



## **D3.1 Report on Selected Business Models for the Development of Community Energy Projects**

Green energy cooperative

## Contents

1. Introduction.....	2
2. Business model overview.....	4
3. Business models in pilot locations .....	6
4. Bistrita, Romania.....	7
5. ZEZ Sun energy cooperative (Zagreb, Croatia).....	15
6. Minoan Energy Community (Crete, Greece).....	22
7. Conclusions.....	28
8. Bibliography.....	30



## 1. Introduction

The main purpose of this document is to describe the process of value creation in energy communities in LIFE LOOP pilot locations. We elaborate on the interaction between renewable technologies, energy flow, stakeholders and communities in the pilot locations. This document will serve as a basis for emerging energy communities and the replication of community energy projects in pilot countries and abroad. When comparing energy communities with commercial energy companies the value proposition of energy communities varies and it is focused on local values, culture, identity, and economy. We proposed a slightly modified approach to describe the value capture process in this document. Business model development is usually related to the business model canvas (BMC), which describes key components of a standard business model. For energy communities, which are in principle focused on local impact and sustainability, the BMC approach usually does not capture the whole range of value creation; especially the social impact mainly provided by energy communities. We therefore decided to use methodology for describing communities based on PhD thesis of Ms. Proka from REScoop.eu [Proka, A].

The value created in energy community projects is derived from the interaction of members, funds, energy, technology, knowledge, education, and information. The presumption in this deliverable is that with empowered members of the community, there is potential for the creation of social and energy innovation to reshape the energy markets as a basis for systemic change in decision-making and investing in renewable energy, energy efficiency, and behavioral changes in energy usage. To provide an overview of community energy development, the business models will offer insights into technical, economic, and social components. The document builds on the value proposition to the actors in the energy market and users of services or products offered by the energy communities:

- Value can be provided directly to the members of the community (natural persons, SMEs);
- Value can be provided directly to the partners (technical partners, developers, local authorities);
- Value can be provided indirectly to the broader community (how the local operation of the energy community strengthens the local economy).

This document will build on the information gathered in D2.2 Pilot Analysis and Status Assessment, which gave an overview of the pilot's legal, organizational, and local contexts in Greece, Croatia, and Romania. All pilot locations aim to develop and deliver solar energy community projects, but different in size and scale. Each pilot location has specific targets for impact creation relevant to business model that are being developed at the project level, summarised in Table 1.



	Bistrita, Romania	Zagreb, Croatia	Crete, Greece
<b>Renewable energy installed (MW)</b>	4,6 MW	2 MW	1 MW
<b>Citizens involved</b>	700	10.000	10.000
<b>New citizen-led initiatives established</b>	5		

Table 1. Expected impacts relevant to the business models in pilot sites by the end of 2025

Working on this deliverable was an exercise for pilot locations to identify what are the business model aspects and related details in the value creation process. It connects to the context of the pilot implementation (WP3), and as a final output, it will be a valuable input into the other WPs, especially in the further development of capacity-building activities in WP2 and replication in WP6.

## 2. Business model overview

This chapter provides an overview of the most common business models used by energy communities in the EU (Kubli & Puranik, 2023). Energy communities are gaining traction as a way to promote renewable energy production, reduce carbon emissions, and support local communities. The most common business models used by energy communities in the EU include collective self-consumption for its members, energy supply, and community-based investment in renewable energy projects. Successful models of energy communities tend to be unique and adapted to local needs, with the common aims of promoting local self-consumption, reduction in energy consumption, individual or collective savings on energy costs, and empowerment of community members to actively participate and benefit from the generation of renewable energy. The specifics of energy communities are attributed to their governance structure and focus on local energy production and consumption. Energy communities provide services that are consumed within the community, ensuring that the majority of the economic and social benefits remain locally where it has been calculated that community 2–8 time of total economic benefits for the community rather than private projects of same size according to research on “Social Impact of Energy Communities in Greece” (Kitsikopoulos & Vrettos, 2023). Energy communities are often structured as non-profits or social enterprises, which means that any profit beyond a certain threshold is reinvested back into the community or used to support the development of new community energy projects. This ensures that the benefits of the energy community are shared among community members and broader local community, rather than being solely focused on financial gains for members. Overall, energy community business models present an innovative way to promote renewable energy and sustainable development at the local level. By creating a sense of ownership and community involvement, energy communities can help mobilize support for renewable energy and contribute to the just energy transition.

### 2.1 Energy community for collective investments in renewable energy generation

Most energy communities are established with the goal of gaining ownership over local renewable energy generation (production). In this model, community members organize themselves in a legal form (cooperative, limited liability company, trust, or other form) to invest in renewable energy capacity with revenue generated from energy sold on the energy market or directly to the end consumer via a Power Purchase Agreement (PPA). Besides monetary returns from shares, memberships, taxes, or fees, the main value proposed is the production of renewable energy communities that contribute directly to the energy transition and decarbonization. The value for community members lies in investing in local, green energy that replaces carbon-intensive energy production. The most common technologies for energy communities to invest in are wind, biomass, and solar PV. *Real-life case:* [Drumlin Wind Energy Co-op](#) (DK)



## 2.2 Energy community for collective self-consumption

This model is very similar to the collective investment described above, but the energy produced from the renewable energy plant is distributed to the members of the energy community for their consumption. This type of energy community usually initiates projects ranging from small PV on multi-apartment buildings or schools to larger power plants. The energy community is focused on maximizing self-consumption and minimizing grid consumption to reduce energy bills. One of the main incentives for the implementation of collective investments is to secure long-term stable energy prices, resilient from market crisis and retail prices. In addition, there is also a reduction of costs in project development and procedures to obtain the necessary permits, providing improved grid stability, utilization of optimal locations for renewable production and enhanced community cohesion and values around sustainability (i.e. providing advice on energy savings and other energy measures for individual members). The surplus energy is sold to the electricity grid according to the contract between the community and the supplier. This model is popular with members that already have established relationships or group identity, and often takes place in villages, small towns, neighborhoods, suburbs, or multiapartment buildings. *Real-life case:* [GD Feirense collective self-consumption](#) (PT)

## 2.3 Energy community as RES supplier

Energy communities that take on the role of the energy supplier enter the next level of professionalization and penetration of the energy sector. These energy communities compete against bigger energy players that have long organizational histories and robust organizational and financial resources. The community suppliers are unique by requiring their customers to become members or shareholders, taking on the risks and benefits of acting as collective independent player in the energy sector. These types of ECs strongly advocate for energy savings and self-consumption, both for their members and customers. They strive for the wider community to become self-sufficient and often have a portfolio of individual green energy producers or prosumers that can strengthen the energy portfolio of the energy community. Some of the main values for members that supply energy communities are reductions in energy prices and energy price fluctuation, as well as experimentation with other business models and services available in the energy market. *Real-life case:* [Enercoop](#) (FRA)

## 2.4 Energy Community as service provider

Energy Communities are recognized and play an active role in the energy market, and as such, they provide energy services to individuals, public institutions, or private companies. Community members pay for the services with special tariffs to compensate for being a community member and having solidarity with other community members, sharing both the gains and costs of business operations. For example, they can act as a consultant and/or project developer for RES and energy efficiency projects, offering their experience and expertise to other market players to help increase local acceptance of energy projects that are being



This project has received funding from the European Union's LIFE programme under grant agreement No. 101077085

developed on a local level. Energy communities can engage in the energy market role of offering PPA or ESCO (Energy Service Company) contracts to building owners or large consumers to reduce, manage, or buy energy for their buildings. Advanced energy communities engage in providing access to ITC technologies for their members, and they provide management of aggregation, access and facilitation of peer-to-peer trading, facilitate the connection with outside partners, manage storage systems, provide balance power to the grid and access to spot market trading or provide e-mobility services. *Real-life case: [Som Mobilitat](#) (SPA)*

### 3. Business models in pilot locations

This chapter describes business models in LIFE LOOP pilot locations, used by pilot project partners. The model will address the value proposition, products or services provided to the members and the process of value capture. The business model descriptions emphasize value creation and delivery process, providing detailed descriptions of resources, activities, partners, and technology. The business model is described from the perspective of members' needs, leading to the value captured – describing activities and elements that produce revenue. In the next chapter, a visualization of models is presented by summarizing individual processes of each pilot location.

The presentation of the business models in pilot locations is structured as follows:

1. **Energy community overview**, which describes in general the organizational structure, mission and motivation of community members.
2. **The value proposition**, clarifies the benefits which the organization offers to its members, customers, investors and other stakeholders. For energy communities this does not only include financial benefits, but also broader societal benefits.
3. **Value architecture**, which relates to the internal organizational structure and processes, as well as the partnerships and related processes that enable value creation and value delivery.
4. **Value capture**, which relates to the cost and revenue flows that determine the monetary and non-monetary values associated with the services or products, and define its viability.

In the LIFE LOOP project, there are three community energy pilots for which we provide business model analysis: Cooperativa de Energie supporting local energy community in the city Bistrita (Romania), ZEZ Sun energy cooperative in Zagreb (Croatia) and Minoan Energy Community Crete (Greece). In this document, a comparison of the models is provided to capture differences in approaches in the value creation process and factors which affect the utilization of a particular business model.

## 4. Bistrita, Romania

### 4.1 Energy community overview

The energy transition in Bistrita is a pillar for equitable, rational, and sustainable economic and social development for all stakeholders on city level and mainly it is creating the opportunity for citizens to participate in renewable projects. In Bistrita, Romania there is no active energy community yet, but the first one could be started in partnership with Cooperativa de Energie (CdE) and the municipality, to carry out the activities foreseen in the Life LOOP project. CdE is the first supply energy cooperative in Romania that provides 100% green energy with certificates of origin. Currently the cooperative has approximately 850 members and is governed democratically. To start the first energy community projects, the city has assigned a highly qualified project team to carry out the work in the LIFE LOOP project. The team members bring expertise in renewable energy, funding, community involvement, stakeholder engagement, partnerships, and community management. The business models will present the benefits of a partnership between the local energy community and municipality. The models are described in three business model development scenarios.

#### 1<sup>st</sup> Business model scenario – Solarization of 100 houses in Bistrita

The potential energy community could start with a simpler activity at the city level by promoting and enabling solar installations on 100 houses with the support of the municipality. The first step of the energy community could be to organize a workshop with local residents to develop a collective purchase scheme and explain the benefits of becoming a prosumer and/or part of the supply community. The strategy involves creating engagement and collaboration opportunities with various stakeholders, including homeowners (future members) and solar installers to explore funding options. The city will provide funds for the organization of awareness-raising workshops and the energy community will mobilize the citizens and negotiate the fair prices for solar installations for its members. Once the energy laws enable energy sharing, the 100 solar prosumers could share energy between the members. At the moment the national public funds are making solar investments even more attractive for household owners. For example, the Environmental Agency currently offers 90% funding for the installation of photovoltaic systems of 3kW and 6kW, with homeowners financing the difference in the self-consumption model.





**2<sup>nd</sup> Business model scenario– Community investments in 50 residential blocks:**

The midpoint of the energy community’s development could involve a more complex investment mix, combining citizens and public funds while renovating 50 residential blocks. So far, only one solar installation was made in Romania on a multiapartment building. The energy community aims to promote a sense of ownership and empowerment through the active involvement of citizens in co-creation and decision-making processes. This includes developing information campaigns on the city and building level to demonstrate the benefits of becoming an energy community member. In Bistrita, calculations have been made for the number of building blocks that will be retrofitted in the short term with the potential of reaching 700 residents. For this tender, the city will explore how to use funding from the National Recovery and Resilience Plan. The idea is to transform an existing homeowners’ associations into an energy community that carries part of the project’s development and investment (see figure 1). Furthermore, the collaboration between homeowners’ associations will be explored to take on larger projects that could benefit the tenant owners in all residential blocks. Additionally, the energy community will work on establishing partnerships with private entities and energy experts.

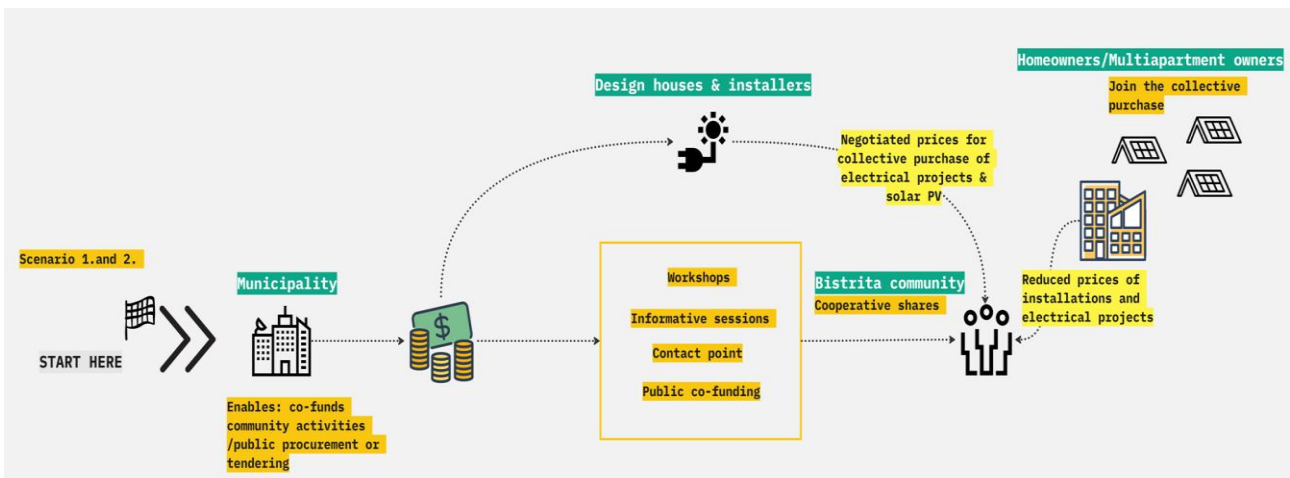


Figure 1. Bistrita: Business model scenarios 1. and 2. (energy community that supports development of self-consumption and collective self-consumption)

**3<sup>rd</sup> Business model scenario – Community investments in large-scale renewable energy projects:**

In the third scenario, the plan is to mobilize citizens to participate in large-scale energy community projects. To achieve that, the energy community could facilitate citizen participation in solar energy investments on public roofs and land. The municipality already has two future projects in mind, in which its citizens will be involved: investments in solar on public buildings (15 buildings) and on public land (3 MW). The energy produced will be consumed by members, and the surplus energy will be sold at a reasonable price, encouraging new businesses to develop in the area and benefit from the community’s overall development. The restriction in blended finance is that national public funds prohibit selling energy and making profits, so the surplus, in the case of public buildings, could be shared with its members and the energy produced by the 3MW solar installation could be fully shared with the city and community members. Not all government funds have this limitation, but it is important to assess which funding type could fit for each investment. This legal barrier preventing energy sharing means it may be difficult to establish a fully profitable project under this scenario.

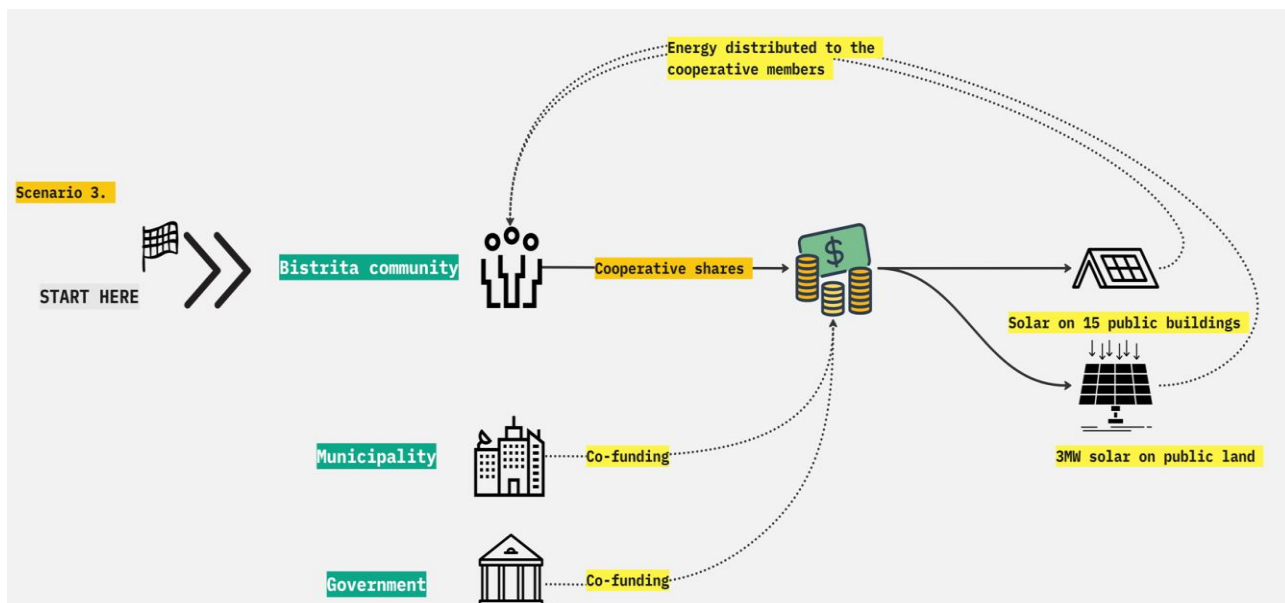


Figure 2. Bistrita: Business model scenario 3.

To deliver all three scenarios, the municipality has set up communication channels to present these opportunities to the public via: the city website, local newspaper, webinar meetings, and workshops. The city is also active on Facebook with over 4200 followers and it has recently created an Instagram account with 90 followers as of the end of July 2023. The energy community intends to promote these projects on its website and social media, participate and organize webinars and workshops, and share its experience as a community with citizens.



## 4.2 Value proposition

The new energy community will create its business model based on its needs and relationship between its members. The energy community will build upon partnerships with the Bistrita municipality and other external stakeholders. There are shared characteristics in three business model scenarios that benefit community members to receive value:

- Within the community, members have voting rights and are included in decision-making processes regarding the organizational development and investment (one member one vote);
- Members receive an annual return based on their shares;
- As solar ambassadors, members actively seek new roofs and locations, providing support to the community enables them to acquire new knowledge and opportunities;
- Members benefit from specialized assistance and consultancy regarding energy-saving practices and implementation of renewable energy on household level;
- Rebuilding trust between public and municipality partnering up in energy community projects;
- Trust and a sense of local identity is encouraged, creating a solid foundation for the community.

### 1<sup>st</sup> Business model scenario – Solarization of 100 houses in Bistrita

In scenario 1, the self-consumption model would enable bulk purchase and installation of solar on 100 homes. These houses will generate energy for their own consumption and sell the excess back to the grid. The energy community offers citizens solar prosumer options while providing high quality information and expertise. It facilitates collective equipment purchases at negotiated prices, benefiting from economies of scale. Surplus energy can be sold, creating income and new opportunities for the community. Additional services will be considered in future to create added value such as a collective purchase of solar installations for businesses and collective self-consumption schemes on other buildings once the legislative framework is in place in Romania.

### 2<sup>nd</sup> Business model scenario– Community investment in 50 residential blocks:

The business model is similar to the first scenario; the main difference lies in the ownership structure (multiapartment buildings). Surplus energy can be directed towards low-income households within the residential building– in recent times, due to rising electricity prices, many citizens face difficulties in paying for energy. The energy community could help them to financially cope with this challenge.

### 3<sup>rd</sup> Business model scenario – Community investments in large-scale renewable energy projects:

The energy community could provide investment opportunities on 15 public roofs and for a 3MW solar powerplant on public land to help the municipality achieve energy and climate objectives. Members could benefit from returns generated by the energy projects and be informed about opportunities on the local level. The energy community provides its members with the option to offset their energy consumption through net metering using solar energy and to invest renewable energy on commercial scale.

## 4.3 Value architecture

Bistrita has the capacity and mandate to plan and implement large-scale energy projects on public land and roofs. The municipality recognizes the need for community involvement and active support to achieve its objectives. Thus, Bistrita took a proactive step and initiates discussions with an informal group of citizens, assessing their interest and potential to establish local energy community. For the realization of green energy investments and the creation of a new energy community, the following stakeholders have been identified:

#### *Building owners*

Building owners can partner with energy communities to lease or sell spaces on rooftops or land for the installation of solar panels or wind turbines. These partnerships can generate additional income for building owners and contribute to the development of renewable energy infrastructure. Building owners can also become members of the energy community, investing in the project and share the energy from solar panels or other renewable sources. Through this process, they can benefit from income generated by selling surplus energy and gain access to cheap and clean energy.

#### *Energy suppliers*

Energy suppliers play a significant role in these projects as they are the main actors in buying and selling energy produced by the presented solutions. Large energy producers in Romania may be less interested in purchasing energy in small quantities, but CdE might be interested in green energy and rounding up new members from Bistrita.

#### *Municipality*

The municipality plays crucial role in establishing local energy community with has several options on their disposal to provide support:

- Creating favorable policies and regulations: The municipality can develop and implement policies and regulations that promote the use of renewable energy, facilitate the installation and development of community projects with a potential to buy back the green electricity, providing financial stability to the energy community and the municipality;



- Active role in promoting energy communities: The municipality engages in informing citizens, participating alongside other actors in organizing events, and providing resources such as marketing materials and event invitations;
- Providing expert assistance on technical and legal solutions for energy communities;
- Providing access to its assets, such as land and buildings (rooftops); in return, it can receive rent or electricity. The municipality can also provide access to meeting rooms, event spaces, Wi-Fi, etc. to enable the energy community to develop and organize engagement events
- Participation with funds in project development, investing directly in the project and getting a financial and / or social return on their investment.

### *Energy community*

As an organization based on cooperative principles, its purpose is to improve access to renewable energy and bring benefits to the local community. The energy community will invest in the development, installation, and energy projects, such as solar installations or other projects implemented through public-private partnership. The community encourages its members to become prosumers by installing solar panels or other renewable sources on their rooftops or buildings. Through the community, members can access funding to install their own system or invest in portfolio of projects. Through community, members can benefit from negotiated lower prices for equipment and installation.

### *Homeowners' Associations*

Homeowners' associations can play an important role in promotion and implementation of green energy projects at the local level. They can collect and manage the common interests of residents in a specific area regarding green energy. They can organize informative and awareness-raising sessions for members to educate them about the benefits and available options for renewable energy and enable their members to take an active role in the energy community. Like the municipality, they often own common spaces such as rooftops and can provide these roofs for the installation of solar panels, potentially buying back the electricity at a discounted rate for their members.

### *Financial institutions/government*

Financial institutions have an important role in ensuring co-funding for the renewable energy projects. The process of obtaining loans can be slow, as the field is relatively new. In some cases, banks may require the conclusion of a Power Purchase Agreement (PPA), which can be challenging to achieve. The municipality has an important role to play here in potentially buying back power and / or in acting as a guarantor for bank loans. In the case of the government, there is uncertainty about the launch of funding programs.



### *Renewable energy technicians*

Designers, equipment suppliers, and installers are necessary for the implementation of RES projects. The energy community and the municipality could help selecting the best specialists, and tenders to ensure the best value for money with optimal long-term operation and maintenance conditions.

### *Key resources*

Cooperativa de Energie and the municipality will focus on realizing the renewable energy projects and creating a new energy community around the projects. They will use experts from both entities to carry out feasibility studies, provide technical expertise, and carry out the communication activities.

## **4.4 Value capture**

Bistrita plans to achieve a significant milestone by securing income through a Power Purchase Agreement (PPA), possibly through the successful collaboration with its local partner.

Crucial financial support for the project has been provided by Life LOOP partners to develop community energy funding pathways combining citizen participation in investments with with public funding available on city level, considering also a funding mix with other financial institutions and governmental programs.

The city wants to support the foundation of a new energy community (energy cooperative), to do so it will explore other funding options for the community, such as loans provided by its members or funding through issuing new shares in the energy community. In this regard, the future energy community can rely on the example and assistance of the CdE participating in this project. Foreseen running costs are related to administration, legal support, project documentation development, consultant fees, and taxes. These expenses are essential for the smooth operation and management of the project and to foster community engagement and skill development. Bistrita can take a proactive measure to establish a volunteering program. This initiative can attract volunteers who contribute their time and expertise to the project. Additionally, the city will implement a mentoring program aimed at nurturing young energy experts, ensuring knowledge is transferred and skills in renewable energy are enhanced on an individual level.

In future, the energy community could generate income through energy exports, self-consumption, flexibility services, and membership fees. This diversified approach ensures a steady income flow for the project's ongoing development. Beyond financial gains, the energy community project could unlock various non-monetary advantages for the Bistrita municipality and its citizens. With profits being generated, the energy community could potentially reinvest them into the development of new projects, ensuring the continuous growth and expansion of local renewable energy. Moreover, dividends could be distributed to community members, encouraging their active participation and support. All business model scenarios take



into account public funding to make projects more attractive to future community members blending EU, national, municipal and community funds.

Cooperativa de Energie has identified the following risks in business model scenarios of founding new energy community in the city of Bistrita and starting public-private RES projects:

1. *Location and funding:* The identification of suitable locations for the community energy project poses inherent risks, as does the need to secure adequate funding for project development. However, several key sites, including a 3MW installation on a local industrial estate have already been identified and are planned as part of the LIFE LOOP project, with the backing of the Bistrita municipality.
2. *Energy production and technical challenges:* Potential risks arise from factors such as poor maintenance, adverse weather conditions, or technical issues with equipment, which can impact energy production and efficiency. Ongoing vigilance and maintenance are crucial to overcoming these challenges.
3. *Contract termination and member loss:* The risk of contract termination or members leaving the energy community can disrupt project continuity. Ensuring transparency, strong partnerships, and cohesive management can help address these risks.
4. *Market and energy price fluctuations:* Risks related to market changes, equipment availability, and energy price fluctuations can impact the project's financial viability. Diversification and adaptability in revenue streams and / or the establishment of a strong Power Purchase Agreement for the project's 20-25-year life time can mitigate these uncertainties.
5. *Regulatory framework:* The project faces risks associated with potential changes in the regulatory framework governing self-supply installations, which may influence the project's returns and feasibility. Staying up to date with regulations and advocating for supportive policies is crucial to navigating these challenges.

Despite these risks, Bistrita remains steadfast in its determination to overcome challenges and unlock the full potential of renewable energy and a range of opportunities have already been identified and committed to. Through unwavering dedication and strategic management Bistrita aims to empower the local community and contribute to a greener and more sustainable future.



## 5. ZEZ Sun energy cooperative (Zagreb, Croatia)

### 5.1 Energy community overview

The ZEZ Sun energy cooperative is a newly established community energy platform with the goal to enable open participation of citizens in owning and developing community energy projects. ZEZ Sun is a cooperative established with the support from ZEZ, which secures administrative and technical support for the early-stage development. ZEZ Sun prioritizes renewable energy as a public good or commodity, accessible to all on local and national level. To reach this goal the cooperative will test two business models based on the production on renewable energy from solar PV: 1) selling the energy on the wholesale market (shown on figure 3) and 2) energy sharing to ZEZ Sun members (shown on figure 4).

ZEZ Sun cooperative was founded with the support from the LIFE LOOP project in early 2023 to serve as a platform for development and implementation of community solar PV projects, primarily on public roofs. The cooperative was founded by 39 members and plans to increase its membership with each new community energy project. Members of ZEZ Sun are shareholders, not only investors or lenders. ZEZ Sun is established as a European Cooperative Society, which allows for greater flexibility in defining the management structure of the organization compared to the classic cooperative, governed by the Croatian Law on Cooperatives. ECS also enables easier onboarding of potential members from the EU.

ZEZ Sun has set short-term goals by the end of 2023 to establish the cooperative as a fully functioning organization, with administration and accounting, and create internal rules and business plan. The goal by the end of 2023 is to sign contracts for the first pilot projects for solar PV projects with target power capacity of 200 kW, while increasing membership by up to 100 additional members with the aim of securing the required amount of 200,000 EUR and to commission of the first solar projects. By end of 2024, the goal is to increase portfolio of projects with a total capacity of up to 500 kW. By end of 2026, it is planned to expand the portfolio up to 2,000 kW in solar PV projects, primarily in the city of Zagreb and by increasing the membership up to 300 members. With that in mind, **ZEZ Sun wants to create a special fund for community projects to support socially beneficial projects from surplus income from RES projects.**

ZEZ Sun started building the project pipeline by visiting more than 15 Croatian cities in June 2023 to present the idea, explore collaboration opportunities, and to motivate the cities to co-develop citizen-led projects. To check the market readiness for investment potential, the energy cooperative's preliminary questionnaire shows the interest of more than 250 individuals to join the cooperative with 300.000–500.000 EUR of investment potential. This shows there is enough support to easily meet the 2023 goals installing first public-private solar projects of 200 kW, with an optimistic outlook towards reaching 2026 cooperative goals of 2 MW solar installation. Currently, ZEZ Sun shares resources with the ZEZ cooperative in outreach





and project development activities by co-sharing community potential of followers to build its community through over 5,700 newsletter members of the official ZEZ page, 35,000 Solar club members, and ZEZ Facebook of 7,300 followers.

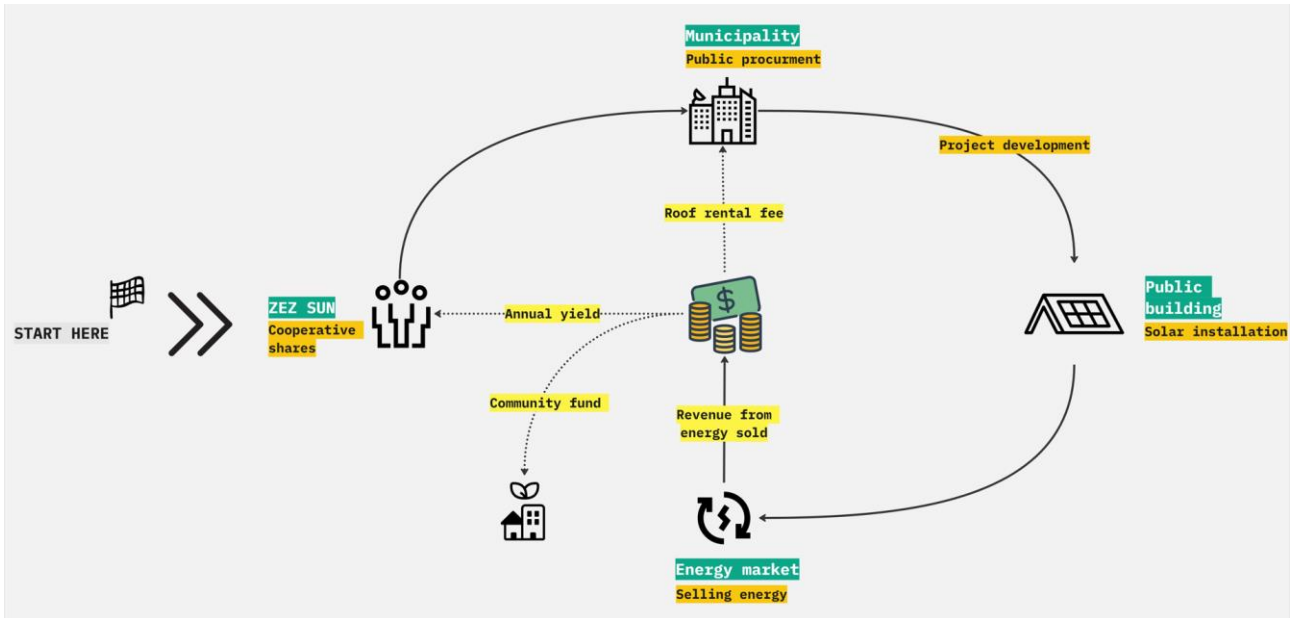


Figure 3. ZEZ Sun energy cooperative – Business model of selling electricity on the electricity market

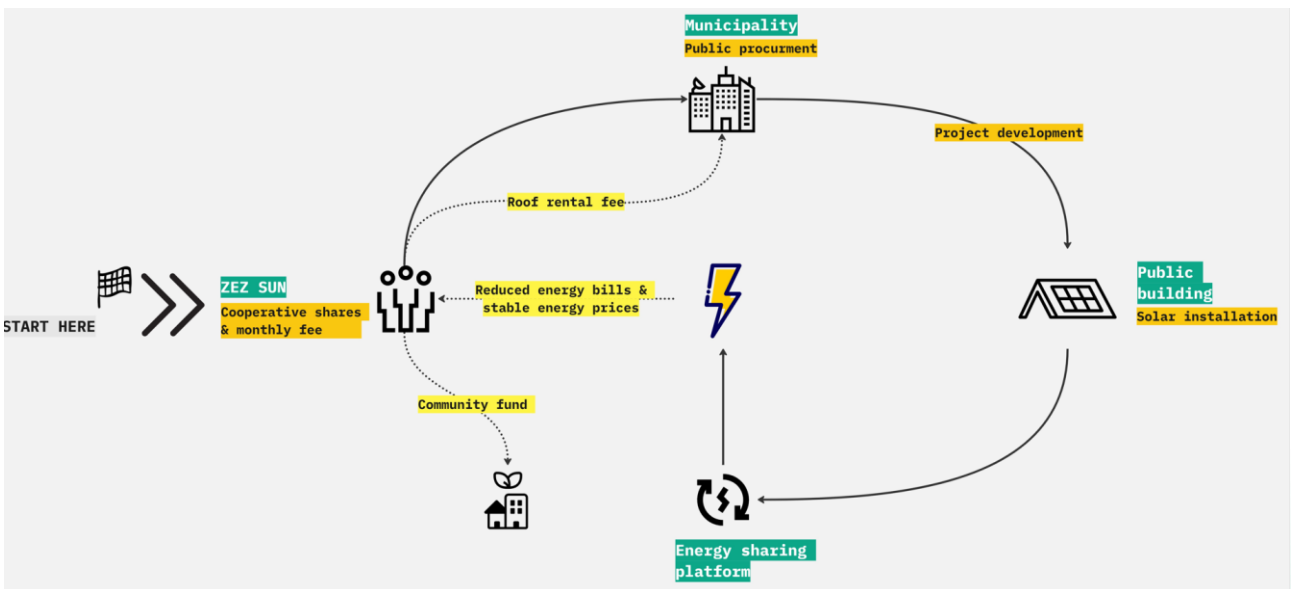


Figure 4. ZEZ Sun energy cooperative – Energy sharing directly to the members (in future when legislation allows)

## 5.2 Value proposition

ZEZ Sun cooperative will build its business model on the production of energy from solar PV projects, primarily rooftop solar PV. The cooperative will especially focus on working with the local municipalities, to provide opportunities for local citizens to engage in energy community. For its members, ZEZ Sun will provide an opportunity to invest funds in solar PV projects, to potentially get a return on their investment and be a part of a democratic cooperative organization. Although the energy cooperative concept has existed in other parts of Europe since the 1980s, in Croatia it is still non-existent but for a couple of small pilot crowd-investing projects implemented by ZEZ. The value for members, derived from generation and owning solar PV projects will fall in two major categories (figure 3 and 4 show visually the business model):

1. **Return on investment.** Initially, ZEZ Sun will focus on developing the first community owned energy projects based on the revenue from selling electricity on the wholesale market. If financially successful, the profit, which is capped at 7%, will be distributed to cooperative members. This is the basic commercial concept which will ensure the generation capacity owned by the cooperative and will lay the foundation to more advanced business models. Optionally, the cooperative could arrange power purchase agreements (PPA) with nearby public institutions, instead of wholesale market, legal framework permitting.
2. **Financial savings and resilience.** The long-term goal is to enable the sharing of energy from the solar PV projects to its members. The precondition for this business model is a legal framework which allows viable energy sharing schemes within energy community. During the energy crisis, customers are vulnerable to price increase, by ensuring energy supply from community owned solar PV for the members of the cooperative, members are securing long-term resilience from market crisis and energy price increases.

The cooperative plans to transition its business model from revenue from wholesale market to energy sharing for its members, when legal preconditions are met. In both cases, the value for members comes from the cooperative investment in solar PV projects, primarily on publicly owned rooftops. This model relies on the political will of city representatives to recognize the value of citizen engagement in community energy project. ZEZ Sun members are individuals who value cooperative principles and believe in local autonomy, decentralization of energy systems, and sustainability. They want to participate in energy transition by investing and using renewable energy, creating communities which are self-sustainable and resilient to crisis. ZEZ Sun members participate in decision making on most important issues and direction of development of the cooperative. To avoid large differences in membership, ZEZ Sun is limiting the number of shares per member to maximum 5% of the total shares. Value proposition for the members:

- Having an opportunity to invest and own in renewable energy projects;
- Receiving a limited distribution of profit on their investment;
- Securing long-term supply of locally produced clean energy with fixed price;



- Having voting rights to vote and make decisions at the cooperative assembly on key issues and future project development.

### Steps and approach

For every community energy project, ZEZ Sun will prepare an extensive public campaign to attract new members to secure funds needed to finance the project. When possible, the cooperative will work with local municipalities to ensure support and wider outreach and to bring value for local municipalities as well. The cooperative plans to develop community energy projects across the whole country and its membership will be open to all citizens living in Croatia. That means that ZEZ Sun members will be co-owners of all the existing and future projects in the portfolio and not owners of a particular project. With this approach, it is important to balance between the interest of the community in close vicinity to the project, existing members and new members outside of local municipality. For each project, ZEZ Sun will ensure preemptive right for the purchase of cooperative shares to local citizens up to 51% of total shares offered. This will give a sense of local ownership for citizens and local authorities, especially important during the public campaign.

It will ensure up to 30% of shares offered to existing members of the cooperative to purchase additional shares. It is important that the cooperative does not forget its existing members and gives them an opportunity to increase their participation. Finally, ZEZ Sun will leave at least 20% of shares offered to new members outside the local municipality. Municipalities and cities play a crucial role by having local resources at their disposal, namely roofs which could be put to use for energy production. In the process of involving energy communities, they speed up their climate and energy targets promised in energy plans, strategies, and action plans. By involving the community, they have the opportunity to strengthen or rebuild the trust of its residents and provide economic opportunities.

Value proposition to local municipalities:

- Support for reaching renewable energy and climate goals.
- Retaining economic and social benefits from the project in the local community.
- Engaging citizens and building cohesion around community energy project.



### 5.3 Value architecture

ZEZ Sun creates relationships with multiple stakeholders in the public and private sector to generate value for the members and local communities.

#### Key partners

##### *Green energy cooperative (ZEZ)*

Even though ZEZ and ZEZ Sun are formally separated legal entities, ZEZ Sun cannot be viewed without ZEZ, at least in the early stage of the development. ZEZ and its members (staff) initiated and organized establishment of the ZEZ Sun cooperative (through the LIFE LOOP project). All staff members of ZEZ are also co-founding members of ZEZ Sun. Also, ZEZ is a founding member of ZEZ Sun, serving as a backstop to ensure that minimum capital needed for registration was raised. Acting as a supporting organization to ZEZ Sun, ZEZ will provide technical and administrative support during the transition period from initial setup and first projects until 2026, effectively donating expertise and other resources for initial setup of ZEZ Sun and project development. ZEZ Sun will have a contract with ZEZ for running day to day management and administration, but it will allow flexibility and a few years of grace period. The aim for ZEZ Sun is to become financially independent and to gradually cover all costs. The projected cost for the initial setup of ZEZ Sun and its first pilot projects, is 30,000 euros per year. To compensate for covering most of the running costs and taking higher risk than any other member, ZEZ was given a statutory right to nominate two of the three members of the Supervisory Board.

##### *Municipalities as rooftop owners*

Suitable location for solar PV project is the essential precondition for a sustainable community energy business model. Owners benefit from solar PV project either directly by receiving rent for lending their asset or in case of PPA, stable and reduced price for energy. Municipalities are key partners for ZEZ Sun's business model, as they manage public assets (roof/land) and are inherently interested in wellbeing of their community (voters). Working with local authorities is more complex and slower than working with private owners, but private owners are not usually interested in sharing their assets through cooperative arrangement and seek profit maximization. Since 2013, ZEZ established cooperation with more than 30 Croatian cities and municipalities, which represents a pool of potential community project locations.

One of the key barriers facing development of community energy projects on public roofs is lack of adequate awareness of community energy benefits and their valorization in the tendering.

There are no cases in Croatia where social and community benefits are taken into account as part of the tendering procedure for roof lending. The cooperative will focus on maximizing roof potential for building users, prioritizing solar PV for self-consumption first and then in second step to expand solar installation for market model. Building solar PV for self-consumption and signing on-site PPA (effectively ESCO) will not be the focus of ZEZ Sun, as it does not allow subsequent transition to energy sharing business model to members. With on-site PPA, energy flow is locked-in and ultimately ownership of solar PV is transferred





to end users after the contract expires. The City of Zagreb has an ambitious plan to install 10 MW of solar PV on public roofs by 2025 and to engage citizens in the process. LIFE LOOP project, with the collaboration between the City of Zagreb, REGEA (regional energy agency), and ZEZ, is giving a unique opportunity to develop the first community owned solar PV projects in Croatia.

#### *Energy suppliers and traders*

Energy traders have a crucial role in making the business model sustainable and commercially viable. ZEZ Sun will use energy suppliers as intermediaries between generation and wholesale market. There are only few suppliers on Croatian market who are willing to sign purchasing contracts for small scale projects (100–300 kW). Depending on the supplier of, they either sign contracts for day ahead market or long-term contracts with fixed price up to maximum of 24 months. It's very rare that a single supplier will offer a hybrid contract, combining fixed price and day-ahead price. ZEZ Sun will seek more conservative approach, which will generate less profit, but with less risk.

#### *DSO*

DSO is key partner for obvious reason granting connection to the grid, but more importantly for the implementation of the energy sharing business model. To implement energy sharing to cooperative members, DSO should provide support, real-time data and transparency to ZEZ Sun and its members. Energy sharing schemes does not yet exist in Croatia, but are expected to be operational in the next few years. It is still not known how energy sharing schemes will be regulated and weather they will enable commercially viable basis for transition from selling energy to a wholesale market to sharing it among cooperative members.

#### *Technical implementation partners*

Technical implementation partners include project designers, solar installers, insurance companies, and equipment suppliers. The relationship between cooperative and implementation partners are regulated by partnership agreements or contracts. ZEZ Sun will conduct internal bidding procedure to ensure best value for money. It will support local installers and other partners, where available, to increase benefits to local community.

#### **Key resources**

ZEZ Sun will be initially focused on building a portfolio of solar PV projects. To achieve this goal, it will need project development experts, legal support, communication expert and administrative support. Most of the resources needed will be provided by ZEZ Sun Board members. For example, conducting feasibility studies and communication activities can be done by mobilizing internal resources. Tools and applications



This project has received funding from the European Union's LIFE programme under grant agreement No. 101077085

for technical and financial management will be selected from available solutions on the market. Legal services will most likely be outsourced.

Internal value architecture is built around the cooperative has a manager and its internal board consisting of five members which will be responsible for implementing the business plan. Board members were chosen for their diverse personal and professional background to act as a stable foundation and management. The cooperative members are experts in project management, finance, academia, crowdfunding, communication and legal experts in the field of cooperatives and social entrepreneurship, with many years of experience in the preparation and development of energy projects.

## 5.4 Value capture

ZEZ Sun will initially focus on developing solar PV projects for selling electricity on the wholesale market. In 2023 ZEZ Sun plans to sign contracts for the first pilot projects on rooftop solar power plants with 200 kW capacity, while attracting up to 200 cooperative members and collecting the required amount of 200,000 EUR (estimate of average investment of 1.000 euros per member). For each potential project location, ZEZ Sun conducts feasibility study, including sensitivity analysis and risk mitigation. If project deems economically feasible and without major risks, ZEZ Sun will start preparing a fund-raising campaign among existing and new members. Funds needed will be secured by issuing additional cooperative shares with nominal value of 100 EUR each, with minimum 3 shares for natural persons and 10 shares for legal persons. Economic feasibility of solar PV project mainly depends on the capital costs and electricity market price. Solar equipment price is more predictable and is less volatile than electricity market price. Capital costs for 100–300 kW rooftop solar PV in Croatia are approximately 900 euros/kWp. With this capital cost and average generation potential of 1.200 kWh/kWp, the cooperative needs price of at least 100 EUR/MWh to ensure economic viability of the project. By current market prices and capital costs, following is a simplified description of a financial structure and cash flow of a potential community solar project. Based on lowest offers of energy brokers setting the market price of 100 EUR/MWh and an annual solar production potential in Zagreb of about 1.200 kWh/kWp (according to PV Sol and Solar Edge software's for calculation of solar powerplants), a 200-kW solar PV project would generate 240,000 kWh per year. Total value of produced energy would be 24.000 EUR/year (revenue). Annual running costs include insurance, maintenance, staff expenses, administration costs, accounting, legal services and office expenses. Taking all into account, the simple payback period for ZEZ Sun is 7.5 years, and the internal rate of profitability (IRR) for ZEZ Sun is 9,5%. ZEZ Sun will distribute profit to its members annually, up to 7%. If annual profit is higher than 7%, surplus will go toward a community fund which aim will be to support non-profit projects in local community. The assembly will decide on initiatives and projects to be funded from the cooperative community fund.



Following is the description on identified key risks and mitigation measures in the business model.

1. **Financial risks** – Access to capital initially depends on members and their equity through shares as access to capital from financial institutions is very limited for energy cooperatives, while in the future the cooperative might rely on loans from financial institutions. This might limit development of larger scale project.
2. **Equipment price risks** – The prices of equipment and installations of solar power plants are variable and depend on factors such as inflation, international supply chains, supply and demand and local tax law.
3. **Electric market risks** – Electricity prices on the wholesale market and prices for final customers are volatile and sensitive to other market conditions. This risk can also be positive for the ZEZ sun business in the event of a rise in prices. However, position and adjustment of investments is needed with the aim of maximizing returns, with transparent cooperation with partners. Ways to sell energy can include selling at prices on the electricity exchange (day ahead, intraday), but also longer-term contracts with energy traders or final customers (PPAs). Future steps may also include the development of flexibility options and participation in the ancillary services market.
4. **Regulatory risks** – a change in the regulatory framework governing the rules for energy communities may affect the cost-effectiveness of investing in solar power plants.

## 6. Minoan Energy Community (Crete, Greece)

### 6.1 Energy community overview

Minoan Energy Community (MEC) was founded in October 2019 in the town of Arkalochori, Crete, Greece, by 38 founding members. The energy community is the largest in Greece, with 650 members that gathers physical persons, 4 municipalities, public companies, commercial and agricultural cooperatives. In practice, MEC focuses on all technologies that harness the available RES potential in Crete: photovoltaics and solar thermal collectors, wind parks and small wind turbines, combined heat and power plants, operating with biomass and district heating and energy saving passive and active measures in buildings and other facilities building its business model around those technologies. In the next 3–5 years, MEC aims to implement the first large size wind park, more than 10 MW of photovoltaics, energy saving projects for municipal buildings and the first pilot cogeneration plants. Currently, MEC has one full time equivalent employee to cover administrative, research, RES development activities, whereas experts in the community work on voluntary basis.

MEC has developed two photovoltaic parks of 405 kW and 1 MW for collective self-consumption (on figure 5 the business model is shown). The community progresses with its ambitious work to license third PV park, it has started a comprehensive study for its first wind park of 12 MW and process of construction of



This project has received funding from the European Union's LIFE programme under grant agreement No. 101077085

smaller wind powerplant of 120 kW to sell the energy to the grid and offer return on investment to its members (on figure 6. the business model is shown). Also, MEC targets the exploitation of the abundant biomass resources in Crete for the heating through district heating networks and cogeneration plants.

MEC members on voluntary basis design commercial RES projects, such as large size wind parks, a pumped hydro storage plant and photovoltaic farms. To fund renewable projects all members of community can participate in additional investments by purchasing additional shares Practically, MEC aims to exploit all technologies that harness the available major RES potential in Crete: photovoltaics and solar thermal collectors, for electricity and heat production, wind parks and small wind turbines, combined heat and power plants, operating with biomass and district heating. Initiative. MEC approaches its members through mailing lists, posts in the official website and the pages in social media (Facebook and LinkedIn), the YouTube channel, the General Assembly and, for specific reasons, through phone calls. With the general public, MEC also uses its official pages in social media, the website, the YouTube channel, press releases in the local press, radio interviews, participations in exhibitions, open in public info-days and other. With the local and national authorities MEC has established official correspondence via e-mails, phone calls, physical meetings and the personal contacts that some members of the Community have.

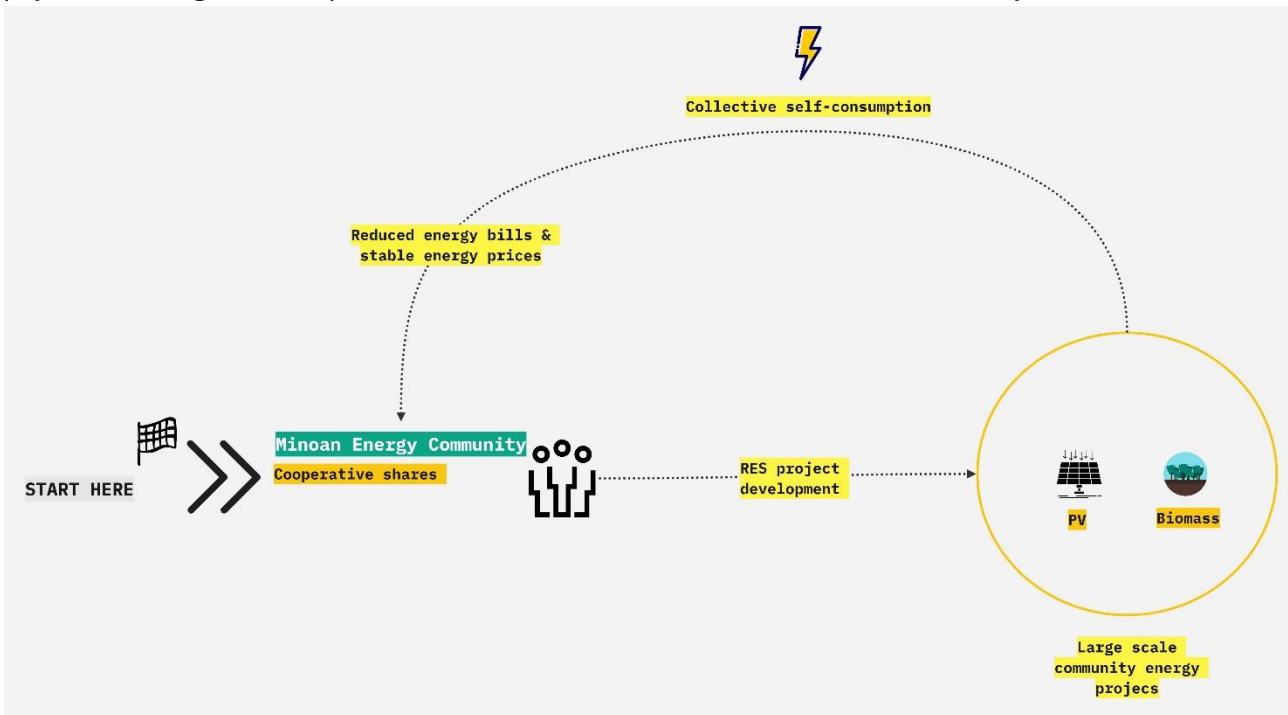


Figure 5. Minoan Energy Community – collective self-consumption (PV is tested and biomass is planned)



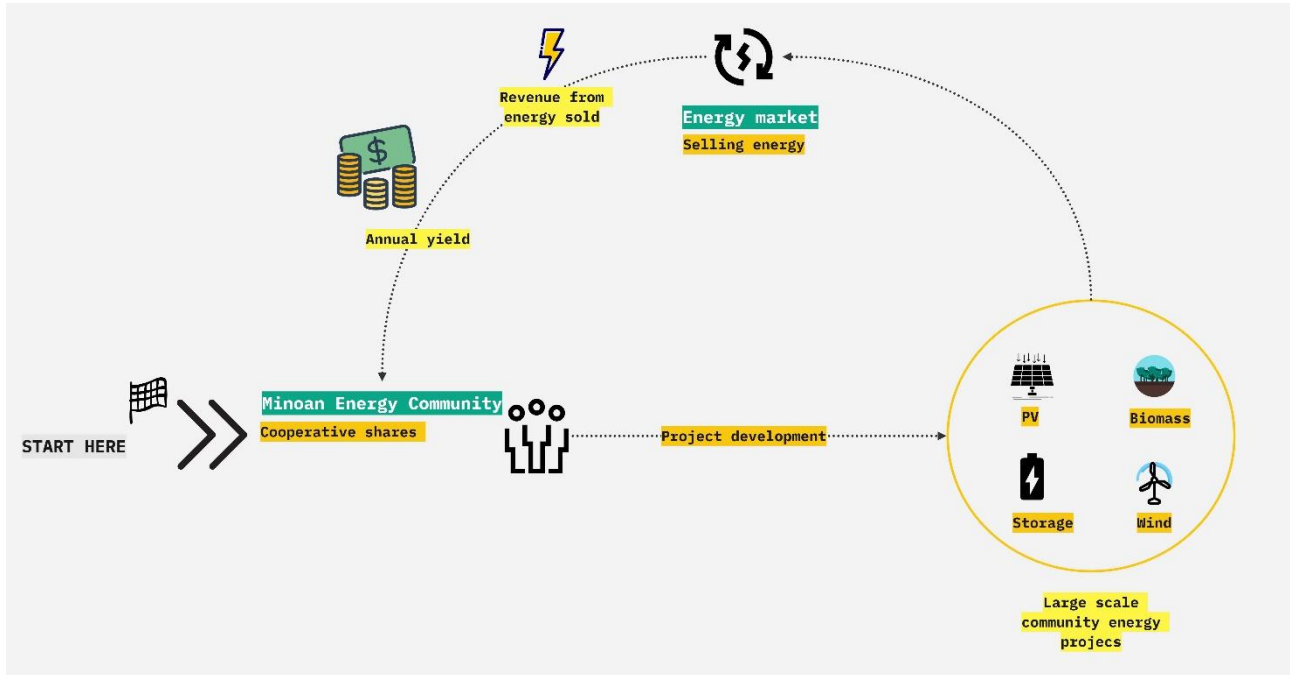


Figure 6. Minoan Energy Community – selling the energy to the market (future model of large-scale utility RES projects)

## 6.2 Value proposition

MEC has the goal to convert the process of energy transition in Crete as a lever for a fair and rational economic and social development for all Cretans. To this end, MEC invites and accepts all interested citizens and legal bodies in Greece to become members of the Community. So far, the members of the Community are individuals from Crete, local authorities, commercial and agricultural cooperatives, municipal corporations, etc. MEC members obtain value by reducing their energy bills by participating in net-metering scheme (collective self-consumption). Members have an option to “match” their annual consumption to the production by investing in commercial sized solar, buying respective share of solar. 280 members participated in first two solar projects by buying shares and taking advantage of the opportunity of being supplied with green energy by 25-year contract. MEC is addressing energy poverty in the community while using a solar installation to cover for the energy needs in the 50 low-income families, earthquake victims and their electricity needs

The anticipated impacts from the efforts and the accomplished projects of MEC is a cleaner energy production, usage and management in Crete to have robust and healthy local economy with citizens who participate in democratic way.

### 6.3 Value architecture

The key stakeholders of MEC are the members of the Management Board and, most importantly, the President, and the members of the scientific – consulting team. All initiatives, activities and projects of the Community are undertaken and accomplished by them. Depending on the specific activity or project, different experts can be involved. Also, depending on the project or the activity, a municipality or the Regional Authority of Crete, official members of the Community, can be also involved.

Apart from the members of MEC, external key stakeholders can be:

- Any manufacturers or equipment providers or contractors for the projects under development. So far, given that MEC has implemented two photovoltaic projects, which actually were assigned to a contractor, the involved stakeholders were only the contractors of the projects.
- The local insular utility, which for the Greek islands is the Hellenic Electricity Distribution Network Operator, which is the responsible authority for the licensing and the electrical connection of the photovoltaic plants and all the electricity production projects from renewables.
- The Regulatory Authority of Energy, the responsible authority for the licensing of large size electricity production projects from renewables.
- The Ministry of Environment and Energy, with which MEC has established a regular and close contact, claiming the configuration of a more supportive legal framework for the energy communities in Greece.
- The REScoop.eu and the “Clean energy for EU islands” initiative, in which MEC participates as official member.
- Other energy communities in Greece and non-governmental organisations, such as Greenpeace, Electra Energy, WWF, with which MEC has also a close and regular contact for issues of common interest (e.g. legal framework, proposals in European or national funding calls, implementation of new projects, etc.).
- The local Municipalities in Crete and, in general, the whole insular community in Crete, where MEC aims to proceed with an integrated capacity building programme.
- All the licensing authorities (e.g. the antiquities service, the forest authority, etc.).
- The Universities and academic institutes in Greece, with which MEC holds close relationships and collaboration.

The most important key resource for MEC is the expertise of the members of the scientific team and the voluntary work they have provided. Additionally, the support of the Regional Authority of Crete at all levels (communication, promotion and dissemination, funding) has been crucial. The networking of MEC has also played an important role, since MEC has received several proposals to join consortiums for proposals in EU calls. Regarding key activities, doubtlessly the implemented photovoltaic parks, in combination with the energy crisis and the increased energy prices, had a crucial contribution to the increase of the Cretans’ interest in the community. Additionally, the forthcoming capacity building programme is anticipated to have



This project has received funding from the European Union’s LIFE programme under grant agreement No. 101077085

an important contribution to the community's popularity. The electricity produced by the community's two implemented photovoltaic projects is directly compensated with the consumptions of the involved members in these projects. Each involved member participates in the project by owning a portion of the total, nominal power, according to the fee that the member has paid.

In general, the role of community is multiple:

- The community is a provider of knowledge, awareness and expertise for the Cretan society;
- The community is a stimulator, which activates local citizens and authorities to be involved in the energy transition process in Crete;
- MEC also has undertaken a major role as a negotiator or a mediator, between the local community and the Ministry of Environment and Energy, struggling against the interests of the large size companies, for a fair and truly supportive legal framework;
- MEC is the designer, the developer and the operator of the new community-based project;
- MEC is an aggregator, representing all its members in the implementation of projects and in the afore described activities.

Internally the work of cooperative is well supported by the scientific – consulting team in the community, which consists of more than 30 experts on the field of energy from various sectors: mechanical, electrical, civil engineers, architects, economists, geologists, programmers, lawyers, accountants, etc. The corresponding cost is covered by the Regional Authority of Crete and the Community. The Community offers continuous expert support to the municipalities and the Regional Authority of Crete, which are members of the Community, in order to upgrade their facilities to zero energy facilities.

## 6.4 Value capture

The two implemented photovoltaic parks of MEC have been funded by purchasing community shares (equity) by community members. The feasibility studies and the development of new projects are a part of the organizational profits that cover for running costs, but most of the works is still mainly based on voluntary work of the scientific team, with the exception of the work accomplished in the frame of the European projects. For example, the energy performance upgrade studies for the sport facilities in Arkalochori were funded by the H2020 project NESOI. Additionally, 3–5 energy performance upgrade studies for municipal facilities will be offered in the local municipalities, funded by the project LIFE LOOP. The voluntary work of the Community's core members, apart from the technical support, also expands to communication, promotion and dissemination activities, aiming to raise the Community's popularity and attract more members to join it. For the future commercial RES projects, MEC will post open calls for its member to invest and it will also seek for funding from third parties. Crowd-funding is a potential alternative to obtain funding. These new commercial projects are anticipated to create a direct economic income for the community, through the produced electricity selling to the utility. MEC has already started the design



This project has received funding from the European Union's LIFE programme under grant agreement No. 101077085

and the licensing process of the first wind parks, with 12 MW nominal power. The profits of the commercial projects will be partly distributed to the involved members (the law at its current form establishes a maximum corresponding percentage of 25% with regard of the project's net profits), while the remaining profits will be re-invested in the new projects. The participation in European and national funding calls always remains an alternative possibility to raise income and fund new projects. Yet, this option cannot be always certain and guaranteed. So far, since the Community has not received any loans, there are no risks for the viability of the Community of economical nature. In the future, the funding of the large size commercial RES projects will be certainly based, among others, potentially to bank loans, crowd funding and private funds. In this case, the contract signed with the utility for a minimum period of 10 years with a fixed selling price for the produced electricity, will minimize potential risk.

Most members participated with average of 3.000 EUR in the investment in two solar PV commercial projects (that amount translates to 3 kW of bought share in powerplant). The cooperative matches the consumption profiles of its members on annual basis to offer them roughly 70% cheaper energy compared to buying the energy from the supplier by participating in collective self-consumption scheme, each member pays only for taxes and fee for using the energy infrastructure. With rising prices of energy this model of energy compensation is becoming even more attractive to the community members with return rate ranging from 3–7 years (offering an opportunity to reduce their own energy bills and participate in the energy community). For members who are financially challenged special monthly payments are organized to compensate for the investment, in simplest terms they “subscribe” on the monthly basis and compensate for their shares form savings on energy bills. Using experience of establishing collective self-consumption scheme MEC will develop model for its members to gain monetary returns by selling the energy to the market.



## 7. Conclusions

The conclusion will round up pilot locations and describe their similarities, targets, approaches, and scale. To begin with, LIFE LOOP pilot locations might appear similar as they address the same challenge of renewable energy utilization on the municipal or regional level committing to an ambitious renewable target of providing an affordable, clean, and resilient energy price. As they are all nourishing partnerships between public bodies and the energy community the pilots are reporting that how the interaction between diverse expert groups is facilitated is key to the development of the energy community.

### *Renewable energy in focus*

All pilot locations are focusing mainly on solar as it is the easiest technology for implementation looking at administrative and technical steps, installing solar on public roofs as the simplest form, following solar ground installations on public land, and then developing other renewable sources of energy as in Greek example (starting to develop wind and biomass coupled with other green technologies).

### *Scale of pilot locations*

Energy communities in pilot locations target different scales in developing energy projects. In the Romanian case, the focus is on the municipal level, then in the Greek case it is the regional area of the island and in Croatia, it expands from the main city to the other cities on a national level.

### *Project funding*

Greek and Croatian example business models are practically the same regarding the way they plan to fund their projects by collecting members' shares to close the financial construction Greek pilot blends its finance with public funds to develop the project and build its capacity, whereas Romanian example is heavily depended on national and municipal public funding.

### *Pilot maturity and needs*

Three pilots are developing in different environmental, cultural, and market contexts. The National Greek energy framework allows a wider area of participation in the collective self-consumption scheme which diversifies renewable technology and widens the targeted area for member participation. ZEZ Sun energy cooperative is jet developing and overcoming obstacles in creating public procurement criteria that include energy communities or citizen participation and Bistrita is partnering up with experienced cooperatives to pave the way for energy community rollout. All pilots report that they lack regulatory changes on a national level to develop more interesting and profitable business models for their members:

- In Greece, only energy can be collectively consumed in the community, but profits from excess energy cannot be sold to the market and then shared in the community;
- In Croatia and Romania energy sharing and collective self-consumption are not possible forcing both pilots to explore other options; in Croatia selling the energy via an energy broker to the grid rather than



offering it to the community members and in Romania developing community projects will be heavily depended on using subsidies (with possibility of using PPA as a model to include energy community).

	Bistrita energy community, Romania	ZEZ Sun energy cooperative, Croatia	Minoan Energy Community, Greece
<b>Members</b>	–	39 members	650 members
<b>Established</b>	–	2023	2019
<b>Legal form</b>	Energy cooperative	Energy cooperative	Social cooperative
<b>Short term goals</b>	Facilitate installation of 100 PV on households & 50 residential blocks	500 kW solar by 2024	10 MW PV by 2028
<b>Long term goals</b>	Investment project in roof solar on 15 public bulidings and 3 MW of ground solar	2 MW solar by 2026	Large scale wind park, exploitation of other RES (hydro & biomass)
<b>RES</b>	Solar (heat & power)	Solar (power)	Solar, Wind, Hydro, Biomass (heat & power), Energy storage
<b>Business model</b>	Subsidy based self-consumption for households and residential blocks	Energy sharing & selling energy to the market	Energy sharing & selling energy to the market
<b>Funding</b>	Blended	Private	Blended
<b>Sscale</b>	Municipal level	National level	Regional level

Table 2. Summary of business models – Key figures and focus in pilot sites

## 8. Bibliography

Kubli, M., & Puranik, S. (2023). A typology of business models for energy communities: Current and emerging design options. *Renewable and Sustainable Energy Reviews*.

Proka, A., Hisschemöller, M., & Loorbach, D. (2018). Transition without conflict? Renewable energy initiatives in the Dutch energy transition. *Sustainability*, 10(6), 1721.

Proka, A. (2021). *Organising for power change Transformative business models for the energy transition*. PhD Thesis. Erasmus University Rotterdam.

Kitsikopoulos, D., & Vrettos, C. (2023). *THE SOCIAL IMPACT OF ENERGY COMMUNITIES IN GREECE*. THESSALONIKI : y Heinrich & ELECTRA Energy cooperative.

