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REC Pilot Project in Culatra

Culatra Island (PT)

Case Study // March 2025

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Relevant Local Practice: Focus on engendering environmental benefits

Focus on engendering environmental benefits refers to energy communities that centre around achieving positive environmental outcomes through their activities and initiatives. This practice involves explicitly targeting reductions in greenhouse gas emissions, air pollutants, and adopting sustainable, nature-friendly approaches in the development and operation of renewable energy projects. Often, these initiatives aim to protect and enhance biodiversity while generating renewable energy, such as the use of wildlife corridors or the preservation of local ecosystems. By focusing on environmental benefits, these communities not only contribute to global sustainability goals but also help address local environmental concerns, promoting cleaner and healthier living conditions. Furthermore, this focus can help overcome scepticism surrounding the environmental impacts of certain renewable energy technologies, demonstrating that, when implemented thoughtfully, renewable energy can have a minimal ecological footprint while delivering significant environmental and societal advantages.

Executive Summary

The Culatra pilot project on a Renewable Energy Community was initiated in 2023 under the aegis of the Culatra 2030 initiative, with the objective of enhancing energy resilience and sustainability on Culatra Island, Portugal through solar power, smart grids, and energy efficiency measures. This initiative incorporates advanced new energy management solutions and engages local stakeholders through participatory governance initiatives and workshops.

The REC pilot project has been particularly focused on engendering environmental benefits and has had a considerable impact on the local community, with benefits including social, economic, and environmental contributions. Significantly, the establishment of the C-COOP cooperative by Culatra residents with the objective of promoting the energy transition on the island has fostered inclusivity, enabled community-driven energy initiatives, and contributed to the alleviation of energy poverty. This cooperative was selected as the management authority of the energy community. In terms of specifics environmental impact, the REC has enhanced energy independence, reduced power outages, and improved sustainability awareness through education and participatory governance. Furthermore, the energy community has been in close collaboration with the natural protection authorities, thereby establishing a positive example of how energy communities can also contribute to nature conservation.

The establishment and development of the Culatra Pilot Project REC has been characterised by a number of key success factors, including the extensive stakeholder engagement and the implementation of a participatory economic model, ensuring that all citizens are cognisant of both their individual contributions to the community and the returns they receive.

1. Key characteristics and context

The C-COOP (Cooperative for the Sustainability of Culatra Island) was formally established on 25 September 2022 within the Culatra 2030 initiative. As part of its remit, a pilot project on a renewable energy community (REC) in the Culatra village was initiated, which is the subject of this case study. This section will elaborate on the contextual elements, activities and technology employed in the establishment and development of the energy community, including an examination of the national framework and policies applicable to it.

1.1.Location and geographical scope

The energy community's focus is on the village of Culatra on the island of Culatra. Culatra is a small island situated in the Portuguese southern region of Algarve. The island is inhabited by three main settlements: Culatra Village, Farol Village and Hangares. The energy community is located in the village of Culatra, where 80% of the island's population is concentrated. The island, along with four nearby barrier islands, constitutes the Ria Formosa Natural Park, a region distinguished by its historical fishing village character, a Mediterranean climate, and a notable influx of tourists. Although the island is characterised by energy poverty and increasing water scarcity, it has undergone recent development, with electricity being connected in 1998 and water and sanitation services being established in 2010. It

Figure 1: Culatra Island in the South of Portugal. Source: C-COOP

was only in 2018 that the Portuguese government formally recognised the village of Culatra. As a constituent of the Ria Formosa National Park, the community is bound by stringent regulations that govern its development.

1.2.Foundation & history

The island of Culatra is supplied with electricity by an interconnected submarine cable with the mainland that was installed in 1992. This cable is susceptible to breakage, especially during the winter months, which in turn can result in power outages. Following a participatory diagnosis process, it was determined that the primary concern of the residents of Culatra was to ensure the continuity of electricity supply.

In order to address these and similar challenges, the Culatra 2030 initiative was launched, aiming at a clean transition for the whole village. The REC pilot project in Culatra emerged as one of the inaugural initiatives of the Culatra 2030 initiative. In this regard, the primary objective of the energy community is to ensure a constant and reliable electricity supply throughout the year. In this context, a key element of the community is to evaluate the technical and economic feasibility of establishing an energy community, allowing the inclusion of innovative technologies, with results that can be reflected in legal and regulatory development proposals.

Before launching the pilot project on the REC, the C-COOP cooperative was established. This cooperative was the result of a joint effort by young entrepreneurs and leaders of the main associations of Culatra and were the responsible entity for the establishment and management of the energy community. The cooperative had two broad objectives: to prepare the future of future generations and to defend the perseverance of the identity of its fishing community. The cooperative that manages the energy community was established in 2022. The Culatra 2030 initiative received official approval at the beginning of 2019, shortly after the Portuguese government recognised the island status, and the pilot project on the energy community was subsequently endorsed in January 2023.

Regarding the goals of the energy community, five key objectives were established as part of the overarching initiative Culatra 2030:

1. Electricity generation, storage, and distribution: Self-sufficient electricity supply system based on solar PV, battery storage technologies and smart grid distribution.
2. Housing climate control and building efficiency: Increase the energy efficiency and energy generation capability of buildings, especially to fight the energy poverty of the island.
3. Trasport on, to and from the island: Decarbonise the island’s transport system by focusing on the socio-economic activities and solar-electric mobility.
4. Water supply and treatment: Produce water for self-consumption, with modular desalination water plants and simplified solutions to the pre-treatment to the wastewater.
5. Waste Management and Valorisation: Create the “Green Island, Plastic Free Zone,” and enhance the waste value through new circular economy projects.

The energy community pilot project is oriented towards the first objective of Culatra 2030 of electricity generation, storage, and distribution. Moreover, the following values and principles are applicable to all C-COOP activities, and must be respected by the REC pilot project:

- Social and environmental responsibility;
- Freely and independently of any government institution, without prejudice to the legal provisions within the scope of its activity;
- Always considering equality of all human beings, without discriminating against gender, race, religion, political or ideological conviction, education, economic or social status, or sexual orientation, promoting and creating conditions for the development of equal opportunities, as well as contributing to social inclusion and integration;
- Focusing on people, cooperators, beneficiaries and clients, on their needs, interests and aspirations;
- Prioritising the empowerment of partner organisations, collaborators as well as individuals and groups of people who wish to benefit from its action, preferably through cooperation, partnerships, and networking with other institutions, individuals, and organisations

In this context, the pilot project on the renewable energy community was launched in January 2023, with the following objectives:

- Definition of energy sharing schemes based on dynamic coefficients and definition of hierarchical criteria for the selection of these schemes;
- Define and evaluate economic models that allow community participation in the financing of new renewable energy production units and the respective distribution of the generated electricity;
- Define methods for the participation of REC members in the coordinated management of consumption in order to maximise the levels of self-consumption energy and the island's self-sufficiency
- Define methods for the automatic control of consumption equipment, which, through IP communications, IoT sensors and AI algorithms, will allow consumption to be adjusted according to production.

1.3.Activities conducted and energy technologies applied

In the initial year of operation, the primary activity of the energy community entails the testing of novel technologies and innovative energy sharing and energy efficiency solutions at 25 facilities, in collaboration with E-REDES, the distribution system operator (DSO). In particular, the energy community will be testing new forms of consumption management, including the integration of energy management systems.

The REC Smart Monitoring and Control Platform (SMCP) has been designed to achieve this objective. It functions as a central server, processing and circulating energy data between Individual Energy Management Systems (IEMS) installed in the twenty-five facilities and Web User Application (WUA) for real-time monitoring. It is responsible for the storage of consumption and generation data, the balancing of energy production with demand, the forecasting of future energy needs using artificial intelligence (AI), and the management of energy storage and electric vessel charging. Additionally, the SMCP oversees surplus energy management, directing excess power to desalination, battery storage, hydrogen production, or selling it back to the grid. The IEMS, which stands for intelligent electronic metering system, is composed of smart meters and controllers. It allows the facilities to adjust their energy consumption dynamically based on directives from the SMCP, thereby reducing energy waste and increasing efficiency.

As part of the energy community initiative, there are also community engagement activities. These include the organisation of educational and awareness activities with the aim of increasing energy literacy. To illustrate this point, the initiative has been collaborating with the Culatra’s kindergarten and elementary school, recognising that educational initiatives for children can positively influence parental behaviour towards sustainability. Furthermore, additional initiatives have been developed to target fishermen. For instance, one such activity involves the collection of discarded fishing nets and the subsequent creation of bags for the fishermen.

Furthermore, the promotion of energy generation from renewable sources has been a central tenet of the project. A preliminary study was conducted to ascertain the viability of the community's potential energy sources. A thorough examination of the ocean possibilities was conducted, however, due to the minimal energy production of the tides, this option was deemed unfeasible. Wind energy was also assessed; however, the implementation of air turbines was precluded due to the presence of protected areas within the natural park. Consequently, the decision was taken that solar energy represented the most suitable solution for the community.

As part of the Culatra 2030 initiative, the local community has successfully installed energy infrastructure for the entire island, including solar panels on public buildings, batteries to store excess power produced by these solar panels, and a smart grid that aligns electricity production with demand. This optimises the electricity system, collectively producing electricity for all residents. This strategy, characterised by centralisation and collectivisation, has been shown to enhance the overall energy generation process by optimising the generation and usage of electricity.

In consideration of the aforementioned factors, the pilot project on the energy community initiated the construction of five generation units. Initially, a comprehensive analysis of the island's energy consumption was conducted, leading to the conceptualisation of a pilot project encompassing five generation units. These five generation units totalised 85.6 kWp which were capable of producing a yearly average of 155.6 MWh.

For the future, the cooperative is set to establish a novel energy community as a constituent element of its ongoing operations. The pilot initiative has garnered significant interest from numerous individuals residing within the island, underscoring a collective aspiration to ensure the provision of essential services and the mitigation of energy poverty.

1.4.National/regional frameworks and policies

Portugal regulates energy communities through its Decree 15/2022 and regulates the details of energy communities very similarly to the EU legislation in its different elements. The Portuguese legislation is especially important for this particular case. Specifically, it allows the creation and testing of a renewable energy community project with energy

sharing purposes. Moreover, it distinguishes two types of energy sharing models. One is the fixed coefficient, and the other is a coefficient proportional to consumption. The legislation sets an obligation to apply for permits for these projects, and once the green light has been given by the Portuguese authorities, there is a need to choose between the different alternatives regulated by law. The DSO and the energy regulator then conduct an assessment of the grid and the number of installations that the energy community can test and provide an assessment report of the project. In this respect, the Portuguese legislation has proved to be noticeably clear on how to carry out the process for the C-COOP case.

From another point of view, there were two main limitations resulting from the Portuguese legislation. Firstly, the energy community is not yet fully operational because they are waiting for the licence, and many of the new energy communities are stuck with the licensing process. In addition, and very much related to the first limitation, the governance model of the island was also difficult and a challenge to create the community. This is because there are 7 entities with jurisdiction in Culatra (e.g. the Environment Agency of Portugal, the Perish of Faro, the Natural Park) and whenever the energy community wants to carry out new activities it needs their approval, which slows down all their processes.

2. Governance and internal organisation

The REC pilot project in Culatra involves several actors and stakeholders, including members of the cooperative that manages the energy community and those who are not. The ensuing sections herein delineate the governance model that has been selected for the energy community, encompassing an overview of its owners and constituents, a concise examination of its decision-making processes, and a presentation of the pivotal stakeholders engaged in energy community endeavours. Furthermore, it will present the business model that has been adopted by the energy community, along with an overview of the funding sources that support its activities.

2.1.Governance model

Ownership and legal model

The REC Pilot Project was initiated and is currently owned by the C-COOP, the Culatra island cooperative for sustainability, an organisation dedicated to the promotion of sustainability on Culatra Island. The project benefits from the guidance of an advisory council. The cooperative consists of a mere fifteen individuals, all of whom are residents of Culatra island. The C-COOP is also responsible for the distribution of the produced energy within the energy community and has a broader social purpose, covering all the socioeconomic activities of the island.

With regard to the membership base, a considerable number of individuals have expressed interest in participating in the pilot project. However, at present, the energy community consists of only twenty-five members, who are not necessarily required to be members of the cooperative. The decision to limit the membership to twenty-five members was established by the Portuguese energy regulator and the DSO. The cooperative has elected to appoint five of these members as the energy production units. To select the twenty consumption installations, the community organised two workshops, inviting all people from Culatra to attend and to learn about the project and how to utilise the energy community. For instance, workshops were organised to instruct members on the interpretation of electricity bills and the implementation of energy-efficient measures within their residences.

In order to select the members of the energy community three pre-defined criteria were employed. Primarily, to avoid the use of the energy community by tourists, residents of Culatra were prioritised. Secondly, the objective was to ensure diversity in the type of buildings covered (e.g., including restaurants and mini markets). Thirdly, given that the island already generates around 28% of its electricity needs through renewables, the decision was taken to prioritise buildings with a higher level of consumption, as the objective of the community was not to generate surplus as such. Consequently, they opted to select those who demonstrated higher energy expenditure and thus higher bills.

To foster engagement with the community, the cooperative organises general assembly meetings and numerous other initiatives, including workshops and music festivals, to promote the energy community and facilitate interaction among prospective members. However, it has been proven that the most effective method of engaging with society members for Culatra is through word-of-mouth, which is the reason the second workshop was organised to promote the pilot project of the energy community.

Decision-making

The decisions are taken following the cooperative paradigm, wherein members of the energy community exercise collective decision-making authority on an egalitarian basis. Decision-making is carried out by the cooperative in close collaboration with REC members.

2.2.Key actors and stakeholders

The entire Culatra 2030 initiative is based on a multi-partnership model, bringing together the Regional Government of Algarve, local authorities, the University of the Algarve, various companies providing technological solutions and the Culatra Island Residents' Association. Moreover, three of these actors, the University of the Algarve, the Residents' Association and an association for innovation and the social economy, Make it Better, are in charge of coordinating the initiative, as they form the Island Sustainability Committee, where they oversee the entire Culatra 2030 initiative.

While the same actors are involved in the pilot project, the University of the Algarve has proved to be a very important actor, as having the academic world on their side was essential to engage all the relevant stakeholders.

In order to engage with the relevant stakeholders, the Culatra 2030 initiative commenced with the facilitation of small workshops, a strategy that has been demonstrated to be the most effective engagement activity in such circumstances. This is due to the fact that the target group is an island, where everyone is acquainted with each other, thus facilitating the capture of attention. For instance, following the initial session, the project garnered increased attention, and it was imperative to consider the time constraints of the participants, who often dedicate a sizeable portion of their time to professional commitments. Due to these constraints, attendance at the initial workshop was often limited, necessitating the organisation of a subsequent session to accommodate those who were unable to attend the first one.

The energy community also gave consideration to vulnerable groups; however, the challenge of identifying them with standard measures was encountered. This challenge arises from the prevalent lack of energy literacy in the region. The economically disadvantaged are often unaware of the application process and are, in some cases, already beneficiaries of government-funded minimum income schemes or other social welfare programmes. Consequently, the social centre was identified as the optimal location to focus on those experiencing the most significant energy poverty. This resulted in those who were selected to be among the most vulnerable.

2.3.Business model

As the energy community has not yet become operational, it is in a constant state of readjustment with regard to its business model. However, as posited by Santos et al. (2023), the fundamental objective of the energy community is to conceptualise a participatory economic model. This model is designed to distribute the benefits derived from renewable energy production to the community members, and to utilise the community's financial resources to invest in the installation of additional renewable energy sources. The model, as articulated by Santos et al. (2023), is predicated on the utilisation of the PV capacity that has already been installed. The model involves the allocation of PV capacity into smaller units, termed 'production quotas', to members of the energy community. This ensures that the entire community benefits from renewable energy production, leading to a reduction in their electricity bills.

In practice, the cooperative sells energy to the people at a lower price. This price covers the costs of maintenance and expansion of the photovoltaic infrastructure. It is important to emphasise that under this model, a member of the cooperative effectively pays for the electricity they consume, as the amount paid by them is reinvested into community activities that ultimately benefit that member. The overarching objective is to reduce electricity bills, with the funds remaining within the cooperative to be reinvested in energy production. Although the cooperative business model is not yet operational, an entry fee is not expected to be levied to the REC members. The costs that the cooperative must cover are nominal and are mandatory for all cooperatives nationwide.

Once operational, the Cooperative will charge REC members for energy. The REC business model foresees a reduction in the cost per kWh (€/kWh) of around 35% compared to the residential tariff of the main national suppliers. For those who are both REC and Cooperative members, a reduction of around 50% is foreseen. This is possible because the energy production units have already been paid off, and the revenue generated per kWh is allocated for maintenance costs and future investments in new production units. Although joining REC is completely free, to become a member of the Cooperative you must be a resident of Culatra Island and purchase at least 5 share certificates of the Cooperative (20€ each, totaling 100€).

2.4.Access to finance

As da Silva Coelho (2023) asserts in their case study of Culatra 2030 for the RECAH project, the energy community has received support from various sources. Specifically, the following funds have contributed to the activities of the energy community:

- European funds, such as the European grant Mar2020. This programme is designed to promote the advancement of maritime and coastal initiatives.

- Local funds, including those from various parishes within the region, have also been instrumental in supporting the energy community's endeavours.
- EEA Grants, which have contributed to the sustainability of the whole island.
- NGOs funds, highlighting the involvement of civil society in supporting the energy community's initiatives.

The cooperative managing the energy community has played a pivotal role in the organisation of festivals and diverse events, with the dual objective of promoting their activities and securing financial resources for the energy community's operations.

3. Impact and Analysis

The activities conducted by the energy community have had a significant impact on the local community. The subsequent section will present an analysis of the principal social, environmental and economic impacts, including an examination of the key innovative elements of the energy community approach and an investigation of the principal drivers for their success. The identification of the necessary and supporting conditions and actions, their potential transferability and replicability to other contexts, as well as the key findings of the study. A particular emphasis is placed on the local practice of focusing on engendering environmental benefits.

3.1.Social, environmental, and economic impacts

Social impacts

The activities carried out by the energy community have a broad social impact, as will be detailed in the following lines.

Primarily, the establishment of a cooperative to oversee the energy community, thereby enabling all individuals from Culatra to become members without restriction, emerged as a favourable outcome of our analysis. The cooperative boasts a wide-ranging social purpose, encompassing a variety of socio-economic activities on the island. A notable responsibility of the cooperative is the protection, conservation, and development of the fishing nucleus of Culatra, a commitment that underscores its dedication to preserving the island's social identity.

Secondly, the energy community has identified the alleviation of energy poverty as a primary objective, recognising it as a salient challenge confronting Culatra society. The energy community's initiatives are poised to contribute to the resolution of this issue.

Thirdly, it can be argued that awareness-raising and educational activities have a positive social impact, as they clearly address other two key social problems of the island and create a sense of belonging for the energy community members.

Economic impacts

According to Santos et al. (2023), the energy community investment is estimated to have a payback period of approximately 3.5 years. The profits from these investments are intended to be used to increase the number of photovoltaic units, thereby enhancing the community's self-sufficiency and consequently increasing its energy savings.

Environmental impacts

The activities carried out by the Portuguese energy community have had a clear environmental impact, which is also the primary focus of the energy community. Primarily, they have been successful in ensuring the island’s energy independence and uninterrupted supply throughout the year. As part of the Culatra 2030 initiative, the energy community conducted a participatory diagnosis, and the primary concern expressed by the Culatra residents was the prevention of power outages. The establishment of energy communities was regulated in 2019 by the Portuguese government, and the initiative by the Portuguese energy community was timely and appropriate.

Moreover, the energy community's location within a natural park contributes to the historical route of over two hundred years, and the island's recognition as a sustainable living space is further reinforced by its status as a significant wetland within Portugal.

The educational and awareness-raising activities undertaken by the energy community, including public events, workshops, and the services they offer, have the potential to enhance citizens' knowledge of energy-related matters and contribute to a positive environmental impact, provided that the targeted audience is able to derive any lesson from them.

In terms of specific consumption data, the island currently has five photovoltaic production units now, totalling 85.8 kWp of installed capacity, which generate around 156.4 MWh per year. This covers more than 25% of the community's

energy needs during the day. This is a result of the Culatra 2030 Initiative, to which the REC pilot project has been the main contributor.

3.2.Innovativeness

It is important to highlight the innovative elements of the Portuguese energy community as part of the case study. Firstly, the establishment of a pilot project on the island to assess the technical and economic viability of establishing an energy community on the territory is a novel approach. This approach facilitates the identification and addressing of the specific needs of the island prior to the implementation of a more comprehensive project such as Culatra 2030. Secondly, the creation of a cooperative made up exclusively of islanders is a pioneering approach that can be particularly beneficial for established populations such as those on the island of Culatra. Thirdly, the creation of an energy community to meet the island's environmental objectives is an innovative approach to achieving energy independence, with the potential to achieve this independence through the use of renewable energy sources.

3.3.Inclusiveness

The energy community places a particular emphasis on inclusiveness. It has clearly defined objectives of addressing energy poverty through its various activities. The enhancement of energy literacy among its constituents, in conjunction with the diverse undertakings designed to elucidate the management of electricity-related challenges, constitute pivotal elements in this regard. A notable aspect of the energy community's approach is its collaboration with the social centre, aimed at identifying and incorporating vulnerable individuals into its membership. This strategy is particularly effective in ensuring the inclusion of individuals from diverse social backgrounds. Finally, the community has engaged in a variety of activities to reach out to the entire population of the island, and all its activities are driven by the interests of the local community.

3.4.Key drivers for success

The case study on the REC pilot project on Culatra has illuminated numerous factors that have contributed to the promotion of a sustainable transition on the island of Culatra and the emergence and evolution of the energy community.

Firstly, the **establishment of the energy community on the island with a clear objective of securing energy supply and independence**, as well as testing a bigger project, was a key element for its establishment and development. This, in conjunction with the participatory diagnosis analyses initiated prior to the project's implementation, engendered a profound sense of community belonging among all stakeholders.

Secondly, the **participatory economic model** adopted by the energy community has been shown to facilitate the development of renewable energy production solutions and to encourage local residents to participate in the initiative. This approach has proven to be highly effective in elucidating the initiative's environmental and economic ramifications, thereby conferring a dual benefit to the community.

Thirdly, the **extensive involvement of stakeholders** ensures that a diverse range of perspectives are represented, and the needs of various social groups are addressed effectively. The involvement of various social groups, including public authorities, non-governmental organisations, and residents' organisations, was instrumental in ensuring that the diverse perspectives of these groups were considered during the decision-making process. This aspect is of paramount importance within the context of the energy community.

3.5.Replicability and transferability

The evaluation of the pilot project of a REC in Culatra has identified several practices that can be easily replicated and applied in both national and European contexts.

The establishment of an energy community within the island territory has been demonstrated to be a replicable model that other nations and territories with analogous characteristics may wish to emulate. The Culatra case study offers compelling evidence that the creation of an energy community within an island territory can facilitate a clean transition, thereby supporting the production of energy from renewable sources. Specifically, the positive impact of the energy community on the island can lead to increased levels of energy security for a small closed system and it potentially result in higher level of social cohesion. In this regard, the energy community can be regarded as an agent that reduces the differences between the various actors in island society.

The wide range of stakeholders involved in the project is another practice that has the potential to be replicated in other contexts without great difficulty. However, it will be necessary to have the capacity to carry out the different activities that the Portuguese Energy Community has carried out in order to achieve similar results.

The establishment of energy communities as part of the broader Culatra 2030 Initiative on sustainability can be regarded as a favourable element in the context of a strategy to achieve a clean energy transition. In particular, the establishment of energy communities can be considered a practice that is easily replicable in other contexts, especially when social, economic and environmental benefits are being sought using a participatory model, as evidenced by the REC pilot project in Culatra.

Finally, the Community's participatory economic model can be replicated in all those contexts, whether European or national, where there is the necessary financial support for its replication and transfer.

3.6.Main takeaways and recommendations

Takeaways and recommendations on the local practice of focus on engendering environmental benefits

The case study of the REC pilot project in Culatra provides insight into how prioritising environmental benefits influences the success of the energy community.

Their various activities have led to significant environmental impacts, as described above. From increasing energy literacy to reducing energy poverty, it is recommended that **energy communities pay particular attention to environmental impacts in their activities**, as they have huge positive effects for society. In the specific instance of C-COOP, this issue assumes paramount importance due to its location within the natural park of Rio Formosa, in conjunction with the extant fishing community in the territory. The activities focusing on education and increasing literacy ensure an overall and holistic understanding of sustainability.

Furthermore, the emphasis on engendering environmental benefits has been evidenced by the **close collaboration of the energy community with the nature protection authorities**, thereby ensuring that the activities of the energy community do not result in any environmental harm. Consequently, this combination of the use of renewable energy sources with nature protection is a key outcome of this collaboration.

Other takeaways and recommendations

The insights and recommendations from the analysis of the REC pilot project in Culatra emphasise additional factors that support the successful implementation of energy community initiatives.

Firstly, it is recommended that a **wide range of stakeholders representing the interests of the different social groups be engaged**. This approach is predicated on the premise that it will engender informed decision-making processes within the energy community, facilitate the execution of more impactful activities within their designated purview, and enhance the probability of achieving success.

Secondly, the **adoption of a participatory economic model** by the Portuguese energy community, in which all investments are ultimately intended to benefit the community itself, is a practice that merits consideration by other energy communities. This recommendation is substantiated by the finding that members of the energy community, or prospective new members, who are cognisant of the manner in which their financial contributions will be reinvested into the community, are more likely to participate in community activities.

Thirdly, the process **of securing energy independence and year-round energy supply for the island** has proven to be a priority for the Culatra community, as evidenced by the participatory diagnostic process. The activities carried out by the energy community have contributed to this and it has been identified as the main objective of these activities. It is therefore strongly recommended that a similar process be carried out for similar societies with similar problems, and that energy communities be used in smaller areas where the characteristics allow it.

This case study was developed as part of the project Territorial Analysis of Decentralised Energy Markets conducted for ESPON EGTC. It is based on information that is publicly available online, on the energy community's own webpage, as well as on information collected through a semi-structured interview with representatives of the energy community. The reviewed documents include**:**

- da Silva Coelho, G. (2023). Culatra 2030, Portugal: An island-wide approach to decarbonisation. RECAH case study. Available at: https://static1.squarespace.com/static/6682941b25e3d618e094cd70/t/67acf95dda168d1c41516a0e/1739389279442/Culatra2030_RECAH_BestPractice.pdf
- Energy community website: https://www.culatra2030.pt/renewable-energy-community
- Santos, J., Pacheco, A. & Monteiro, J. (2023). Implementation Process of a Local Energy Community in Portugal – The Case of Culatra Island, *Springer Nature Switzerland*. INCREaSE, 2023. Available at: https://www.springerprofessional.de/en/implementation-process-of-a-local-energy-community-in-portugal-t/26223226

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