



Energy Communities and Socio-Territorial Innovation in Urban Suburbs. Insights from the Case of Naples

Raffaella Monia Calia, Ivano Scotti, Riccardo Zaccaria¹

Abstract

Renewable energy communities (RECs) are a new energy model promoted by the EU for a sustainable and just transition. This explorative case-study examines a supposedly successful REC in a socially disadvantaged suburban area. The research centres on the Renewable and Solidarity Energy Community of East Naples (ReSECEN), led by the Famiglia di Maria Foundation (FMF). The aim is to outline a preliminary framework to understand the factors that make energy community projects (and their impacts) possible in urban districts such as East Naples, characterised by social, economic and environmental challenges. ReSECEN was established in 2021 through collaboration between the FMF and Legambiente Campania, with external financial support. The project relies on trust and pre-existing relational networks. The analysis reveals limited participation of members in management of REC, behavioural and perceptual changes mainly for direct participants, and limited impact of the initiative in the district. Thus, the study offers some insights into the process of engaging individuals with fewer resources (social, cognitive, economic), considering the importance of local context and network of actors that enables these experiences to take place. In these cases, the need for a balance centralised management and active participation seems to emerge for the success of RECs in complex urban contexts, like the suburbs of large cities.

Keywords: territorial context, leadership, urban suburbs, socio-energy innovation, training and educational process, social change.

¹ Raffaella Monia Calia, La Sapienza University of Rome, raffaellamoniamonia.calia@uniroma1.it. Ivano Scotti, Department of Social Science, University of Naples Federico II, ivano.scottiti@unina.it. Riccardo Zaccaria, University of Foggia, riccardo.zaccaria@unifg.it.

Le comunità energetiche rinnovabili sono un nuovo modello energetico promosso dall'EU per una giusta transizione sostenibile. Questo studio di caso esplorativo esamina una comunità energetica ritenuta di successo in una periferia urbana socialmente svantaggiata. Lo studio si concentra sulla Comunità Energetica e Solidale di Napoli Est, guidata dalla Fondazione Famiglia di Maria. Lo scopo è quello di delineare un preliminare schema che consenta di comprendere i fattori che rendono possibili progetti di comunità energetiche (ed i loro impatti) in quartieri urbani come Napoli Est, caratterizzato da difficoltà sociali, economiche ed ambientali. La Comunità energetica rinnovabile e solidale di Napoli Est è stata fondata nel 2021 attraverso la collaborazione tra la Fondazione Famiglia di Maria e Legambiente Campania con un supporto finanziario esterno. Il progetto si basa sulla fiducia e sulle reti relazionali preesistenti. L'analisi rivela una partecipazione limitata dei membri alla gestione della comunità energetica, cambiamenti comportamentali e percettivi soprattutto per i partecipanti diretti e un contenuto impatto dell'iniziativa nel quartiere. Lo studio offre, quindi, spunti di riflessione sul processo di coinvolgimento di soggetti con minori risorse (sociali, cognitive, economiche), considerando l'importanza del contesto locale e della rete di attori che permette di realizzare queste esperienze. In questi casi sembra emergere la necessità di un equilibrio tra una gestione centralizzata e la partecipazione attiva per il successo delle comunità energetiche rinnovabili in contesti urbani complessi, come le periferie delle grandi città.

Parole chiave: cambiamento sociale, contesto territoriale, innovazione socio-energetica, leadership, periferie urbane, processo formativo ed educativo.

■ Introduction

Increasing the use of renewables is one of the strategies toward a low-carbon future that contribute to counter climate change. Nevertheless, renewables can come with problems because they could generate forms of socio-territorial injustice (Jenkins *et al.*, 2016). For example, territorial transformation generated by large green energy facilities can affect fragile actors and territories, increasing or consolidating their marginality, particularly if facilities have no link with the local economy, if local authorities can only slightly define their deployment and if local stakeholders do not gain advantages and control them (Carrosio and Scotti 2019; O'Sullivan, Golubchikov and Mehmood, 2020).

Renewable energy communities (REC), a new energy provision model championed by EU directives, promise to mitigate some of the challenges associated with green energy. They could offer a pathway to a sustainable and just energy transition. RECs could provide cost-effective energy provision for direct members, stimulate the local economy, foster forms of solidarity

(among REC's members and the larger community), enhance awareness and knowledge on environmental themes, and promote local democratic control of energy (Dall-Orsoletta *et al.*, 2022). The study of RECs is a burgeoning research field, with scholars exploring several aspects of this socio-technical novelty (Gianaroli *et al.*, 2024). Our research aims to contribute to the ongoing debate by examining the renewable energy community as a socio-energy innovation in the case of a REC in a suburban area of Naples (Italy), grappling with environmental and social challenges. Previous research on RECs in EU urban contexts identified potential measures to promote them, focusing on social inclusion and environmental issues (Di Battista, De Luca and Santangelo, 2024). Our study will delve into the process of socio-energy transformation to understand if and how energy communities can foster social innovation in fragile urban contexts. The hypothesis is that the network of relationships (horizontal and vertical) fostered by REC promoters shapes the process and its impacts on the people involved and the contexts.

■ Crises, social innovation and energy

Following Morin and Kern (1999), the current global situation can be described as a polycrisis scenario, characterized by intertwined economic troubles, geopolitical instabilities, climate change, and ecological issues that threaten our societies and the future of life on Earth. Some scholars suggest that this disastrous scenario is rooted in the structural crises of fossil-capitalist society (Di Muzio, 2015), and that the solution lies in a strategy of renewable energy and degrowth (Tsagkari, Roca and Kallis, 2021). Whether one agrees with this interpretation or not, the promotion of a just and sustainable energy transition is a focus of international programs and investments, such as the UN 2030 Agenda, which aims to decarbonize socioeconomic processes without leaving anyone behind. The decentralized, renewables-based, and participative energy scenario forecasts social innovation because both policies (such as the EU's Clean Energy Package) and grassroots initiatives (like energy cooperatives) aim to develop new socio-technical solutions to enduring socio-energy problems.

Research on RECs, a novel energy configuration promoted by the EU directives (RED II of 2018; IEM of 2019), shows that socio-energy innovations involve the activation of virtuous institutional and community processes, which incentivize participatory logics (Dall-Orsoletta *et al.*, 2022). The initiatives to establish and launch RECs also highlight the need to integrate technical issues related to energy production and distribution with social, political, and organizational aspects (Tarpani *et al.*, 2022; Tricarico, 2021). Moreover, studies stress the heterogeneity of REC initiatives, which are associated with different implementation policies and regulatory frameworks (De Vidovich, Tricarico and Zulianello, 2021). This highlights that every REC should be understood starting from the local context's conditions (Bau-

wens *et al.*, 2022; Lode *et al.*, 2022). Yet, beyond their differences, energy communities seem to be a potential tool for achieving a just energy transition that includes marginal social actors. The creation of RECs could set a relational model of energy production that favours the self-organization of social actors at a collective level, enabling multi-stakeholder governance interventions. Furthermore, understood as a situated form of social relationship, RECs could be the driving force of local development and favour social inclusion and innovation processes (Carrosio, 2014; Dall-Orsoletta *et al.*, 2022; Tricarico, 2021).

Considering the literature on social innovation (Galego *et al.*, 2021; Genoio-Lefrançois *et al.*, 2022), a locally-based transition governance to foster participation, social relations, development of actors' capabilities, promoting equal access to resources, and the redistribution of economic and political power seems an essential element for the success of this socio-energy novelty. In this sense, RECs could promote wider innovations, satisfying individual and collective needs in a new way, particularly for the marginalized people that could be involved in these experiences.

Based on these considerations, we present the main outcomes of an exploratory research on a renewable energy community located in San Giovanni a Teduccio, an eastern district of Naples, that involves marginalized people. The aim is to obtain insights to determine 'which kind' of network of relationships can foster initiatives like our case-study, 'how' it influences the configuration of the REC and the impacts (economic, social and behavioral) for members of the energy community and district residents.

■ Case study, research question, and methodology

The Renewable and Solidarity Energy Community of East Naples (ReSECEN), our case-study, attracted significant attention from the media, institutions, and academia since its beginning in 2021 (Kaiser *et al.*, 2022)². Interest in ReSECEN arose because it was one of the pioneering renewable energy communities established in Italy after the first provisional and experimental adoption of related EU directives. Additionally, the project's promoters emphasise the term 'solidarity' to highlight the explicit aim to support ReSECEN members (specifically, families living in the district and almost already involved with the promoter, Famiglia di Maria Foundation) as stated in its statute. Unlike other Italian RECs projects largely located in

² For example, Gennaro Dragone, an 11-year-old boy chosen to represent all the children of the Famiglia di Maria Foundation (which implemented the ReSECEN), was honoured as a Standard-Bearer of the Republic by the Italian President, Sergio Mattarella, in 2022. This honour was assigned as an institutional recognition to the Famiglia di Maria children that participate to environmental educational initiative and promote the energy communities in a disadvantaged urban district. In this specific case, the boy talked with parents promoting their involvement in the ReSECEN describing its collective benefits and family advantages.

small Municipalities (for example, less than 5,000 inhabitants), this initiative is based in a peripheral urban district. It was also portrayed as a symbol of revenge for a district, that is characterised by marginalisation and deviance, suffering from the impacts of industrial decommissioning and environmental issues. In addition, ReSECEN is a grassroots initiative developed by third sector actors. Specifically, it is led by the Family of Mary Foundation (FMF), a district organization founded in the late 19th century and dedicated to legality education and combating school dropout. This project is also led by a chairwoman (the president of FMF), contrasting with most renewable energy communities in Italy that are typically spearheaded by men and strongly promoted by local authorities.

Our goal is to understand which actors enabled the ReSECEN project, which appears to be a successful social innovation initiative contributing to combating energy poverty and fostering energy democratisation (Hanke et al., 2021) in a rough peripheral urban district. Based on the research hypothesis that the networks of relationships among the promoters of any REC define the implementation process, its organization, impacts, and distribution of burdens and benefits, this analysis aims to identify a schematic framework of the elements that facilitate or hinder the implementation of energy communities. We adopt an exploratory approach and the analytical perspective of a case-study. Our research questions focus on three points: a) how and by whom it was implemented the ReSECEN, b) who the people involved in the energy community are, how they were involved, and how active they are, and c) what impacts, if any, it generated on the community members and in the district. The last aspect concerns one of the pivotal research issues for energy communities: their social impacts (Koltunov and Bisello, 2021; Bielig *et al.*, 2022).

In line with most of the studies on the energy communities (Pellizzoni, 2018), we adopted a qualitative research approach. We understand case-study as the lens, strategy, and research design for an empirical inquiry that «investigates a phenomenon in its real-life context» (Priya, 2021, p. 94). Since this is an ‘exploratory’ case study, we used «multiple methods of data collection» (Priya, 2021, p. 94), including ethnographic digital explorations (Caliandro, 2018) - that is, online press reviews - to identify key actors.

The energy community of East Naples, formed in mid-2021, became fully operational only in December 2023. Our fieldwork started in May 2022 and stopped in March 2023, with 2 stop-and-go moments. In this period, we realised: 14 semi-structured interviews with stakeholders and key players of ReSECEN (Tab. 1), 2 urban explorations with field notes, 5 spontaneous conversations with district residents and 3 photo elicitation experiments (Harper, 2002).

In particular, the interviews and spontaneous conversations attempted to delve deeper into the following dimensions: social inclusion/exclusion; knowledge and recognizability of the ReSECEN (also in light of strong media exposure); inequality and energy; enhancement and care; energy awareness; territory and social capital; gender perspectives.

Fig. 1 - A picture used for the photo-elicitation experiments (the solar panels on the roof of the FMF headquarters).



Source: research data.

The photo elicitation stimulus involved showing three interviewees a photograph of the roof of ReSECEN in East Naples, where solar panels are installed next to the bell tower with two bells. The stimulus was aimed at understanding whether the interviewees had visual knowledge of RECs or how they envisioned them, including from a technical point of view. In addition, it was intended to explore whether the co-presence of a bell tower, a religious symbol and architectural heritage, with solar panels, evidence of more advanced and green technology, aroused contradiction in some respondents.

Of course, respecting the rules of the technique, the interviewee was simply shown the photograph, leaving him or her free to express emotions, feelings, reflections and to intervene if necessary (Auken, Frsvoll, Stewart, 2010).

Given the exploratory nature of the case study presented here, it is premature to attempt an accurate analysis of its impacts; consequently, only some of the dynamics that ReSECEN has triggered have been examined, such as its visibility and recognition, the perceptions and reactions of members and non-members, and the emergence of emulative projects. During the fieldwork, it was more complicated for the researchers to interact with the 18 families who joined ReSECEN.

The president of the FMF did not facilitate contact with them for three main reasons. First, according to her, families were overexposed to media and had received heightened attention from institutions and the university, which increased expectations placed upon them. Expectations that they could not meet because, due to bureaucratic reasons, they only began receiving public incentives in December 2023. Secondly, until the incentives arrived, not much

had changed for the families; everything remained mostly on paper. Finally, if the president had continued to propose interviews or meetings with the media, institutions, or the academic world to the families without this leading to a positive and tangible effect on their daily lives, it could have undermined their trust in her and her own credibility. For these reasons, the researchers were only able to arrange one interview session with two members selected by the president of the FMF³.

Tab. 1 – Stakeholders and key players interviewed

Environmental association Legambiente Campania (LC)	2 subjects (LC #1, LC #2)
Famiglia di Maria Foundation (FMF)	1 subject (FMF #1)
Fondazione con il Sud (FcS)	2 subjects (FsC #1, FsC #2)
Company that planned & installed the energy facility (3E)	1 subject (3E #1)
Energy experts of the University of Naples (UNINA)	3 subjects (UNINA #1, UNINA #2, UNINA #3)
Women-mothers involved in the ReSECEN (W)	2 subjects (W #1, W #2)
Associations operating in the district (AS)	3 subjects (AS #1, AS #2, AS #3)

■ The context of East Naples

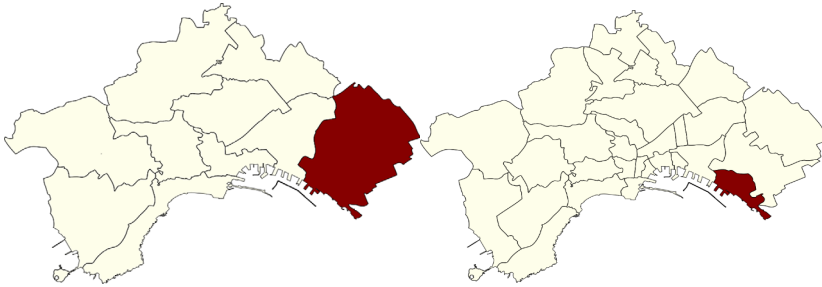
The district of San Giovanni a Teduccio is part of the 6th Municipality of Naples with other two districts, Ponticelli and Barra (Fig. 2). According to 2024 data⁴, this Municipality, with around 138,000 people, is the youngest one of the city (average age: 40.2 years compared with 42.7 of Naples), but it presents a low schooling rate (7.0% of population has a college degree or similar qualification compared with 15.8% of the city) and a low employment rate (38.5% for 16-64 age group versus 41% of the city), lower for women (23%). The district is also characterized by a dense mix of housing and large number of buildings are old and decaying edifices. This contributes to increase the energy expenditure for families that live in buildings in a ‘G energy class’, the

³ Note: those who participate in this energy community and take part in related meetings and initiatives are predominantly women, particularly mothers, because FMF activities are dedicated to families, and mothers, along with their children, are the most involved. When it comes to household matters, fathers generally play a secondary role within the family (for example, managing family finances and paying bills are tasks typically handled by mothers). Additionally, in some cases, fathers are either in prison, under house arrest, or otherwise reluctant to expose themselves to the public or attend meetings.

⁴ 1° Rapporto dell’Osservatorio Economia e Società Napoli, Comune di Napoli – Assessorato al Bilancio, 2024.

lower of the Energy Performance Certificate, worsening their socioeconomic condition (Legambiente, 2022).

Fig. 2 – Map of the 10 municipalities of Naples with the 6th highlighted (on the left) and the district of San Giovanni a Teduccio highlighted (on the right).



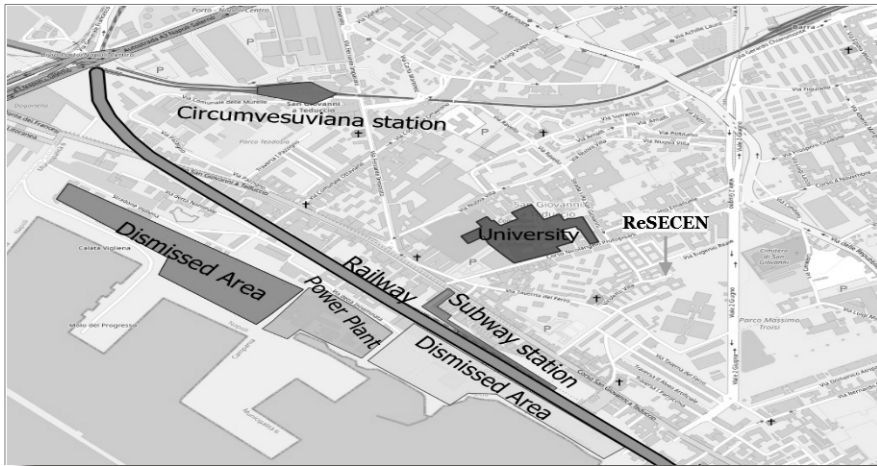
Source: research elaboration.

As it was stressed (Caruso, 2019; Parisi, 1998; Simonetti, 2003), since 1904, with ‘Special Plan for Naples’, national institutions intended to develop in the East of the city an industrial and commercial hub due to its environmental condition (flat terrain and a long coastline) and existing infrastructures, like the railway. In the early 20th century there were petrochemical industries, refineries and food processing plants, while in the second half of the century, private, often foreign, companies, leading to industrial growth and job creation but also environmental and social degradation. Additionally, the unplanned urbanisation and social housing driven by political control strategies from the ‘50s to the ‘70s, designed the context. The energy crises of the ‘70s triggered a deindustrialisation process that continues to this day, leaving the area with high unemployment and visible signs of degradation, such as dilapidated brownfield sites, air pollution, and a clear separation between the district and the coastline. This made it difficult to define a ‘new urban identity’ (Caruso, 2019: 210).

East Naples has long faced challenges related to urban decay, crime, and unemployment. However, recent efforts to combat marginalisation, deviance, and degradation have intensified, driven by a dense network of third sector associations and collaboration with local political and academic institutions. Positive signs are emerging from this network, which engages in various social initiatives, particularly those supporting minors and families in socioeconomic distress, as well as projects in culture, information, tourism, sports, environment, and urban regeneration. Notable redevelopment projects, such as the conversion of Cirio factory building in San Giovanni a Teduccio into artistic laboratories for the San Carlo Theatre of Naples and the technological

hub of the University of Naples Federico II, underscore this positive change (see Fig. 3). The ReSECEN itself is a significant urban experiment of social regeneration and innovation.

Fig. 3 – A zoom map of San Giovanni a Teduccio showing the location of the brownfields, the only remaining active power plant, the campus of the University of Naples Federico II and the ReSECEN site. Scale: 1:100.



Source: QGIS/Open StreetMap - elaboration by Fabio Esposito.

■ The renewable and solidarity energy community

The Famiglia di Maria Foundation (FMF) and the regional section of the environmental association Legambiente, called Legambiente Campania (LC) have a longstanding partnership in providing environmental education to children and teenagers in the district. Recently, the LC encouraged the FMF to explore new opportunities in the energy community sector: “to address poverty, specifically energy poverty among district households; to promote energy legality – where many households are illegally connected to the grid – and to increase environmental awareness and civic engagement” (LC #1). Despite encountering bureaucratic and technical-legal challenges, their collaboration led to the establishment of Naples’ first energy community in March 2021. This initiative was made possible with financial support of the Fondazione con il Sud (FcS, a foundation dedicated to support innovative projects in Southern Italy), which covered 50% of the plant cost (approximately 50,000 euros), and assistance of 3E, a medium-sized PV installation company based in Naples,

responsible for its implementation and upkeep. ReSECEN features a 55 kWp PV system and 10 kWh storage batteries installed on March 29, 2021, on the roof of the Famiglia di Maria Foundation's building.

According to 3E, the energy community is expected to reduce household electricity bills by approximately 40-50% annually. Initially, only 18 households were involved, as they were connected to the secondary substation of the electrical grid, a prerequisite under the previous regulations for participation in an energy community. With the new legislation that entered fully into force in March 2024, ReSECEN plans to expand to include 40 households of the district in the near future as originally planned. Furthermore, according to the FMF, this experience, coupled with educational activities involving families and youth, has fostered a shift in energy behaviour towards a more environmentally conscious direction; in this regard, FMF staff tested families' knowledge during some meetings on energy issues and their practices related to energy consumption (such as laundry or indoor lighting). Additionally, these families and FMF's children have become advocates for these issues beyond the confines of the energy community and the Foundation. In short, ReSECEN is presented in newspapers and in public events as a successful initiative because it was able to involve people in socioeconomic difficulties operating in a rough district, however, we need to report how this experience was possible and the extent of its impacts.

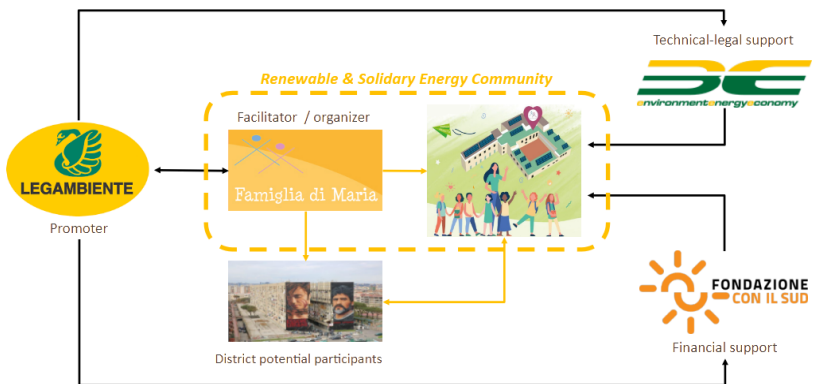
Facilitating the project and involving residents

The ReSECEN seems to have emerged thanks to two key elements: trust and a relational network (Fig. 4). On one hand, FMF, a local-rooted organization, is situated in a context where it has garnered a high level of trust among households involved in its activities, which benefit minors and families facing socioeconomic challenges. It is through this pre-existing capital of trust that the FMF has successfully engaged district families in the ReSECEN project, a resource overseen by its president, despite bureaucratic challenges. "Families have a great trust on us that we get through our example and perseverance. (...) When we were accused of building code violations, a matter later resolved, I was worried. We promote a culture of legality, and we were accused of illegality?" (FMF #1)

On the other hand, LC acted as a facilitator and intermediary, leveraging its connections to provide financial, legal, and technological support, essential to involve low-income households. Furthermore, FMF and LC fostered relationships between district's families and external stakeholders useful to develop the project. "Through the national secretariat, we identified a partner who largely financed the project. Then, with the association Italia Solare, we identified a technical partner who used public incentives to cover the remaining costs. (...) We activated all our channels to overcome bureaucratic problems" (LC #1).

The importance of networks, trust, and informal connections is also evident in the words of the chairperson of the FcS, who financed the realization of ReSECEN. They highlight how these resources reduced ‘transaction costs’ and facilitated communication among actors. “I was contacted by the national vice-president of Legambiente, a friend of mine, who proposed this crazy idea of an energy community in San Giovanni a Teduccio, and I liked it immediately. (...) Our organization has procedures to follow, but we are very flexible. If someone proposes something interesting, thanks to our mutual trust and respect, we almost always proceed. After the ‘East Naples’ experiment, we committed to funding a call for proposals for another 10 RECs” (FcS #1).

Fig. 4 – Relations among key actors that established the ReSECEN.



Source: our elaboration

If the relationships among key actors were essential to initiating the energy community project, district families were engaged through the leadership of the FMF president, who defined the subjects to be involved based on local considerations (e.g., if they were or not already involved in FMF activities) and technical constraints (if they were legally connected to the grid and if they were linked to the same secondary electric cabin, condition necessary for Italian law to establish a renewable energy community system). What emerges is that the community of ‘East Naples’ seems largely based on the existing social fabric. In this context, ReSECEN reinforced this ‘community’ through its involvement in the project, while simultaneously promoting FMF goals such as education for legality: “We needed substantial support to communicate the energy community correctly to district families to avoid excessive expectations. (...) We first involved families close to our foundation, identifying them also based on

various factors, such as having an electricity supply contract, which is not obvious here. (...) The idea is to involve all families close to us gradually, but we must be sure the project works; otherwise, we could lose mothers' trust and willingness to commit to the change" (FMF #1).

The energy democratization dimension, namely the members participation in governance and decision making process, appeared (in the time of collecting data) rather limited. For instance, participants did not discuss how to divide the public economic incentive for energy communities, but the solution adopted was set by FMF. This choice was influenced by the socioeconomic situation of district's families (low-income households); to respond to their need, the simplest option was to offer them an equal economic benefit. Moreover, the opinion of promoters was that members of ReSECEN were not capable of managing more complex options (for example, dividing incentive according to the level of families need that can change months by months), which led to the selected solution. A more 'democratic' participation, such as members discussing how to use the public economic incentive, is postponed to the future by the promoters.

For me, energy and climate issues were not a priority here; there were other problems. But when I realized we could be part of the energy transition and face family poverty, I sought full support from LC. (...) If we adopted a different form of economic redistribution, it would be a chaos. This can change in the future, when they will realize a mature awareness on these points, and we are working on it

(FMF #1)

Similarly, despite significant media coverage of this initiative and word of mouth communication by participants, during the district ethnographic exploration and spontaneous conversations with residents, ReSECEN was often unknown, and few people were able to explain exactly what an energy community is. According to representatives of other district associations interviewed, the project is pioneering and relevant for the zone, but there was a poor exchange of information and communication between them. Often, the associative actors in the district work on their own projects without interacting with each other. Moreover, in the case of ReSECEN, the project is aimed at a limited number of participants, both for technical and social reasons. At the moment, the system is set for 40 households, and to join the project it is necessary to establish a relationship of trust with FMF, which aims to tackle (energy) poverty but also to promote a culture of legality and civic and environmental education. In short, the initiative was primarily aimed at families close to FMF to experiment with a socio-energy innovation in a challenging district, involving low-income families.

Ongoing impacts

Although ReSECEN is a bottom-up initiative, data highlight that it is not a citizens-led project, but a novelty promoted by third sector organizations that operate in a complicated context. Here, residents involved with FMF had little knowledge of energy-saving practices (for example, they often did laundry with half loads at times of day not convenient for electricity prices, as reported by interviewed members, see below), and energy-environmental issues were not a priority or were not connected to social justice dimensions, as reported by both the FMF president and the LC president. However, the energy community is a socio-energy innovation that requires a certain level of energy and environmental awareness, some technical competences and the reconfiguration of energy consumption patterns based on the importance of environmental “value”.⁵ In particular, as 3E reports: «We are quite confident about economic benefits and impacts, we can calculate them, but not for other possible impacts. They depend on how the community will evolve, how members decide to use and share economic benefits, if they will be active part of it. The potential of socio-cultural impacts is high, we will see if and how there will be significant non-economic impacts» (3E #1). Similarly, another interviewee states: «I think we have to work on cultural aspects. To be part of a REC does not guarantee that you change your energy consumption if you think that the comfort cannot be reached with low use of air-conditioner» (FcS #2).

In this sense, non-economic impacts call for a training and educational process for people involved in the project that may lead to both new awareness on environmental issues and more sustainable energy practices. In our case study, promoters enacted initiatives to encourage this change. «There are families in severe hardship, so we are dealing with an explicitly social initiative, but we are also dealing with a sustainability initiative. For example, as it seems, they have learned that they need to turn off the lights, not waste energy, and they have also learned that there is no need to steal electricity» (FcS #1). More specifically, as reported by one of our interviewees:

We held an open meeting (...) on how to save energy and reduce electricity bills through everyday actions. With five interested families, we applied smart metering systems to their energy-intensive appliances and monitored them for a week. Afterward, we provided a report and discussed suggestions to reduce consumption with them. They were doing 3-4 laundry per day. «Our children need clean clothes», they said. It seems that they viewed cleanliness as a value in contrast to the district's degradation. (...)

⁵ These points was particularly stressed by UNINA energy experts. They refer, for example, to switch-off all electrical appliances stand-by to reduce energy consumption despite it can create some discomfort like the TV is not all the time immediately available just using the remote control.

We connected cleanliness with environmental issue, PV production with economic benefits, which changed their behaviour regarding laundry (...), they do laundry in more efficient way, of course not all of them, but many and now all of them have information that what they did, or do, is not convenient for them and for the environment

(LC #2)

One of the other possible impacts of energy community is to positively affect people outside the project due to formal and informal communication that spread its aims encouraging other actors to establish new initiatives. Excluding the common opinion emerged in interviews that this initiative contributes to an image of the district's revitalisation, we already mentioned that in 'East Naples' this impact seems not particularly easy to achieve, despite promoters' work: «We organise environmental education for young people who can then bring values of ecology and legality to their families. (...) With the project, we emphasise energy-saving practices, and members share information with their friends and neighbours. (...) Here, some families are connected to the grid illegally, but one family, in order to join the initiative, decided to sign a regular contract. This is an indication that our work is successful, even if on a limited scale» (LC #1). On the one hand, the economic conditions probably limit the chance of other district families to sign a regular energy contract; on the other hand, the ability to involve other parties in ReSECEN heavily depends on establishing and nurturing relationships between FMF and families not currently engaged with the Foundation's activities.

On the 'successfulness' of the project, there are two episodes reported by the FMF president that reinforce this point. During a public event to present the project in mid-2023 a journalist asked a ReSECEN member about the economic benefits of being part of an energy community, but she replayed: «Of course we will reduce our electricity bill, but we are here mostly for environmental reasons, to guarantee a future to our children» (FMF #1). In another occasion, a friend of a ReSECEN member participated for the first time to a meeting about energy community and the president started to explain to her the economic benefits of this project, but the woman said: «Yes, but I am here for the environmental issues». To which the FMF president commented: «It shocked me, I think that answer is proof that our work on environmental education, the energy community initiatives and so on, is working in the district, changing something thanks also to our families that are spreading what they have learned here» (FMF #1).

The actions of the promoters seem to be producing behavioural and perceptual changes, but these are very limited outside the ReSECEN and in some case even members lack some technical knowledge needed to manage energy issues: «We follow their suggestions, such as doing the laundry after 7 p.m. or fully loading the washing machine before running it. (...) I am not able to see if my actions positively affect my electricity bill, but I have learned that they should» (W #1). Additionally, proactive participation in the management

of the energy community is still an underdeveloped aspect as members help us to highlight. ReSECEN appears to be organised in a centralised manner, with decisions more communicated than discussed, even though there is some mediation between the members' expectations and those who effectively manage the project. «Almost all of us participate constantly in meetings even for energy issues when they call us. (...) We discuss what to do, they inform us about some initiatives, if a famous person, a politician, a journalist, or a TV programme will be here and what to do. (...) We have full confidence in the President, with whom we discuss, for example, if I can say something more, such as if I can complain that we are still waiting for the incentive» (W #2).

■ Conclusions

Our analysis allows us, within the limits of this case study, to problematise some points in the literature on energy communities. A first aspect concerns the role these initiatives can play in opening opportunities for social inclusion and socio-territorial empowerment. It has been highlighted how individuals with fewer social and cultural resources may not be adequately engaged by this innovation (Radtke and Ohlhorst, 2021). Our research highlights the complexity of involving these subjects, necessitating targeted actions by actors interested in promoting their social integration and enhancing their knowledge resources.

Second, the research revealed how the kind of 'community' defined in these socio-technical configurations shapes outcomes both for members and external actors (Kumar and Aiken, 2020). In the case of ReSECEN, limited connections emerge with actors external to the FMF and the East Naples area. This 'closure' seems dictated by the complex relationships of the promoters with the challenging context. Specifically, FMF aims to involve new members in its initiative through efforts to build trust and mutual understanding regarding goals and rules, thereby promoting perceptual and behavioral changes aligned with FMF's institutional objectives (mainly, the promotion of the value of legality). In the case of ReSECEN, promoters also need to raise awareness about energy-climate issues and provide necessary knowledge for managing the redistribution of power derived from members' ability to self-generate energy. These members are mostly part of FMF's existing community, which is currently characterized by strong leadership. In similar contexts, even the 'political aspiration' (Becker and Kunze, 2014) of these initiatives appears to be limited to certain actors (e.g., promoters), at least in the initial phases of energy community activities.

Third, this work highlights that for energy community innovation to express its full potential and be inclusive, it is necessary to implement a 'multilevel and bottom-linked' approach (Moulaert et al., 2019). In other words, projects must involve a plurality of actors (public, private, and the third sector) to promote inclusive learning processes and combat exclusion from knowledge

processes and social inequalities, especially for the most vulnerable actors.

Finally, our hypothesis that networks of actors activating the energy innovation process define its outcomes and processes seems reasonable. However, the data also indicates that the context where these networks arise has a significant role in determining the dynamics that are generated with the implementation of a REC. In this case, there is a need to establish a centralised organisation to govern the complexity of the context and initiate training pathways for ‘energy citizens’. Alternatively, there is a need to redefine consumption cultural models through mediation processes between existing values and expectations and new opportunities of novel socio-technical configurations. These considerations, however, require comparative studies across multiple energy communities to further explore our research findings.

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