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INCLUSIVE RENEWABLE ENERGY COMMUNITIES' PLATFORM: COMBINING LOCAL, VIRTUAL AND HYBRID RENEWABLE ENERGY COMMUNITIES

ABSTRACT

To reach the ambitious EU 2030 renewable energy targets, new innovative models and collective investment schemes are needed to release citizens' socio-economic potential to fully participate in the energy transition. The article aims to set the direction and basis for a concrete renewable energy communities (RECs) platform able to encourage the multiplication of RECs while ensuring the inclusion and empowerment of the most vulnerable parts of society. The REC platform is an interactive meeting, learning and investing point – a “one-stop shop” which connects REC producers with the customers, the urban and rural population, local and virtual members, (crowdfunding) investors and the most vulnerable individuals.

KEY WORDS: *communities, renewable energy sources, energy transition, vulnerable groups, inclusive platform*

Vključujoča platforma za skupnosti obnovljivih virov energije (OVE): Kombiniranje lokalnih, virtualnih in hibridnih skupnosti obnovljivih virov energije

IZVLEČEK

Da bi dosegli ambiciozne cilje EU na področju obnovljivih virov energije do leta 2030, so potrebni novi modeli in inovativne kolektivne naložbene sheme, prek katerih bi lahko sprostili celoten družbeno-ekonomski potencial prebivalcev za njihovo polno aktivacijo v energetske zelenem prehodu. V ta namen raziskava članka prek »platforme za skupnosti obnovljivih virov energije (S-OVE)« ponuja temelje oz. smer, ki lahko pripomore k večji participaciji prebivalcev in multiplikaciji tovrstnih skupnosti. Platforma predstavlja nekakšno interaktivno točko srečevanja, komuniciranja, učenja in investiranja ter deluje kot enotna točka (»vse na enem mestu«) za vse vpletene deležnike. Platforma za skupnosti OVE bi lahko povezovala proizvajalce s kupci, mestno prebivalstvo s podeželjem, lokalne in virtualne člane ter investitorje z najranljivejšim delom družbe.

KLJUČNE BESEDE: skupnosti, obnovljivi viri energije, energetske prehod, vključujoča platforma, ranljive skupine prebivalcev

1 Introduction

Attaining a green transition with the decarbonisation of energy production is one of the most critical challenges of the 21st century (Fuso Nerini et al. 2019). In recent decades, the global energy landscape has been completely reshaped in order to respond to the threat of climate change (de Bakker et al. 2020). The EU launched a new strategy by adopting common rules and new forms of cooperation with the implementation of the "Clean Energy for all Europeans Package" (CEP) in 2018/19. CEP goals are to boost EU competitiveness in global markets and at the same time to empower its citizens to become "active players" in the energy transition (European Commission 2019a). Each year EU citizens have more possibilities to become members of the expanding network of decentralised renewable energy communities (Xia-Bauer et al. 2022). Numerous community-led sustainable energy projects have emerged globally and European countries are the forerunners (Hewitt et al. 2019). In line with the Paris Agreement, the EU endorses a comprehensive energy transition agenda by promoting the usage of renewable energy sources (RES) and the implementation of a more decentralised

energy production system - where passive consumers become active energy producers (European Commission 2018).

Currently, the majority of the existing energy supply in the EU is still controlled by just a small number of large energy companies, which negatively affect energy affordability and a fair transition towards greener energy systems (Bouroumand 2015; Darmani et al. 2016). The unequal distribution of benefits from energy transition represents a major challenge in regards to "energy justice" (Hanke and Lowitzsch 2020). Decentralised energy system developments such as renewable energy communities (RECs) represent an innovative way to counter the domination of large powerful players and obstruct the advancement of the social and economic inequalities (Lacey-Barnacle 2020). After years of being marginalised as passive consumers, citizens are now being positioned as active central producers within energy systems (Nolden et al. 2020). Local energy initiatives like RECs in the EU are becoming a societal movement. Several thousands citizens now own and manage energy generation capacities which have a significant impact on the entire energy system (Koirala et al. 2018). Although in general RECs represent a real facilitator for energy transition (Ghorbani et al. 2020), vulnerable citizens still remain underrepresented in REC projects (Hanke and Lowitzsch 2020).

Several studies have explored the reasons that lead to the implementation of or joining RECs. There are financial reasons (increase savings, cost reduction), environmental reasons (environmental protection, reduction of emissions/carbon footprint), community reasons (sense of belonging, networking, community building), self-sufficiency reasons (self-sufficient reliable energy supply, energy independence), etc. (Iazzolino et al. 2022; van Summeren et al. 2020). All these motives are definitely important and have to be deeply examined for further improvement of future REC models. However, without the necessary upfront capital and without the possibility (in general) to create or join a REC, exploring the motives to join a REC become less important (secondary). It is often not a question of willingness to become a co-owner of a REC project but a concrete possibility to receive an initial loan for REC investment (Hanke and Lowitzsch 2020). The first and most important thing is to achieve extended availability of RECs - accessible to a larger proportion of the population.

We have nearly reached a global consensus that we must create and implement concrete and feasible emission reduction and decarbonisation. The investment requirements for the targeted emission reductions are substantial and in the EU they are not being met. In 2020 Pons-Seres de Brauwer and Cohen (2020) estimated an investment gap of €176 billion annually to achieve the EU's 2030 climate and energy target, which at the time of the analysis was a 32%

RES share of the EU's gross final energy consumption. However, the new recently revised Renewable Energy Directive raises the EU's binding renewable energy target for 2030 to a minimum of 42.5% (European Commission 2023d), which means that the investment gap is much higher than €176 billion. However, this ambitious target could in theory be achievable if European citizens were activated through special collective investment schemes. New innovative models are needed in order to unlock citizens' socio-economic potential to fully participate in the energy transition. One possible direction represents the development of new community-based energy business models (Nolden et al. 2020).

Based on the previously mentioned assumptions, it is necessary to investigate and explore new socio-economical policies, schemes, and solutions in order to propose an adequate and suitable model that could contribute to a quicker and stronger push towards energy transition. The main aim of the article is to answer the research question: how could a realisable platform to improve the proliferation of renewable energy communities be structured to include the empowerment of the most vulnerable members of society? There are several barriers that affect the creation and expansion of RECs, but one of the greatest is "availability" for the vast majority of citizens. The main goal of the article is to create a basis for a platform that will be "fit-for-all" and not just for the most educated and wealthy. The research data was collected through the analysis of scientific literature, EU policy recommendations and directives, concrete case-study analysis, and the analysis of the latest research project dedicated to RECs. Based on the research data, it was possible to construct a "REC platform," which will consider different citizens' lifestyles, mentalities, financial situations and geographic locations.

The paper is structured as follows. First, the terminology is defined. This is followed by two sections wherein the contextual background (social circumstances and variety of REC models) is presented, which lead to the main core section, where the inclusive and just "rec platform" is proposed. The last two sections represent a discussion on the implications of the new model and the conclusions.

2 Inconsistent terminology: defining the renewable energy community

Within academic scientific literature and non-academic papers, there is a confusing and incoherent use of various definitions which roughly address the same subject – renewable/clean energy cooperatives/communities. With the literature analysis it was possible to identify numerous terms that often have very similar explanations: e.g. (renewable) energy clusters, citizen-driven renewable energy projects, community-led sustainable energy projects, low carbon communities,

sustainable (energy) communities, local low carbon energy initiatives, renewable energy communities, renewable energy cooperative, citizen energy communities, local energy initiatives, grassroots energy cooperative/project/initiatives, renewable energy communities, community micro-grids, clean energy communities, community energy, civic energy communities, etc. Although several authors have tried to differentiate between terms by adding a specific connotation or perspective to each term, it may be said that in most cases all the different explanations address and encompass the same topic with little distinction. All the mentioned terms and their variations are (almost) de-facto synonyms. In some countries, one term is more popular owing to the local translation, and other times a term is not entirely adequate in specific regions due to ideological background. For example, in some eastern EU countries (e.g. Poland) the notion of a "cooperative" is negatively associated with state socialism promoted by the communist regimes before 1990 and is not usually used (Beckmann et al. 2015). However, at the EU level, Renewable Energy Cooperatives is one of the oldest terms used, and perhaps still the best known for the general audience (Capellán-Pérez et al. 2018; Magnani and Osti 2016).

In recent years, the term "community" has become quite popular, used and associated with specific energy projects. In relation to energy, the term community has various meanings and purposes; it is used as a stakeholder, a scale between individual citizens and (local) government, a physical place (such as a village or a neighbourhood), a social network (without geographic connotation), a collaborative process which involves citizens in decision making, or as a way of life (Walker 2011). Community has a strong normative dimension and is generally perceived as something positive. However, the term "community" has also been used to legitimise and popularise policy measures for offloading governmental responsibilities. Walker et al. (2007) are cautious about the loose definitions of community, which do not always imply "participation, empowerment or wider civic outcome". Moreover, a critical perspective for renewable energy communities should be maintained because "communities" are not always harmonious, inclusive and collaborative (Walker 2011).

Recently the term "renewable energy community" (REC) and its derivatives have been frequently used in citations and is becoming the most recognisable term; and from this point forward it will be exclusively used herein. "Renewable energy community" (REC) means a legal entity: (a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity; (b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities; (c) the primary

purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits (European Commission 2018).

RECs are found in various forms throughout Europe, including the co-ownership and co-management of wind turbines and solar farms, mini-hydro-electricity power plants, farmer's bioenergy establishments, distribution networks, etc. (Hewitt et al. 2019).

The social network of REC members (and organisations) is determined by its 1) geographic area (place-based REC) and/or with 2) shared interests (van Summeren et al. 2020). REC members are often but not necessarily part of the same geographic location (Hewitt et al. 2019). RECs could be "communities of place"—with shared values linked to a particular territory, and/or "communities of practice"—with shared ethics, world views or financial motivation (Magnani and Osti 2016; Seyfang et al. 2013). Similarly, Klein and Coffey (2016) acknowledged the REC duality – as a project managed by a group of citizens united by a common local geographic location and/or set of common interests.

3 REC for elites?: inclusivity challenge

Approximately 8% of EU citizens (cca. 35 million) were unable to keep their households adequately warm in 2020 (European commission 2023). The increase in energy prices that started in 2021 and even worsened with the COVID-19 crisis and the war in Ukraine in 2022, have likely aggravated an already problematic situation for many EU citizens (European commission 2023a). We are experiencing unjust energy transitions and facing a divergence between the new wave of extraordinary innovation and economic affluence, with the rise in social inequality (Lacey-Barnacle 2020). While a new group of privileged individuals and institutions take advantage of the energy transition, we are experiencing unprecedented social and economic inequality (Zucman 2019).

Several authors have noted a strong correlation between social inequality and the physical setting of new sustainable energy infrastructures (Lacey-Barnacle 2020), which is a consequence of systematic socio-economic deprivation and inability to join or create a REC (Catney et al. 2014). This phenomenon that Bridge et al. (2013) call "spatial difference" represents a major challenge, especially for future geographic distributions of RECs that should more adequately address issues of social inequality and social inclusivity (Bouzarovski and Simcock 2017). The unequal allocation of costs and especially benefits from the green energy transition has become an important topic for academic society and also for EU energy policymaking. The EU legislator recognises the potential of REC as

a vehicle to empower vulnerable citizens and requires that European member states ensure that RECs are accessible to all citizens, including low-income or vulnerable households" (European Commission 2018). The EU recognises the potential ability of RECs in regards to the empowerment of vulnerable citizens and it acknowledges the need to facilitate measures to boost the participation of vulnerable consumers in RECs. However, on an operational level, policymaking for the inclusion of vulnerable consumers in RECs is still insufficient. EU policymakers have not indicated how to achieve a greater participation in RECs from the most deprived social strata (Hanke and Lowitzsch 2020).

REC initiatives are conceived as egalitarian, but in practice some RECs "are more egalitarian than others" (Harnmeijer et al. 2018). The REC manifestation in the EU revealed several exclusive aspects where wealthier communities, which have more time, resources and capabilities, are usually more likely to develop their own local REC (Catney et al. 2014). The REC fundamental principle of "open participation" has not been truly achieved. For example, more than 70% of German REC members are highly educated, wealthy males (Yildiz et al. 2015). The main barriers to achieve a greater heterogeneity of REC members is financial. Raising sufficient (especially initial) equity represents a decisive barrier for the participation of the most vulnerable part of society with limited financial resources. Inducing low-income households to drastically save in order to engage in asset formation for the REC co-ownership is somehow irrational as it would keep the most vulnerable citizens in the poverty trap. Accumulating sufficient assets to participate in a REC and consequentially produce a financial return should be separated from basic savings. Some EU member states have introduced concrete measures such as feed-in tariffs and low interest rate credit programs that have effectively supported individuals joining and investing in a REC. However, the underprivileged have not benefited from these measures because the fundamental prerequisite to access or begin RECs is linked to initial equity capital. One of the main challenges in the coming years is to create innovative incentives and conditions that facilitate the creation of asset formation to enable wider inclusion and participation in RECs (Hanke and Lowitzsch 2020).

4 REC governance models: from local to virtual REC

REC projects typically associate market accessible technologies with innovative business models in context-specific arrangements. This implies that no two REC developments are the same, because apparent common features, like business models, RES typology, funding approaches, are assembled and adjusted to national and local specificity and requirements, and to available policies and

support during a specific time period (Walker and Devine-Wright 2008; Nolden et al. 2020). As previously mentioned, REC members are connected because of the geographical proximity, or/and by common interest. Local-based RECs encompass both dimensions (proximity and interest) and could rely on some very important local structural basis which contribute to the success of the project, e.g. community cohesion, local traditions, existing practices, personal social networks and volunteer work (Martiskainen 2017; Ornetzeder and Rohracher 2013; Seyfang and Longhurst 2016). "Participatory governance" is an important element in local RECs and affects decision making processes and empowerment. REC members have the possibility to decide on features that influence their community and lifestyles (Komendantova et al. 2021).

On the other hand, in recent years "virtual RECs" are becoming increasingly popular. Virtual RECs are not geographically constrained and their members could live and operate from anywhere in the world. This means that they are de-facto "only" interest-based communities. Virtual RECs mostly comprise energy generation and storage systems (mostly solar PV and batteries) run using advanced ICT technologies (use of sensors, advanced metering, cloud-based software and other ICT applications). Because virtual RECs are usually bigger, involve a more varied group of stakeholders, its members use more sophisticated technical solutions, and require a deeper understanding of electricity markets, they are usually established using the "top down" approach (van der Grijp et al. 2022). This is one of the main differences in comparison to local RECs, which are typically initiated using the bottom-up approach. Because the governance structure does not require regular in-person meetings, and it is possible for a member to be an anonymous "silent" member – investor, virtual RECs are often not considered "true communities".

Virtual RECs do not have a distinct definition in academic journals and are interpreted using several variations. They could be understood as portfolios of distributed energy resources aggregated and managed by an ICT platform, adopted by a network of members (van Summeren et al. 2020); they could represent a renewable energy sharing system, which enables peer-to-peer trading of renewable energy, where citizens can exchange or sell locally produced power with one another (peer-to-peer) or external markets (Iazzolino et al. 2022), or they could represent a REC, where its members do not necessarily live in close proximity to each other, and use ICT platform to manage, be informed or communicate, control the REC's daily operations etc.

In general, all RECs (virtual and local) are manifested in very different forms and governance structures, and in each country, region or even town or village we may find very different REC systems. There are different ownership models (from full community-owned to different variations of co-ownership) which has an

impact on the level of community involvement and decision-making (van Summeren et al. 2020). In the UK, for example, a REC could be developed as a “community development trust”, which allows for profit sharing with the (local) community as a whole, rather than just to investors (Harnmeijer et al. 2018). In France, where the energy system is very centralised, policymakers are trying to increase citizen participation in energy transition through special “crowdfunded” projects, initiated by municipalities with their capital and then in the second phase, continued with the participation of local citizens (citizen share offers) (Hewitt et al. 2019).

RECs are very different among each other regarding the basic functions they perform. Certain RECs possess entire (or shares of) renewable energy infrastructures (hydropower plants, wind turbines or solar farms), others (mainly) work as resellers of RES electricity. Some provide energy only to REC members but most sell electricity to the market. In addition, the internal governance is quite varied. In the common traditional cooperative model all members have equal voting rights, regardless of the ownership share (van Summeren et al. 2020). However, in some newer RECs, decision making (and voting) is mostly related and proportionate to the amount of invested capital, and not on the traditional REC principle of “one member - one vote” (Hewitt et al. 2019).

5 An inclusive and just “REC Platform”

As previously mentioned, there is a great need for massive funding in different energy systems to reach goals set by the EU for 2030. It is clear that the current socio-economic relations rooted in the energy system should be reformulated towards greater public participation and control (van Veelen and van der Horst 2018). Institutional socio-legal setup and civil energy networks should be redesigned to support polycentric heterogeneous RECs (Heldeweg and Saintier 2020). However, RECs are not a common entity, but are expressed and structured very differently, and are therefore not suitable for a one-size-fits-all policy solution (Martiskainen 2017; Rae and Bradley 2012). REC models should be segmented to reach and involve as many citizens as possible. To uncover the entire EU social potential it necessitates a stable regulatory framework that enables market access for new market players and innovative tools to attract new members. Extending the availability, accessibility and awareness of REC investment options seems a priority and necessity to encourage citizen participation in renewable energy projects (Pons-Seres de Brauwer and Cohen 2020). We must look further, and constantly re-invent our modus-operandi in order to find more innovative and accessible options to expand an immense social potential in order to achieve a prosperous, inclusive sustainable society.

The article proposes a comprehensive segmented REC scheme – called a “REC Platform”, which encompasses multifunctional and variegated forms of collective citizen participation in RECs. The platform for a REC (which should be accessible online and through a mobile app) would work as a “one-stop shop” for all the possible stakeholders involved in RECs (potential REC members, investors, legislators, producers, municipalities) and would offer a simplified and transparent interactive database comprising all the necessary REC regulations, accession forms, learning programs, etc. A one-stop-shop REC platform would remain optional for new RECs, who could choose (or not) whether to contact the platform organizers or create their unique innovative niche model that could remain completely autonomous. The aim of such agency is to avoid imposing rigid centralisation and uniformisation, and to be a non-compulsory, complementary advisory partner for the formation of the REC.

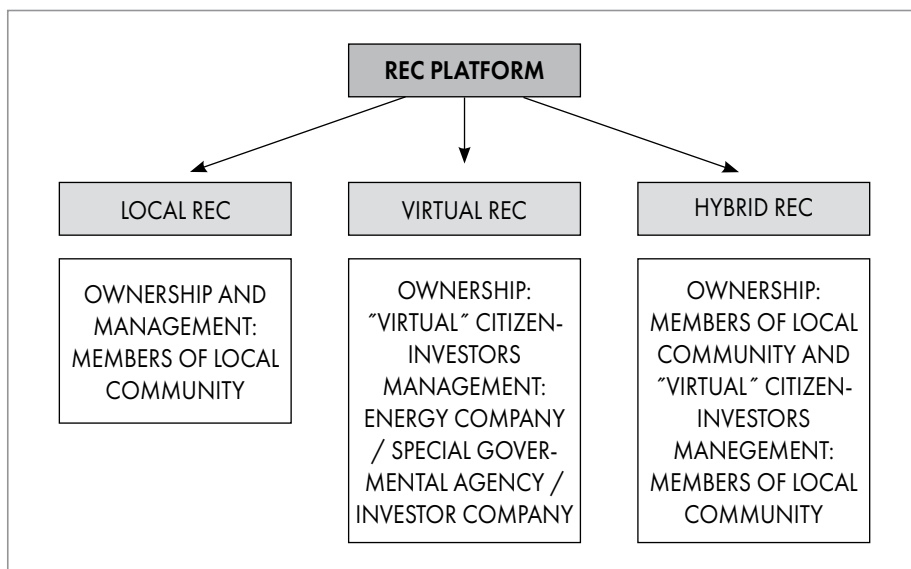
REC one-stop shops are expanding in the EU in recent years: (a) at the national level (e.g. “Osona Energía” in Spain, “Homegrade Brussels” in Belgium, “SHAREs OSS” in Croatia, “Energie Samen” in the Netherlands and (b) at the EU trans-national level (Energy Community Platform, Energy Communities Hub, SHAREs, REScoop.eu, etc.); and where recognised by the European Commission as an important tool to enforce REC implementation (see also “Setting up community energy one-stop-shops”, Energy Communities Repository; European Commission 2023b).

An energy community one-stop-shop is defined as an organisation that provides a range of services to energy communities in order to help them overcome barriers in the process of setting up their organisation and/or projects at different stages of the process (European Commission 2023b). One-stop-shop offices providing administrative, technical, capacity-building and/or financial assistance to RECs in this context have emerged as an effective way to support the set-up and development of energy community projects (European Commission 2023b). The Energy Community Repository also offers a comprehensive overview of practical digital tools for RECs (European Commission 2023c) which are especially useful as they derive from real already-implemented successful RECs (e.g. internal management digital services from the Spanish online REC platform Som Comunitats; the energy forecasting system from the Italian city of Magliano Alpi; the interactive energy software platform from the Croatian MARS, etc.). These already verified functional REC digital tools could potentially be adapted and upgraded within the new REC platform.

The proposed innovative REC platform would expand the prevailing advisory notion of the established one-stop shops and would also function as a “crowdfunding platform” where potential investors-members would transparently and easily

invest in REC shares and become REC members. From the “learning facilities” platform, it would be possible to book a personal or online training program for REC leaders and other members. Moreover, it would include special targeted measures through the “inclusive enabling framework” (see below). The new “REC Platform” is structured with three pillars. The first pillar represents the most traditional form of REC - the “Local REC”, where local REC members can find all the relevant information, news, regulatory procedures to access, register and implement their own REC plants. The second pillar is the “Virtual REC” where the local electricity distributor or special new agency investor or a private company could invite citizens to invest in their project (“crowdfunding shareholders”), who would receive in return a guaranteed investment profit. The third pillar “Hybrid REC” – support and facilitate local RECs which have not 100% covered their financial budget, to search and invite potential investors to join them as potential shareholders. The Hybrid REC scheme is a relatively new emerging form of REC which through their ICT platform could put together private and public, social and commercial, local and virtual (remote) stakeholders (de Bakker et al. 2020).

Graph 1: Renewable energy communities’ platform.



Source: Author 2023.

In order to expand the “REC elite bubble” (see Section 3), the new platform (for all three pillars) should be managed in such a way as to address and involve as many citizens as possible with special attention being paid to the most vulnerable. Because what constitutes vulnerable is very specific and complex,

it is crucial to comprehend the (local) culture, available investments, tradition of community-led initiatives, the preferences and mentality of local vulnerable households and distribution of national savings (Pons-Seres de Brauwier and Cohen 2020). The main obstacle remains a financial one as vulnerable groups simply do not have significant savings nor do they have access to loans. Therefore, an innovative structural measure – called an “inclusive enabling framework” should be set in place to (1) support vulnerable citizens in gaining access to the required financing and to (2) provide RECs with additional financial and other resources to facilitate the inclusion of vulnerable groups. It is essential that the proposed framework includes concrete and realisable actions that are easily applicable and based on already implemented good practices.

The “inclusive enabling framework” (inspired by – Hanke and Lowitzsch 2020) could comprise:

- schemes of incentives and direct subsidies for vulnerable citizens or for investments in RECs that would more effectively include vulnerable members (subsidies for vulnerable citizens could be tied to membership in a REC; these subsidies could be capitalised and paid out as a lump sum to join an existing or implement a new REC).
- zero or low-interest loans to facilitate access to finance for vulnerable groups
- tax exemptions for RECs who have a considerable share (e.g. 10-15%) of disadvantaged members
- “REC asset creation for vulnerable members” (comprising financial support and assistance to low-income households) which should be independent and separate from different social remunerations
- educational services, information gathering, training designed to facilitate the participation of the most vulnerable
- REC citizen funds as a financial basis for old-age provision
- the possibility to receive a part of their annual social transfers in a lump sum on the condition that the money is invested in a local REC
- one-time financial REC coupon - incentive directly transferred to the REC for each vulnerable citizen who becomes a member.

There are several case studies that have proven that RECs can considerably help the most vulnerable part of society to take advantage of the (renewable) energy transition. For example, the REC case study in Getafe (Madrid, Spain) shows that the implementation of the REC with a shared self-consumption solar power system led to significant savings in the electricity bills for households experiencing energy poverty. Various tools such as gamification, information platforms, workshops, and citizen participation initiatives, empowered local

deprived citizens and facilitated their active involvement in RECs (Parreño-Rodríguez et al. 2023). However, on the other hand Standal et al. (2023) in their study focussed on how REC enable energy transition in Latvia, Norway, Portugal and Spain, acknowledge that RECs alone are still limited in their ability to address “equal” distribution. They put forward that several dimensions such as adequate information to bring awareness and involvement, relevant support schemes and financial tools, and conducive regulations are issues that have to be solved through national policies. In the German REC case study, Bode (2022) identified that in order to establish “just procedures”, it may be helpful that RECs join forces with local energy counselling services who possess the know-how to implement consumer-friendly energy practices such as climate bonuses, subsidies for energy efficient appliances, energy efficiency counselling, information material in different languages, instalment payments, etc. REC projects can rely on these insights from local intermediaries and develop further feedback mechanisms to increase the participation of vulnerable households (Bode 2022).

However, RECs cannot always count on intermediary public agencies. For example, the relatively recent UK government cuts reduced local public services and new community-led organisations have emerged in order to help the most vulnerable citizens. One such example is the UK based community-led “Energy Cafés.” The UK Energy Cafés are usually short-term initiatives in a “pop-up shop” format held in various locations, e.g. town centre shops, churches, cafés, city farms, community centres or village greens. These initiatives provide various energy information and advice, and at the same time offer support and access to energy assistance for less advantaged citizens (Martiskainen et al. 2018).

Another potentially interesting financing feature for the REC platform could also be transferred from the Spanish *Sociedades Laborales* (SLs) scheme where unemployed persons can capitalise their unemployment benefits as a lump sum to start a new REC or to buy shares (ownership) of existing RECs (Lowitzsch et al. 2017). These schemes support unemployed citizens who join or build up a REC not only with access to capital but also with mentoring and practical know-how.

6 Discussion

Naturally, a REC is not a one-size-fits-all solution that will solve the climate change problem in one day. There are several challenges that slow the adoption of RECs. The proliferation of decentralised energy sources has already increased the un-balanced grid congestion, which has become difficult to manage (Iazzolino et al. 2022; Xia-Bauer et al. 2022). Apart from the grid capacities and other technical issues there are also other challenges to REC implementa-

tion: e.g. inadequate (or non-existent) regulation for RECs; lack of equipment, knowledge and expertise, community participation, (un)just allocation of costs and benefits, etc. (Koirala et al. 2018). The present research is focused predominantly on the availability issues and on suggesting mechanisms for inclusive and fair distribution of funding and for sustainable long-term benefit allocations through new REC systems. The Energy Union's regulatory framework should be re-adapted in order to facilitate and operationalise support for more inclusive citizen participation (Pons-Seres de Brauer and Cohen 2020). A supportive legal and policy framework is fundamental for RECs to be successful (Hewitt et al. 2019). In addition, adequate regulation should offer basic protection for REC members (Heldeweg and Saintier 2020), which is especially relevant for those unseen vulnerable households living in marginalised "energy peripheries" (Lacey-Barnacle 2020). The "inclusive enabling framework" for RECs is a concrete option for policymakers in order to facilitate the inclusion of marginalised citizens and transform them into active co-owners, which will consistently improve their socio-economic situation.

The idea to release and take advantage of citizens' socio-economic potential should be seriously considered. For the mass participation of citizens, there is a need to raise the general awareness about REC benefits and availability, and to educate citizens about the basics of RECs. Today, in order to initiate a REC it requires substantial analytical processing, information gathering and (expensive) legal and economic consultancy (Hanke and Lowitzsch 2020). Rather than just offering grants to an existing REC, it would be more advisable that potential (and existing) REC members also receive adequate training regarding technical installations, management (with legal and financial advice; guidelines concerning applications and permits) and governance (for facilitating decision making). The proposed "REC platform" should incorporate these features and offer a comprehensive learning program to all its existing and potential members, with a special focus on REC leaders. REC leaders are crucial and sometimes indispensable for seeking new funding resources, teaching new skills (forming REC members), engaging with all stakeholders and (in general) fostering REC development (Ghorbani et al. 2020; Martiskainen 2017).

From the perspective of the local context, Slovenia is in front of a very rare opportunity to release its socio-economic potential in order to create a wealthier, just and more sustainable society. Slovenian citizens currently have more than 24 billion euro in passive cash deposits in banks which daily lose their real value due to high inflation – 8.4 % (Statistical Office of the Republic of Slovenia 2023). At the same time, Slovenians have the traditional know-how to build RES capacities and the policymakers and other decision-makers seem to be more

aware of sustainability issues. There is a positive inclination to create a stable investing bridge between the enormous saving to be transferred into RES, but it is impossible to predict if it will really materialise. The "REC platform" together with the "inclusive enabling framework", could show a possible direction that would bring Slovenia and Slovenians through the energy transition in much better condition. In order to create a transversal wealth accumulation in Slovenian society, all citizens should own valuable and profitable assets. Not only the wealthy, but also the most vulnerable part of society should be included in the energy transition. It is time to analyse and perform a comprehensive check-up of Slovenia's capabilities and build several all-inclusive investing schemes which would address a vast majority of the population. The most important is to address the "unseen" and to finally create durable assets which could create a security-base for future generations.

7 Conclusion

The various forms of REC manifestation will probably maintain the role of incubators for ideas that could later be adopted (in the second phase) by the mainstream (Hewitt et al. 2019). However, we are now running out of time in front of irreversible climate change catastrophe, and we have to shorten the innovation transfer time - from niche incubators towards mainstream manifestation. New socio-economic innovations and evolutions of energy system models are needed in order to boost citizen participation in the energy transition (Nolden et al. 2020). To include a significant proportion of the population, we have to rethink why RECs are (in most cases) constructed mainly for the well-educated upper-middle class. RECs should not be an elite privilege. The participation and empowerment (especially through asset formation) of vulnerable citizens is crucial for the overall success of the energy transition, which depends on the involvement of all societal groups (Hanke and Lowitzsch 2020). Because we all have different preferences, live in different micro and macro environments, have different socio-economic backgrounds and financial capacities, and have different lifestyles, it follows that the strategies to address and convince citizens to join and/or invest in a REC should also be differentiated. The REC Platform, which proposes such segmentation through three different pillars (local, virtual and hybrid RECs), would represent an interactive meeting, learning and investing point – a "one-stop shop" for all the stakeholders involved. It would upgrade the existing counselling activities of the current one-stop shops, because it would also represent a real crowdfunding platform where potential members could invest in REC shares. A REC platform would connect the producers with the costumers,

city population with the rural citizens, local and virtual members, investors with the most vulnerable part of society, which would be additionally supported and directed through the “inclusive enabling framework.”

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