries by establishing a relationship of trust between the parties.

A summary of the minimum content, aspects and engagement plan is shown in the following Table 5.

Aspect	Engagement Plans
Focus	Emphasis on two-way dialogue and community involvement
Materials Used	Digital media, interactive workshops, personalized content
Audience Interaction	Continuous feedback loops and community consultations
Trust Building	Collaborative efforts with local organizations

Table 5 – Aspect and activities for an engagement plan

5.4. Implementation and Framework

Implementation Framework

The Rome Pilot through its activities have been to implement some relevant policies of the SECAP recently approved by Roma Capitale:

1. Energy poverty mitigation measures: in collaboration with the Observatory on energy poverty (OIPE) as foreseen by the Integrated National Energy and Climate Plan (PNIEC).
2. Development of the Energy Communities, open, inclusive, solidarity based.

Roma Capitale intends to decline, at a local level, the creation of national one-stop shops for clean energy, foreseen in European regulations as one of the PAESC actions contributing to the achievement of the objectives of the National Integrated Climate Energy Plans and, therefore, of the EU Climate Energy targets for 2030.

The intervention by the Capitoline Administration aims to disseminate best practices and knowledge of actions that can be summarized as follows:

- Contribute to the reduction of climate-altering emissions both in the relevant territory and in delocalized territories (decarbonization pillar of the PAESC).
- Allow Roman citizens to enjoy, directly and indirectly, the positive economic effects (incentives, savings, and revitalization of the local economy) and better quality and healthiness of the air (reduction of emissions of fine dust, nitrogen oxides, carbon monoxide). In this sense, it is necessary to facilitate investments

Implementation Framework

in sustainability and the adoption of conscious and sustainable behaviours for individual citizens, families, and companies.

- Alleviate energy poverty, which is the social pillar of PAESC (universal access to secure, sustainable, and affordable energy).

Following the resolution of Rome Capital in February 2024 which selected 15 schools that will host photovoltaic plants on the roof serving energy communities, they were included in the GIS mapping carried out by the CITERA centre. The map allowed for proximity analysis by evaluating the distance between the PV system present in the Sun4All community and resident beneficiaries.

The integration of solar systems in Rome's schools will be a strategic process that combines technical, social, and economic aspects. Through accurate mapping, active involvement of the Municipalities, and a strong focus on social objectives, Roma Capitale aims to create sustainable energy communities that benefit not only schools but also families and local communities.

The selection of school buildings for the installation of solar systems in Rome will follow a well-defined process aimed at ensuring the effectiveness and sustainability of Renewable Energy Communities (CER). Here are the main steps and criteria that will guide this decision:

Mapping of Buildings

Roma Capitale will conduct a detailed mapping of available school buildings, identifying those most suitable for the installation of photovoltaic systems. This mapping will help assess structural characteristics and sun exposure, key factors for maximizing energy efficiency.

Involvement of the Municipalities

The responsibility for selecting buildings will lie with the Municipalities, which will collaborate with SIMU (Infrastructure and Urban Mobility Service) and other city departments. The Municipalities will be asked to propose schools they consider most suitable for hosting the systems, considering local needs and social priorities.

Social Objectives

The selection of buildings will not only be technical but also social. The chosen schools will need to contribute to projects that support economically vulnerable families, such as foster homes or recovery centres. This approach ensures that the benefits of the energy produced are shared with the most vulnerable communities.

Redevelopment Projects

Schools included in the building renovation program through the Institutional Development Contract (CIS) will be prioritized. Around 300 schools are scheduled for renovation in the coming years, and many of them will receive solar systems as part of this process.

Simplification of Procedures

Implementation Framework

To facilitate the installation of the systems, Roma Capitale is working to simplify bureaucratic procedures. This includes creating a specific regulation that allows more efficient use of public buildings, making it easier to access funding and resources.

Collaboration with Third-Sector Entities

Additionally, the city plans to collaborate with third-sector entities to propose innovative projects that can include schools in the creation of CERs. These entities can contribute expertise and resources, increasing the social impact of the projects.

5.4.1. Action Plan for Result Adoption

Action Plan for Result Adoption

Roma Capitale intends to decline, at a local level, the creation of national one-stop shops for clean energy, foreseen in European regulations as one of the PAESC actions contributing to the achievement of the objectives of the National Integrated Climate Energy Plans and, therefore, of the EU Climate Energy targets for 2030.

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- Alleviate energy poverty, which is the social pillar of PAESC (universal access to secure, sustainable, and affordable energy).

https://www.comune.roma.it/web/it/notizia/sun4all-10-luglio-2024.page

The use of social media, LinkedIn and Facebook has allowed us to disseminate the project objectives in a very efficient way. They represent a very powerful tool that allows us to reach the different profiles foreseen in the project in a targeted way: the participants by inviting them to workshop or site visits and community chats through which we can convey targeted information on a weekly basis.

5.4.2. Resources Allocation and Budget

Resources Allocation and Budgeting

The recent deliberations by the Giunta of Rome regarding photovoltaic installations on rooftops highlight significant advancements in the city's approach to renewable energy and community engagement.

The Municipality Giunta has approved a regulation aimed at facilitating the installation of solar photovoltaic systems on municipal buildings, promoting the establishment of Comunità Energetiche Rinnovabili (CER), or renewable energy communities. This initiative is designed to support social and environmental objectives, particularly benefiting vulnerable households facing energy poverty.

The resources allocated by Roma Capitale for the installation of photovoltaic systems to establish solidarity energy communities (CER) amount to €700,000 for 15 systems on schools in each municipality.

Further resources are offered to the RECs by the Chamber of Commerce of Rome with an open call (September – October 2024) and by the Lazio Region with a forthcoming call delivering 10 ML€ (2025).

The Sun4ALL Rome pilot defined two RECS business models by analysing three factors: monitoring flows, solidarity criteria, concrete modality of distribution of benefits to the beneficiaries.

The image below represents this first scheme "Sun4All Project Simulated RECS scheme".

At the start of the Sun4All project on 1 October 2021, the regulatory context of RECs in Italy had not yet been fully defined. It was finalized in April 2024 (M31) with the publication of the operating rules for access to the service for widespread self-consumption. In the absence of a clear technical-economic reference framework, the engagement activities with the beneficiaries were carried out by simulating all the operation of a RECS (Solidarity Renewable Energy Community) focusing on the capacity building and the social aggregation for each Community Group.

The model adopted during the project was based on four pillars:

1. PV plants on school roofs, considering an installed capacity of 300 kW generating incentives for the municipality.
2. The Sun4All Rome pilot partners (RCAP and CITERA).
3. Direct support from the third sector, mainly Forum Terzo Settore Lazio and Federconsumatori and their network of grassroot associations.
4. The end users are the 200 selected beneficiaries.

The benefits for vulnerable families were provided in the form of decarbonizing devices, such as LED light bulbs, multi-socket plugs, and similar items, corresponding to the yearly average economic value coming to the consumer from the REC scheme (Figure 5).

Resources Allocation and Budgeting

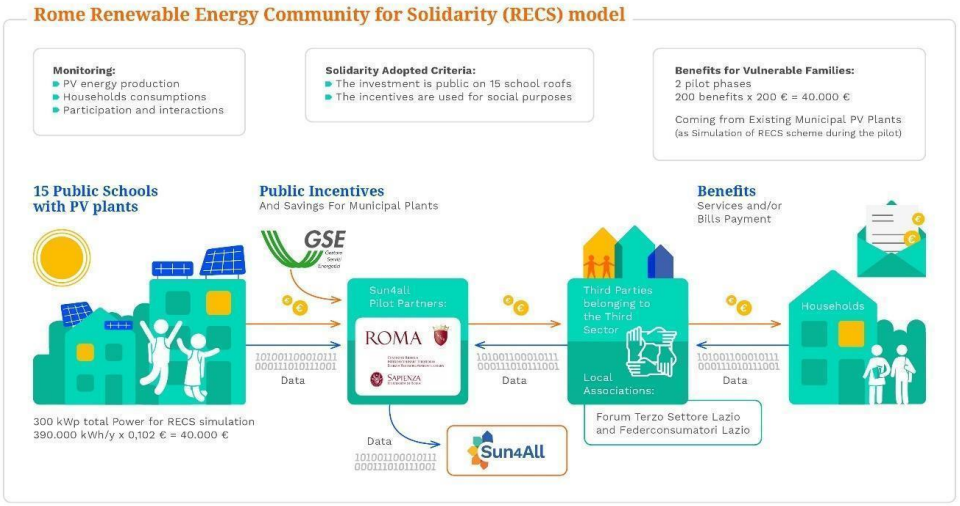

Figure 5 – Infographics model 1 – "Sun4All Project Simulated RECS scheme"

The second model of RECs, the ideal "post-project RECS scheme", provides for the RECS implementation as per national legislation and the city policy context. Roma Capitale through two public acts has defined some criteria for the promotion of CERs in its municipal territory, offering 900 public roofs and n15 complete PV plants to the Roman RECS.

The first is Resolution 139 of 2021 which establishes the guidelines for the installation of photovoltaic systems on the roofs of public buildings, promoting the use of renewable energy and facilitating the creation of CERs.

The second is the Regulation for the provision of areas and photovoltaic solar systems of Roma Capitale in favour of solidarity renewable energy communities, approved by the Council on 26 July 2024.

The resolution represents an important initiative to integrate renewable energy into the urban fabric of Rome, while also promoting social cohesion and environmental sustainability.

The second Business model presented in the conclusion phase of Sun4All as a post-project stable Model for the implementation of RECS, is based on the public incentives (see figure below) that are granted for any registered REC since April 2024, where the REC 20-year incentive is paid directly to the REC association (Figure 6 and Figure 7).

Resources Allocation and Budgeting

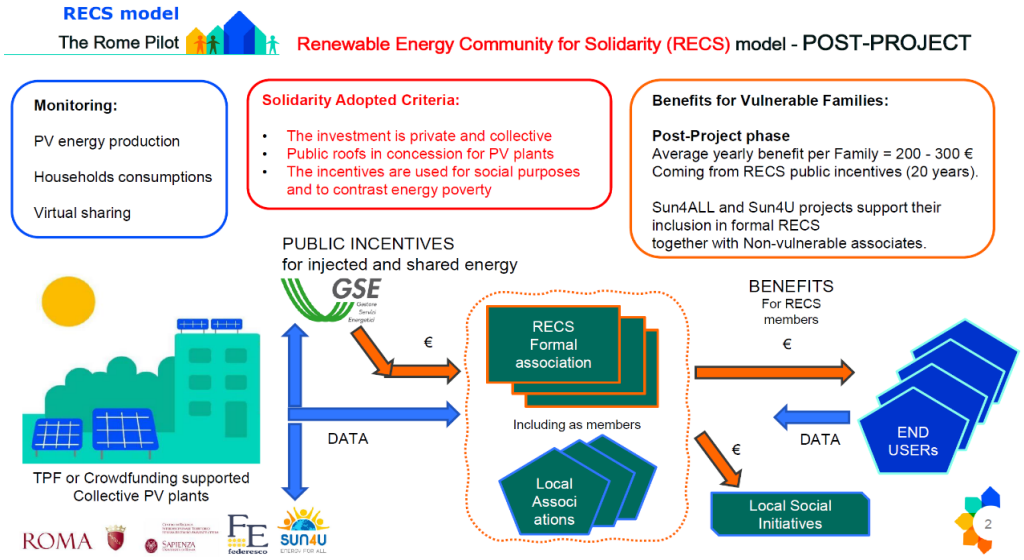

Figure 6 – Infographics model 2 – "post-Project RECS scheme"

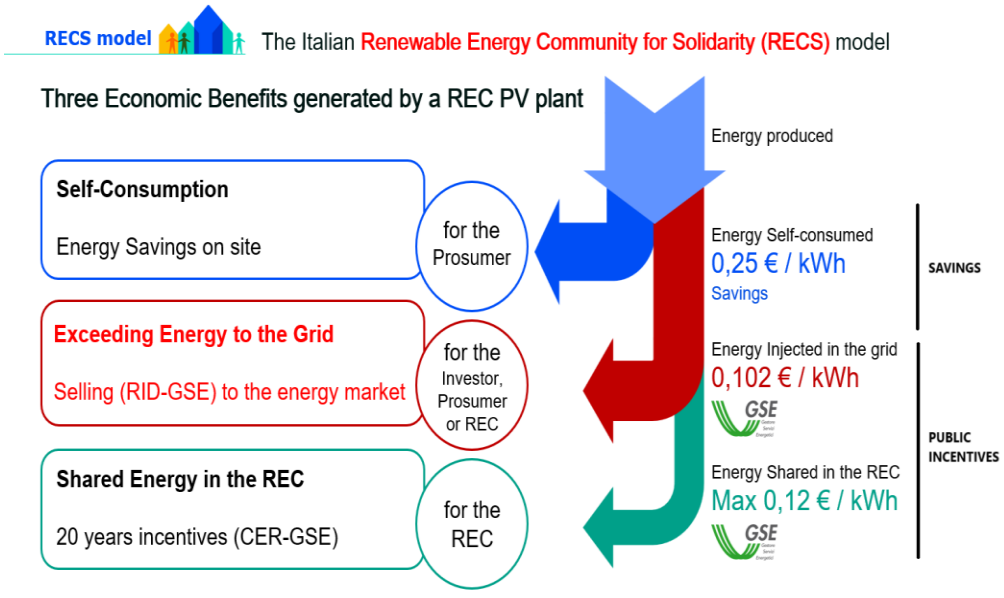

Figure 7 – Infographics on the Benefits for any REC in Italy

5.5. Capacity Building and Training

Capacity Building and Training

Within the Capitoline Offices for Sustainable Energy, 29 municipal employees have already been trained to define a new dedicated professional figure, the so-called Tutor for Domestic Energy (TED), to contribute to the fight against energy poverty. The employees have been trained both in relation to the language and the actions, practical and social, to be undertaken and transmitted to citizens so that they become aware of the tools in their possession, useful for reducing energy waste and consequently consumption and costs in the bill. The Course, with the support of GSE and ENEA, provided employees with the cognitive tools to:

- Communicate with the public in the best possible way and understand the various needs.
- Acquire mastery of the concepts of energy, power, heat, renewable energy sources, vulnerability, and energy efficiency.
- Provide the first basic information for a correct reading of energy bills.
- Illustrate the various possible interventions to achieve economic and energy savings and at the same time contain CO2 emissions.
- Inform about tax breaks and incentives (thermal account, eco-bonus, home bonus, credit transfer).
- Use the GSE and ENEA portal and customer area.

5.5.1. Training Programs for Stakeholders

Training Programs for Stakeholders

The PAESC provides for a first step with a preliminary refresher course, organized in collaboration with ENEA and GSE, aimed at the Capitoline employees who have made themselves available through a continuous training approach that will have the aim of guiding citizens and businesses towards the opportunities offered by the new regulations and incentive measures already in force, especially with regard to support for the creation of new systems and models (including behavioural ones) of participation in the generation of distributed renewable energy and energy savings.

5.5.2. Capacity Building Initiatives

Capacity Building Initiatives – combination of textual and visual elements

The "Sportelli Energia" in Rome play a crucial role in promoting access to sustainable energy and combating energy poverty. They are established under the SECAP with a specific action that began as part of the EU H2020 ASSIST2GETHER project, supported by GSE and ENEA. Rome Capital has trained approximately 30 employees to operate the

Capacity Building Initiatives – combination of textual and visual elements
Sustainable Energy Offices. The first training course, initiated and completed in 2019, enabled the formation of Domestic Energy Tutors (TED). TED employees can illustrate to citizens both practical and social actions to undertake for reducing energy waste and consequently lowering consumption and utility costs. The offices, planned for each of the 15 municipalities in Rome, serve as intermediaries between citizens and public institutions, facilitating communication and ensuring that community needs are heard in local energy policies. The training course for stakeholders foreseen by SECAP includes: • Individual self-consumption and collective self-consumption. • Energy community. • Low enthalpy geothermal energy. • Possible energy income mechanisms. • Incentives for sustainable mobility. • Measures and actions to combat energy poverty. • Successful experiences and replicable best practices. • The energy label for household appliances.

5.6. Institutional Integration

Institutional Integration
The Capitoline Offices for Sustainable Energy will have two access methods: • Virtual office, in a dedicated area on the Roma Capitale portal, with FAQs available for citizens and businesses and a contact form designed to make an appointment or ask specific questions to a "Tutor for Domestic and Business Energy" (TEDA) and receive answers via email, chat or in person. • Physical offices located in some of the municipal offices that have already made themselves available (in the case alongside the Roma Facile Offices). Communication to citizens will be carried out, in close collaboration with the Department of Participation, Communication and Equal Opportunities, with dedicated events and campaigns and through the portal, social media and radio of Roma Capitale.

5.6.1. Integration of Results into Existing Policies and Practices

Integration of Results into Existing Policies and Practices
The recent deliberations by the Giunta of Rome regarding photovoltaic installations on rooftops highlight significant advancements in the city's approach to renewable energy and community engagement. Here are the key points:

Integration of Results into Existing Policies and Practices

Approval of New Regulations

The Giunta has approved a regulation aimed at facilitating the installation of solar photovoltaic systems on municipal buildings, promoting the establishment of Comunità Energetiche Rinnovabili (CER), or renewable energy communities. This initiative is designed to support social and environmental objectives, particularly benefiting vulnerable households facing energy poverty

Procedures for Implementation

Two main procedures are outlined in the regulation:

- Municipal Projects: This allows for solar installations on properties owned by the city, enabling energy sharing and financial incentives for community members.
- Third Sector Initiatives: Non-profit organizations can propose projects to install solar panels on municipal buildings, furthering social goals while enhancing renewable energy production

Simplification of Installation Processes

Notably, about 95% of the territory in Rome allows for the installation of photovoltaic systems without requiring specific authorizations. This simplification is crucial for encouraging widespread adoption of solar technology, as it categorizes these installations as ordinary maintenance activities2

Future Goals

The city aims to significantly increase its solar capacity from approximately 1.9 MW currently installed to around 8 MW by 2026 through these initiatives. This expansion will involve various public buildings, including schools and community centres, thereby addressing both energy needs and social welfare.

5.6.2. Collaboration with Public Agencies and Institutions

Collaboration with Public Agencies and Institutions

Rome Capital has equipped itself with a Climate Adaptation Strategy. The document, developed with contributions from the CMCC Foundation, ENEA, ISPRA, CNR, ISTAT, the University of Rome "La Sapienza," and Roma Tre, focuses on adopting planning tools to protect the territory from the impacts expected by 2050, with interventions to be implemented by 2030.

Regarding the proposed Strategy, the Capitoline Council has announced the launch of a public consultation through a series of information and awareness-raising events, such as conferences, thematic workshops, and round tables. These events will involve institutions, stakeholders, and citizens in discussions on issues related to climate change.

The thematic sessions for the public consultation on the Strategy will also address climate mitigation actions as part of the implementation of the PAESC (Sustainable Energy and Climate Action Plan), which was approved on November 14, 2023, by the Capitoline Assembly. The PAESC aims to contribute to the Paris Agreement's goal of

Collaboration with Public Agencies and Institutions

limiting the global temperature rise to below 1.5°C this century, while also supporting decarbonization and urban regeneration projects worth over 10 billion euros, partly funded through PNRR funds.

The new PAESC was drafted by the Climate Office of Rome Capital, with scientific support from GSE, ISPRA, and ENEA. In its role as the national coordinator of the Covenant of Mayors, ENEA is committed to promoting and facilitating the adoption of PAESCs at the local level, in collaboration with the Regions. To this end, ENEA provides technical tools, such as the platform developed within the ES-PA project, which has been used in collaboration with the Sicilian Region for monitoring PAESCs developed by Sicilian municipal administrations.

Roma Capitale is implementing several initiatives through SIMU (Servizio Infrastrutture e Mobilità Urbana) to promote the installation of photovoltaic systems and address energy poverty.

5.7. Monitoring and Evaluation

Monitoring and Evaluation

One of the objectives that Rome Capital has set for itself in implementing the goals of the Sun4All project is to promote Renewable Energy Communities (CER) as part of its strategy for environmental sustainability and the fight against energy poverty. The CER regulation approved by the Rome Capital council outlines two main procedures:

- Municipality-owned systems: This allows the installation of photovoltaic solar systems on public buildings, enabling the sharing of the energy produced and benefiting from the incentives provided by the ministerial decree.
- Projects proposed by Third Sector Entities (ETS): This allows these entities to build solar systems on municipal buildings, promoting projects with social and environmental objectives.

The goal is to create 15 RECs, one for each municipality, financing the initiative with €700,000. This initiative represents an innovative path where public property, specifically the roofs of buildings, combined with the support of Third Sector Entities, promotes a public REC model with social and solidarity purposes.

5.7.1. Performance Monitoring and Tracking

Performance Monitoring and Tracking

Roma Capitale will monitor the objectives through its offices responsible for the implementation of Sun4All: Department of Social Policies and Health and the Climate office of Roma Capitale. For the purely technical part, the Department of Infrastructure and Public Works will also be involved, which has jurisdiction over photovoltaic systems.

Performance Monitoring and Tracking
These two structures that supported the project on the two pillars of their respective competence: socio-economic vulnerability, the DPSS, and for the technological part, the Climate office and the Department of Infrastructure and Public Works.

5.7.2. Feedback Mechanisms and Continuous Improvement

Feedback Mechanisms and Continuous Improvement
The model implemented with the contribution of the offices of Rome Capital and the partnership with the third sector during the project in the Rome pilot remains valid. The support received also from the grassroot associations has proven to be very useful. They are fundamental collectors and repositories of information, direct knowledge that limits the barriers between beneficiaries and institutions. The third sector, citizen associations, and local communities can significantly contribute to the continuous Improvement of the Sun4All adoption methods and approaches in several ways: **Feedback Mechanisms** • Community Engagement: By actively involving local citizens and associations in the implementation of Sun4All, feedback can be gathered on the effectiveness of the solar initiatives. This feedback is crucial for identifying areas of improvement and understanding the specific needs of vulnerable households. • Surveys and Workshops: Conducting surveys and organizing workshops can help gather insights on user experiences, preferences, and challenges faced by participants in the community solar programs. **Data Collection and Analysis** • Monitoring Impact: Local communities can assist in monitoring the impact of solar initiatives on energy bills and overall quality of life. Collecting data on energy savings and satisfaction levels will provide valuable information for continuous improvement. • Sharing Best Practices: Associations can facilitate the sharing of best practices among different communities involved in Sun4All, enabling them to learn from one another's experiences and successes. **Iterative Enhancements** • Adaptive Strategies: The involvement of citizen associations allows for adaptive strategies that respond to changing community needs. As new challenges arise, these groups can propose modifications to the Sun4All approach based on real-world experiences. • Pilot Programs: Testing new methods or enhancements in small pilot programs within local communities can provide insights before wider implementation. **Capacity Building**

Feedback Mechanisms and Continuous Improvement

- Training Programs: Community organizations can develop training programs that educate participants about energy management, renewable energy benefits, and how to maximize their involvement in the Sun4All project.
- Empowerment Initiatives: By empowering citizens through knowledge and resources, local associations can help them become active participants in their energy communities, fostering a sense of ownership and responsibility.

Advocacy and Policy Influence

- Local Advocacy: Citizen associations can advocate for policies that support renewable energy initiatives at the local level, ensuring that community voices are heard in decision-making processes.
- Building Alliances: Collaborating with other organizations can strengthen advocacy efforts, leading to more substantial support for sustainable energy practices.

5.8. Conclusion

Conclusions

The present Sustainable Adoption Plan describes the replication strategy in the territory of Rome Capital of the activities of Sun4all based on the experience gained in the last three years of the project. The adopted model that involved the offices of Rome Capital, voluntary associations and the third sector has proven to be very effective.

A possible replication is towards the entire territory of Rome Metropolitan City, the largest local authority that includes that of Rome capital with 121 municipal administrations and 4,300,000 inhabitants. This plan is part of the path of a more sustainable and inclusive city envisaged in the climate plan of Rome Capital of September 2024 and of the SECAP.

With the scientific support of the interdepartmental research centre CITERA Sapienza University of Rome, it was possible to integrate the analyses and data relating to energy poverty with the availability of photovoltaic systems managed by Roma Capitale and present on the roofs of school buildings.

Integrating REC into urban gardens brings numerous benefits, extending beyond energy production. The creation of decentralized energy communities reduces the need for energy from the national grid and makes local communities more resilient to potential energy crises.

Shared management of energy and food resources encourages active citizen participation, fostering a sense of belonging and responsibility. Additionally, these projects often involve low-income families, offering them more affordable access to energy.

Urban gardens become not only green spaces but also innovative centres for energy production, contributing to the revitalization of often marginalized areas of the city.

The lesson learned from this journey was that the approach of a continuous workflow from the Bottom Up of citizens and communities on the territory to the Top down of public administrations is a winning strategy to implement the themes of projects such as Sun4All.

5.8.1. Summary of Key Findings

Summary of Key Findings – combination of textual and visual elements

The Sun4All Project has allowed for the experimentation of an innovative pathway in the territory of Rome Capital that has never been implemented before. This has enabled the evaluation of opportunities and barriers.

Opportunities

- To test a model to combat energy poverty in direct contact with stakeholders and beneficiaries in vulnerable conditions.
- To activate engagement procedures specifically designed for a vast territory like that of the Rome pilot, reaching 12 small communities/groups across the 15 municipalities of Rome Capital.
- To collect data and information from beneficiaries, which has allowed for a clearer understanding of their actual needs.
- To establish a trusting relationship with project partners, municipal offices, grassroots associations, the third sector, and universities.
- To implement more effective actions to combat energy poverty as outlined in Rome Capital's SECAP.
- To produce resolutions and regulations that have initiated the creation of solidarity Renewable Energy Communities (RECs) using the roofs of public municipal buildings.
- To provide know-how to all participants in public administration on how to reach energy-poor individuals using the Sun4All model.

Barriers

- Implementing a highly articulated and complex sector regulation.
- Regulations on RECs becoming operational only from April 2024 while the project is nearing completion.
- Lack of trust from beneficiaries.
- Difficulty in maintaining high participation in the project from beneficiaries.

5.8.2. Outlook and Recommendations

Outlook and Recommendations

Based on the findings and outcomes related to the development of Renewable Energy Communities (CER) in Rome, several future directions, potential implications, and

Outlook and Recommendations

actionable suggestions can be outlined to create a Sustainable Adoption Plan for the Pilot City.

Expansion of Renewable Energy Communities (CER)

Continue to establish additional CERs across all 15 municipalities in Rome, ensuring that each community has access to renewable energy sources.

Leverage public buildings and schools as central hubs for solar energy production to maximize community engagement and energy sharing.

Integration with Social Programs

Develop programs that link CER initiatives with social services aimed at supporting vulnerable populations, particularly those experiencing energy poverty.

Implement educational campaigns to raise awareness about the benefits of CERs and how they can alleviate energy costs for low-income families.

Collaboration with Third Sector Entities

Foster partnerships with Third Sector Entities (ETS) to co-design projects that address both environmental and social objectives, ensuring that community needs are prioritized.

Encourage ETS to lead initiatives that promote local job creation and skills development in renewable energy sectors.

Potential Implications for a sustainable action plan for Roma Capitale are:

Economic Benefits

By reducing energy bills through shared renewable energy production, households can allocate more resources toward other essential needs, improving overall economic stability.

The establishment of CERs can stimulate local economies by creating jobs related to installation, maintenance, and management of renewable energy systems.

Social Cohesion

Engaging communities in the development and management of CERs can strengthen social ties and foster a sense of ownership among residents.

Projects that focus on social objectives can enhance community resilience by addressing not only energy needs but also broader social issues.

Environmental Impact

Increasing the capacity for solar energy production will contribute to reduced greenhouse gas emissions, aligning with broader climate goals.

Enhancing green spaces through urban gardening initiatives alongside CERs can further improve urban biodiversity and air quality.

The plan must be capable of pursuing the following actions

Develop a Comprehensive Communication Strategy

Outlook and Recommendations

Create targeted outreach programs to inform residents about the benefits of participating in CERs, including workshops and informational sessions facilitated by local leaders and ETS.

Utilize social media platforms and community events to disseminate success stories from existing CERs to inspire participation.

Implement Financial Incentives

Explore additional funding opportunities from national and EU sources to support the establishment of new CERs and enhance existing ones.

Consider offering financial incentives or subsidies for low-income households that join CERs or invest in energy-efficient home improvements.

Monitor and Evaluate Progress

Establish metrics for evaluating the success of CER initiatives in reducing energy poverty and improving community well-being.

Regularly assess the impact of these initiatives on local economies, social cohesion, and environmental sustainability to inform future policy adjustments.

Strengthen Regulatory Frameworks

Advocate for streamlined regulatory processes that facilitate the rapid establishment of new CERs while ensuring compliance with environmental standards.

Work with local government bodies to ensure that policies are adaptable to changing community needs and technological advancements.

5.9. References

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