



The challenge of economic sustainability for Renewable Energy Communities (RECs)

di Damiano Cesa Bianchi – Università di Firenze

Introduction: RECs and financial challenges

In May 2019, the European Union finalized the Clean Energy for All Europeans Legislative Package (CEP), designed to meet the EU's 2030 climate and energy goals. Key components of this package include the recast Directive 2018/2001 (Renewable Energy Directive II, or REDII) and the recast Directive 2019/944 (Internal Electricity Market Directive, or IEMD). These directives introduced the concepts of '[renewable energy communities](#)' (RECs) and '[citizen energy communities](#)' (CECs). Together with the recast Regulation 2019/943 (Internal Electricity Market Regulation, or IEMR), they provide a robust legal framework supporting community ownership of energy projects.

Despite this legislative foundation, the expansion of energy communities across Europe faces significant challenges ([Energy Communities Repository, 2024](#)). These include the lack of a consistent legal definition of energy communities, which creates legal uncertainty, low public awareness, and limited access to financing. While EU policies support RECs for energy and social sustainability, their economic viability hinges on the development of sustainable business models ([ComeRes, 2022](#)).

Funding for energy communities might come from various sources, including equity, debt, crowdfunding, and grants ([SCCALE 203050 Financing Guide, 2023](#); [Compile Project Financing](#); [RESCOOP 20-20-20](#)). The optimal mix of funding varies by project stage ([ACCE, 2023](#)). Early-stage projects (3–12 months) rely heavily on grants and voluntary contributions, whereas later phases, including development (1–6 years) and construction (2–15 months), typically depend on equity, loans, and investments. Once operational, energy communities can sustain themselves through revenue generated from energy sales.

One of the main hurdles for Energy Communities (ECs) is access to private financing. Due to their small scale, perceived risks, and democratic governance, ECs are often less appealing to traditional financial institutions. Compounding the issue is the fact that much of the funding is raised after the project reaches financial closure, making the process even more difficult. While public funding aligns with EU energy transition goals, accessing these funds can be

challenging due to the expertise required, along with fluctuating national and regional policies ([Friend of the Earth Europe, 2022](#)).

Municipalities can play a crucial role in the success of CECs by advocating for favorable regulations, raising awareness, purchasing energy from community projects, and providing financial support. They can also offer resources, technical assistance, and legal support platforms, fostering collaboration among local stakeholders. By directly joining CECs, municipalities contribute to their long-term sustainability ([Friend of the Earth Europe, 2020](#)).

RECs and the academic business literature

The development of renewable energy communities (RECs) is marked by tensions and challenges, as highlighted by [Gomez et al. \(2022\)](#), including issues of participation and inclusivity. Shareholding structures tend to favor individuals with greater financial resources, raising concerns about social equity, while the nature of remuneration blurs the line between acting as a citizen or as an investor. Financial contributions can also influence political dynamics within the community. Decisions regarding the use of public or private spaces for energy projects, local economic engagement, and the selection of financial partners—whether traditional or cooperative models—further complicate REC development. These factors underscore the evolving and complex nature of RECs.

[Cielo et al. \(2021\)](#) propose three business models for RECs based on the distribution of capital costs and revenue sharing between the REC and developers. In one model, the REC covers all capital costs and retains all revenue. In another, costs and revenues are shared equally between the REC and developer. In the third model, the developer covers all costs and grants the REC 30% of the revenue.

Other studies point to innovations in energy systems, including the application of blockchain for transparency and efficiency in microgrids ([Svetec et al., 2019](#); [Mello et al., 2020](#)), collective tariff savings for RECs with private distribution networks ([Rocha et al., 2020](#)), and the growing role of prosumerism, local energy markets, and electric mobility cooperatives ([Moreno et al., 2022](#)). Pilot projects, such as Capwatt's, aim to optimize dynamic energy-sharing mechanisms to improve regulatory frameworks and operational efficiency ([Tavares et al., 2023](#)).

Success factors for RECs include strong user ownership, technological readiness, and smart grid integration to enhance transparency. Case studies from Germany and the Global South demonstrate that self-steering governance, open decision-making, and local leadership are critical to mobilizing technological and financial resources ([Kirchhoff et al., 2016](#); [Young and Brans, 2017](#)). Further advancements can be made by investing in battery storage and diversifying renewable energy sources ([Ceglia et al., 2015](#)).

RECs and the Italian “gray literature”

In Italy, the GSE ([Gestore dei Servizi Energetici](#)), a governmental agency, is a key player in promoting Renewable Energy Communities (CERs). The GSE offers financial incentives through two main mechanisms:

- **Incentive Tariff for Self-Consumed Energy:** CER members receive incentives for renewable energy produced and virtually self-consumed. This incentive, ranging from €60/MWh to €120/MWh, applies for 20 years from the start of each renewable plant's operation, with additional bonuses for photovoltaic systems based on geographic location.
- **Compensation for Self-Consumed Energy:** ARERA (Italian Regulatory Authority for Energy, Networks, and the Environment) provides compensation of approximately €8/MWh for virtually self-consumed energy.

Any surplus energy not self-consumed can be sold under market conditions, with producers having the option to use GSE's "ritiro dedicato" (dedicated withdrawal) service. Additionally, CERs in municipalities with fewer than 5,000 residents can receive capital contributions covering up to 40% of investment costs through Italy's National Recovery and Resilience Plan (PNRR).

In collaboration with ANCI ([ANCI, 2024](#)), the GSE emphasizes the vital role municipalities play in supporting Renewable Energy Communities (CERs). By leveraging urban planning tools, raising awareness, and offering public spaces, municipalities create favorable conditions for self-consumption and energy projects. They also promote citizen involvement, ensuring inclusive and transparent processes, and select technical partners through public procurement. These actions are key to advancing energy communities and contributing to Italy's energy transition.

The GSE also provides an [Interactive Map of Primary Substations](#), which helps identify eligible areas for CER projects, as CER members must be connected to the same primary substation.

RSE (Ricerca sul Sistema Energetico) has published two key studies on CERs ([RSE 2021](#); [2023](#)), emphasizing their role in enhancing public acceptance of small-scale renewable projects. Their 2023 report outlines three potential business models for CERs: prosumer, ESCO (Energy Service Company), and consumer, depending on who provides the initial project funding.

ENEA (Italian National Agency for New Technologies, Energy, and Sustainable Economic Development) supports CER creation through tools like [RECON](#), [DHOMUS](#), [CruISE](#), and [SIMUL](#), which aid in energy monitoring, management, and simulation. Additionally, ENEA ([ENEA, 2021](#)) has published a guide summarizing the key aspects of CERs.

Legambiente, a non-profit organization in Italy, has also contributed to the development of RECs. The organization has published two important reports, in [2022](#) and [2024](#), that provide an initial mapping and analysis of emerging REC projects in Italy. These contributions offer valuable insights into the national landscape of renewable energy communities, highlighting their growth and the challenges they face.

Conclusion

RECs are crucial to Europe's energy transition but face financial and operational challenges that require sustainable business models for long-term viability. Although RECs are not

primarily profit-driven, ensuring economic sustainability is essential for their future. While grants and subsidies significantly enhance the appeal of RECs, the development of robust business models is key to their long-term success. Since their formal recognition in 2019, RECs have evolved rapidly, with continuous advancements in funding, governance, and technological innovation shaping their trajectory. Key areas for further research to address economic barriers include the exploration and definition of sustainable business models, particularly in relation to economic aspects. Further investigation is needed into management control mechanisms that can promote transparency and trust among members. Additionally, research should focus on how RECs can be positioned as distinct non-profit entities with unique characteristics.