RENEWABLE ENERGY COMMUNITIES: CONCEPTS, APPROACHES AND THE CASE STUDY OF TELHEIRAS NEIGHBORHOOD IN LISBON

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Abstract

Collective energy initiatives as Renewable Energy Communities (RECs) play a key role in reducing energy poverty and increasing energy citizenship, associated with various economic, social, and financial benefits for the locals. This paper aims to present a broad view of the concept of a REC focused on the European context, also systematizing a set of study cases to uncover key activities, technologies, advantages, and challenges of implementing this energy entity. In this context, a real world study case is explored in detail through the Telheiras REC development, where the implementation process was followed and is reported, and key outputs include photovoltaic simulations carried out in six buildings of the community.

Keywords: renewable energy community, energy poverty, energy transition, energy democracy, renewable energy, solar photovoltaic.

1 INTRODUCTION

The energy transition towards renewable energy sources, reduction of global warming effects, and achievement of sustainable development are some of the most important goals of this century. In this scenario of various climate agreements and objectives, citizen participation is an important pillar for the transition, where energy collective actions – such as Renewable Energy Communities (RECs) – play a keyhole in translating the needs of the population regarding energy and reducing energy poverty and vulnerability, where no citizen should be left out of this transition process, making it increasingly fair and democratic.
The main objective of this paper is to provide a study about RECs and the link between these energy organizations, energy poverty and energy citizenship, based on the real case of Telheiras REC.

2 METHODOLOGY

After a study and literature review about energy poverty, energy citizenship and RECs, a global analysis of these initial concepts and their interconnections is done, as the obtained results focus on how a REC can reduce energy poverty and enhance energy citizenship of its members. Then, the study case of Telheiras is analyzed, focusing on the implementation process – biggest challenges and the associated solutions – and how this energy organization acts on the local community, as well as six photovoltaic simulations for evaluating the potential of local renewable energy generation.

3 RESULTS AND DISCUSSION

3.1. Impact of RECs on the reduction of energy poverty (possibilities)

- Profits of the microgrid systems: surplus reached after the payback time of the systems can be utilised on workshops on energy efficiency, reduction of energy bills of the members and enhancement of energy literacy.
- Partnerships with the municipality: possibility of subsides on energy tariffs, higher energy security and reliability, enhancement of energy local actions provided by local authorities.

- Energy storage and flexibility: a REC can be associated with energy storage systems and energy flexibility practices, avoiding higher consumption on peak hours, and promoting reduction on energy bills.

3.2. Impact of RECs on the enhancement of energy citizenship (possibilities)

- Enhancement of energy literacy: a REC can provide sessions and events to discuss simple energy efficiency practices for the local community, enhance their conscience about climate change and their hole in the transition and helping the citizens to understand their energy needs (citizens not only as simple consumers, but as active players in the transitions).
- Increase on the acceptance of renewables: a REC can be the link between renewable energy systems and the population, enhancing the acceptance of clean energy and promoting the creation of local jobs and companies associated with these systems.
- Raise awareness about citizen participation in the transition: the REC is a proof of how important the citizen participation is to achieve the climate goals and objectives, even though many citizens still believe that this responsibility rests solely on the shoulders of local governments and authorities. A REC can also be seen as a way of translating the real needs of the local citizens can impact the local energy decisions.

3.3. Study Case: Telheiras REC

Telheiras REC faces important challenges during its implementation process, such as:
- Lack of knowledge about RECs by local governments (solution: constant participation in local events and a well-designed communication plan).
- Maintenance of engagement and proactivity of the voluntary citizens (solution: strong leadership figure).
- Authorization for the use of roof area of public buildings for photovoltaic systems (solution: partnerships with important authorities).
- Elaboration of a financing scheme (solution: partnerships with experts, as FCT-NOVA, Coopérnico and Energy Poverty Advisory Hub).

As the scheme includes social members and enhancement of energy literacy regarding household energy efficiency, Telheiras REC acts directly towards the reduction of local energy poverty, where the members will face lower energy bills based on renewable energy and higher knowledge about their energy needs, helping the most vulnerable ones to enhance the comfort inside their homes.
Regarding the photovoltaic systems, the six evaluated buildings are way more than enough to reach the generation for the pilot project, as the REC has complete conditions for starting its licensing phase.

REFERENCES

Chevalier, J.-M. (2009). The new energy crisis. The New Energy Crisis (6-59). Palgrave Macmillan UK. https://doi.org/10.1057/9780230242234_2
DellaValle, N., & Czako, V. (2022). Empowering energy citizenship amont the energy poor. Energy Research & Social Science, 89 (102654), 102654. https://doi.org/10.1016/j.erss.2022.102654.
Gui, E.M., & MacGill, I. (2018). Typology of future clean energy communities: An exploratory structure, opportunities, and challenges. Energy Research & Social Science, 35, 94-107. https://doi.org/10.1016/j.erss.2017.10.019.