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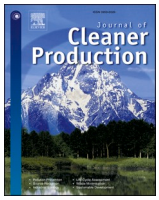
Citation for the original published paper (version of record):
Boije af Gennäs Erre, E., Palm, J., Bergek, A. (2025). Community of place or community of interest: challenging the role of citizen engagement and
proximity in energy communities in Sweden. Journal of Cleaner Production, 510.
http://dx.doi.org/10.1016/j.jclepro.2025.145654

Journal of Cleaner Production 510 (2025) 145654

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro



Community of place or community of interest: challenging the role of citizen engagement and proximity in energy communities in Sweden

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A B S T R A C T

There is an ongoing debate about what should be considered an energy community (EC), particularly in terms of citizen engagement and the proximity of community members to renewable energy production. The type of EC that exclusively engages with actors in a certain geographical location is defined as a community of place (COP). In contrast, communities of interest (COI) do not limit membership to the area where the renewable energy project is located but include members with shared interests. This study explores the distinction between COPs, defined by geographical proximity, and COIs, united by shared interests. Using Swedish solar energy communities as examples, the paper assesses five key elements—financial benefits, range of actors, distribution of voting rights, decisions on technology scale, and level of community engagement—to determine whether the studied ECs are COPs or COIs, and how this impacts the degree of an EC's community orientation. Each element is assessed on a five-point scale, where characteristics that are deemed more community-oriented correspond to a high score, while outcomes that are deemed less community-oriented correspond to a low score. Most of the ECs in our analysis allowed non-local actors to join them and a vast majority of the ECs included members based on their interest in solar power rather than the member's proximity to the solar plant(s). Apart from their exclusively local connection, the COPs and COIs thus shared similar characteristics. We conclude that all the Swedish ECs offer low-effort citizen engagement in the energy transition but are not arenas for building strong social commitment between their members. The findings challenge conventional dichotomies between COPs and COIs, suggesting a more nuanced understanding of community engagement in energy projects is needed.

1. Introduction

In recent years, both academic researchers and policymakers have introduced energy communities (EC) as a means to engage citizens in the increasingly decentralized energy market. In the European Union's clean energy for all Europeans package (CEP), two versions of ECs were introduced in two different directives.[1] In both directives, ECs were defined as voluntary, member-controlled initiatives to organise cooperation around energy-related activities in a way that emphasizes a variety of benefits and rather than only financial profits. Combining the environmental advantages of renewable energy with the socio-economic benefits associated with an engaged local community is intended to help develop a decentralized system that is local, renewable and participatory, and at the same time contribute to a prosperous community and the energy transition (Mihailova et al., 2022; Palm, 2021).

The CEP allows member states to define what ECs should include, such as what actors are allowed to participate and whether or not the membership should be dependent on physical proximity to the renewable energy project (Savaresi, 2019). When transposing the directives into national regulations, member states are thus able to adapt the EU version of the EC into a national form that suits the country's specific characteristics. In this context, previous research emphasizes the significance of acknowledging national differences and taking into account the historically and geographically influenced nature of ECs (Palm, 2021). This suggests that what may be considered ideal in one context might not be in another, even within the confines of the same country. However, empirical research remains limited on how these differences manifest in practice and how specific organisational forms affect participation, benefit distribution, and governance (Petrovics et al., 2024). There is also a lack of comparative studies analysing existing ECs using a common framework, particularly in the context of solar energy. This study addresses these gaps.

In both research and policy, there is a tendency to idealize ECs as locally-owned, citizen-driven initiatives rooted in place-based social ties that offer broad stakeholder benefits (Bergek and Palm, 2024; Walker et al., 2022). The type of EC that exclusively engages with actors in a certain geographical location is commonly known as a community of

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[1] There are two versions of energy communities introduced by the CEP that member states need to take into consideration: "citizen energy communities" (CEC), which were introduced in the revised Electricity Directive (IEMD) [12], and "renewable energy communities" (REC), which were introduced in the revised Renewable Energy Directive (RED II) [13].

https://doi.org/10.1016/j.jclepro.2025.145654
Received 20 August 2023; Received in revised form 25 April 2025; Accepted 4 May 2025
Available online 6 May 2025

List of abbreviations

CEP	Clean energy for all Europeans package
COI	Community of interest
COP	Community of place
EC	Energy community
MUC	Municipal utility companies

place (COP); this is the most prevalent understanding of ECs in the literature (Musall and Kuik, 2011). COPs can be compared with communities of interest (COI), which are not confined to the place where the renewable energy projects are located but rather include members with shared interests (Bauwens et al., 2022). Given that the original intention of the EC concept was to enable local communities to have a significant impact and investment in renewable energy projects, COPs have emerged as the more favoured organisational structure in comparison to COIs (Baxter et al., 2020). COPs are preferred since those facing the most tangible and visible risks in relation to a renewable energy project, such as noise and landscape changes, should also be the ones benefitting from the revenues from the wind turbines or solar farms (Pellegrini-Masini, 2020). In contrast, COIs have been described as "robbers" of local communities, where members who do not live close to the plant, and therefore do not experience the potential negative consequences of the project, make decisions about local assets, deplete the local community of these assets and receive all profits from the energy production (Walker et al., 2022).

However, this line of argument is based mainly on studies of wind ECs, and there is a lack of studies analysing the characteristics of COPs versus COIs in relation to other energy sources, such as solar energy. More specifically, few studies look at how solar ECs make decisions and distribute their profits, and to what extent they consider the local communities where their solar plants are located. This lack of research is notable given the increasing number of solar ECs being established, ranging from grassroots cooperatives using donated land to municipality-led initiatives with regional or national memberships (Domenteanu et al., 2024). These examples demonstrate a rich diversity in practice that has not yet been systematically studied. This will be done here using a number of Swedish solar ECs as examples.

This lack of research is particularly relevant given the diverse ways in which solar ECs have emerged in Sweden. For instance, one EC was initiated through a local study circle and developed into a cooperative that installed solar panels on donated land—an example of bottom-up, place-based engagement. In contrast, other ECs have been initiated by municipal utility companies (MUCs), involving national members and reinvesting revenues into additional renewable production rather than returning dividends to local citizens. These practical variations challenge simplistic assumptions about proximity, ownership, and benefit distribution, and illustrate the need for comparative analysis of organisational models and their consequences. This article examines a selection of Swedish solar facilities that identify themselves as ECs with the aim of analysing how their organisational structures align with the distinction between COPs and COIs. The analysis focuses on five key elements: financial benefits, actor involvement, distribution of voting rights, technological scale, and level of community engagement. Each element is assessed on a five-point scale, where characteristics that are deemed more community-oriented correspond to a high score, while outcomes that are deemed less community-oriented correspond to a low score. This method enhanced the comparison between the different ECs and the rationale for its use is outlined in the theoretical framework and the methods and materials section.

This article begins with an overview of previous research on COPs and COIs together with a description of the theoretical framework used to identify the elements to be assessed. Thereafter follows a discussion of the methods and materials and how the analysis of the ECs and the five elements was carried out. Subsequently, the results from the analysis are presented. The article ends with a discussion and a conclusion. An appendix containing more details on the analysis of the separate ECs is also attached.

2. Previous research on COPs and COIs and analytical framework

Several attempts have been made to define and delimit the EC concept so as to render it concrete and measurable (Bauwens et al., 2022), not least to protect it from being coopted by renewable energy projects that do not live up to the standards of ideal ECs (Bergek and Palm, 2024). According to previous literature, an ideal EC project usually includes collective ownership, questions pre-existing energy market structures, and promotes social and ecological values (Becker and Kunze, 2014). Based on these ideas, Walker and Devine-Wright (2008) identify two dimensions that reflect the degree of community-orientation of renewable energy projects: a process dimension that accounts for who the project is set up and run by, and an outcome dimension that accounts for who the beneficiaries are in economic and social terms. They argue that projects characterized by open and participatory processes as well as local and collective outcomes have a strong community orientation, whereas projects without these characteristics should be viewed as less community-oriented, or perhaps not as ECs at all. This article focuses on two aspects relating to these dimensions that have been extensively discussed in previous literature: the role of citizen engagement in ECs and the importance of "the local"—i.e., geographical proximity to the renewable energy project.

In terms of *citizen engagement*, ECs can be organised in different ways in terms of who owns, has access to and benefits from the energy production (Ptak et al., 2018). How an EC is organised is dependent on who initiates and manages it (Cilio et al., 2024), as well as the legal forms (Lowitzsch et al., 2020) and financing schemes that must be adhered to (Soeiro and Dias, 2020). There is a strong preference within the EC literature to emphasize the importance of citizen engagement and influence (Otte et al., 2024). However, the formation of an alliance of different actors has also been highlighted as important in earlier research (García-Martínez et al., 2022; Gui and MacGill, 2018). In this regard, municipalities can be instrumental in the successful implementation of an EC (Palm, 2023). A municipality can contribute funding and knowledge, as well as increase the level of support from citizens (Hartmann and Palm, 2023). Municipally-owned energy utilities have historically also played an important role in the emergence of ECs (Heldeweg and Saintier, 2020; Magnusson and Palm, 2019). In an increasingly complicated energy market, with low policy support for ECs, expanding the types of actors that are included in the EC is viewed as a solution to increase the number of ECs (Nolden et al., 2020). In our analysis one element explored is how different initiators of EC projects influence their organisation and outcomes.

With regard to *geographical proximity*, the most prevalent understanding of ECs equates them with COPs—i.e., communities that are defined by geographical boundaries and engage people who live within these boundaries (Bauwens et al., 2022). In contrast, COIs are bound together by a common interest that transcends the site of the renewable energy project and can involve national and international actors (Walker et al., 2022). COIs are often viewed as less just and democratic than COPs because they export decision-making outside the local community (Bergek and Palm, 2024). Moreover, as members of COIs do not necessarily live in close proximity to the renewable energy project, they do not experience the potential (negative) consequences of the projects, but may reap the financial benefits (Baxter et al., 2020). However, the localness of an EC does not guarantee financial inclusivity, as renewable energy projects can exclude those who do not have the means to invest in them (Savaresi, 2019). Furthermore, while a COP can be initiated by local actors to pursue common goals and benefits, the local community

is not one entity, but rather a mix of several different interests that can collide, and local EC projects have also faced resistance in the past (Savaresi, 2019). While COIs cannot guarantee consensus within the local population either, they are associated with other benefits, such as providing funding when local financing is scarce, as well as an ability to overcome knowledge barriers as a result of involving a broader group of members (Medina-Bousoño and Sierra, 2024).

There is, however, a lack of studies looking at whether it matters if an EC is a COP or a COI, which is something we will address in this article. Hicks and Ison's (2018) community renewable energy development framework was used as a starting point to find relevant analytical criteria. This framework was chosen since it adheres to the above-mentioned notions about the importance of citizen engagement and spatial proximity but presents these as spectrums rather than distinct categories; we found this to be a more suitable approach when analysing the organisational forms of Swedish ECs in terms of COPs and COIs.

We used the five essential elements defined in the framework as shaping a renewable energy project and contributing to achieving desired outcomes in our comparison of COPs and COIs in Sweden: community engagement, choice of actors, decision-making, technology and scale, and finance. The community engagement element captures who is involved in the development of the project and what forms that involvement takes. The choice of actors element defines the makeup of the desired community, which is strongly tied to a preference for local or non-local actors. Decision-making refers to which actors have influence over decisions concerning the EC. The element for technology and scale captures what technology the EC invests in, how large that investment is, and the purpose of that scale. Finally, the finance element defines who the project financially benefits.

For each of these elements, the framework includes a spectrum that exemplifies how ECs can range from more to less community-oriented. The sum of the elements on the spectrum indicates whether the community has a strong or weak community orientation. As illustrated in Fig. 1, ECs with a strong community orientation form a robust connection with the local community by involving the members in activities and decision-making. These ECs exclusively include local actors and stakeholders, scale the project for local demand, and financially benefit the local community. On the other hand, ECs with a weak community orientation have limited engagement with local actors and stakeholders, have fewer connections to the local community, concentrate the decision-making power, scale the project in line with financial interests, and distribute the financial benefits to the (non-local) stakeholders.

As our purpose is to explore how Swedish ECs are organised and how their organisational structure adheres to the divide between COPs and COIs, we analyse them in relation to five elements: level of engagement, range of actors, distribution of voting rights, decisions around scale of technology, and distribution of financial benefits (Hicks and Ison, 2018). Following Hicks and Ison (2018), a spectrum was used for each element. We translated each spectrum into a five-point scale, where EC characteristics that are deemed more community-oriented correspond to a high score, while outcomes that are deemed less community-oriented correspond to a low score (see Table 1). For example, on the actor spectrum, an EC would receive five points if it consisted of only local actors, but one point if it included only actors from outside the local community where its facility was located.

When deciding how to score an item, various considerations were made. The authors started by individually assigning a score to each EC. When the scores varied, a joint reanalysis was conducted to come to a consensus. For example, we judged roof-top solar panels to be less intrusive and therefore more appropriate for the local context compared with a solar park since they are smaller and do not cover the ground. An association's choice of where to place its panels thus influenced its score on this scale. Additionally, associations that considered whether the land (or building) they placed their panels on was suitable for other purposes scored higher than those who did not take such potential conflicts of interest into consideration. Another factor that played into the placement was political will. Some of the associations were founded by municipal companies that were motivated to invest in solar panels because of municipal renewable energy goals. This political will of the local community was to some extent given a higher score. The fact that several researchers conducted the analysis ensured consistency in the data coding.

At an early stage of the analysis, we realized that the ECs' intentions had not always been implemented, at least not at the time of the study. For example, while board members of an EC might have had clear ambitions to engage members in initiation and management, members were not always interested in participating in such activities. To capture these discrepancies between intended characteristics and the characteristics that in fact were in place, we divided the assessment into "intended characteristics" and "actual characteristics". Intended characteristics are defined here as characteristics that are described in the ECs' statutes and websites, whereas actual characteristics are the genuine outcomes based on member lists, organisational models in use, and the motive as expressed in the statutes for using a particular financial model (see also Appendix A).

3. Methods and materials

The Swedish energy system is mainly centralized, with nuclear and hydropower accounting for 70 % of total electricity generation in 2022, while wind and solar generated 19 % and 1 %, respectively (Statistic Sweden, 2023). Nevertheless, solar power production is growing. The number of grid-connected photovoltaic (PV) systems increased by 46 % between 2020 and 2021 (Swedish Energy Agency, 2022).

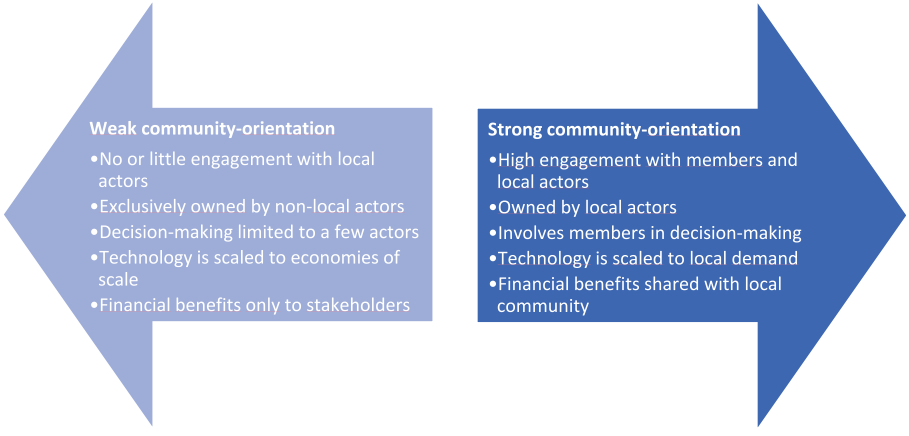

Fig. 1. Spectrum defining more or less community orientation.

Table 1
The five spectrums and their associated five-point scales (adapted from Hicks and Ison (2018).

	1 Weak community orientation	2	3	4	5 Strong community orientation
Level of engagement: by what means and how often is the project's identified community engaged?	Starts late, occurs rarely, and uses limited methods	Occurs only at key points in time during a project using limited methods	Occurs via various methods but only at key points in time	Starts early but is sporadic and uses several methods	Starts early, occurs often, and uses a broad range of methods
Range of actors: who are the actors that comprise the desired community?	Only non-local organisations, businesses, and government	Mix of all actor types; more non-local than local actors	Mix of all actor types; more local than non-local actors	Local individuals, organisations, government, and businesses	Only local individuals
Distribution of voting rights: which actors have power and influence in the decision-making process?	All voting rights held by one or a few actors	One vote per share	Limit on shareholding to ensure that no individual actor holds a controlling interest	Some actors get more, fewer, or no votes	One vote per member
Decisions around scale of technology: what is the technological scale and what is the purpose of that scale?	Scaled to maximize economic efficiency	Scaled to local demand	Scaled to gain economic efficiency with some consideration for appropriateness to the local context	Balanced between achieving economies of scale and appropriateness for the local communities	Scaled in relation to local energy demand and local agreements
Distribution of financial benefits: where does the money go after all costs are accounted for?	Dividends to non-local investors; i.e., surplus leaves the local economy	Dividends to both local and non-local investors	Dividends to local, with local economic flow-on effects	Partly to community, partly as dividends to local investors	Community fund to be used for communal benefit

Citizen-led energy projects have existed in Sweden since the 1990s, when the first wind cooperative was established. Due to the domination of large players on the Swedish energy market, it has been difficult to establish grassroots initiatives (Kooij et al., 2018). However, despite unfavourable conditions (Magnusson and Palm, 2019) and the fact that Sweden has not yet introduced any supporting legislation on energy communities (REScoop, 2023a), at least 82 active EC projects were recently identified in Sweden, most of them wind cooperatives (REScoop, 2023b).

Solar energy communities were identified by searching the Swedish Energy Agency's database, Cesar, which includes organisations registered in the Swedish electricity certificate system, as well as the Swedish company registry. The key words used were "solar" and "economic association". This search was complemented by a Google search on solar cooperatives and solar communities. This study includes all identified solar ECs that were active in Sweden when the search was conducted in the autumn of 2021 (see Table 2).

Data was collected through interviews and document studies, and the analysis is based on both of these sources. The use of multiple sources of data (interviews and documents) is a way to cross-verify and strengthen the validity of the findings. To identify and describe the organisational models of the studied energy communities, secondary data from the ECs' websites were complemented with semi-structured interviews with the chairperson or an assigned contact person. The interviews surveyed different themes, spanning from the EC's initiators' aims and motives and the activities they conducted, to how the organisation was structured (see Appendix B). Thirty interviews were conducted at the beginning of 2020 and in the late autumn of 2021, each lasting 45–60 min. The interviews were transcribed and sent to the interviewees to ensure that the recorded data reflected the participants' responses accurately.

The transcribed interviews were analysed in NVivo with an open-ended coding method similar to a conventional content analysis (Hsieh and Shannon, 2005). In the first round of the coding process, the material was structured into organisational codes. The open-ended coding process provided an overview of the material and assisted the initial analysis, where patterns were discovered. The next round of coding was a directed content analysis informed by the elements of the theoretical framework (i.e., range of actors, distribution of voting rights, distribution of financial benefits, decisions around scale of technology, and level of engagement).

4. Results

Based on their different characteristics, we developed three categories of ECs in our data: ECs with strong local connections; ECs with strong local connections that are open to non-local members; and ECs initiated by an MUC. The results are presented in accordance with these three groups.

Table 2
Interviewed energy communities.

Energy community	Economic model	Number of members	Number of informants	Number of interviews
Energy community #1	Monthly deduction on electricity bill in accordance with shareholding	5–50	1	1
Energy community #2	Reinvestment in solar panels through selling shares	100–150	3	3
Energy community #3	Reinvestment in solar panels through selling shares	5–50	1	2
Energy community #4	Annual dividends based on shareholding	5–50	2	2
Energy community #5	Annual dividends based on shareholding	200–250	1	2
Energy community #6	Monthly deduction on electricity bill in accordance with shareholding	100–150	1	2
Energy community #7	Annual dividends based on shareholding/reinvestment in solar panels through selling shares	500–1000	4	7
Energy community #8	Monthly deduction on electricity bill in accordance with shareholding	No data	2	2
Energy community #9	Monthly deduction on electricity bill in accordance with shareholding	No data	3	2
Energy community #10	Monthly deduction on electricity bill in accordance with shareholding	1000+	3	4
Energy community #11	Monthly deduction on electricity bill in accordance with shareholding	200–250	1 3	

4.1. Group 1: COPs with strong local connections

This group consists of the only two ECs (#1 and #4) that are clear examples of COPs: they mainly engage with local actors and the financial benefits that are generated remain in the local area. Both received high overall scores in the assessment (see Table 3 and Appendix A for details) and thus are among the most strongly community-oriented of the eleven ECs, with EC #1 receiving the highest overall score of all the ECs.

4.1.1. Level of engagement

The origin of the two ECs was similar: both started as study circles (for renewable energy and solar PV, respectively) in which some participants realized they shared a common interest in solar PV and decided to come together to invest in the technology. They found suitable locations for the solar panels through the participants in the study circles:

> I was the one who initiated this in the village by starting a study circle on solar power … I have some land, and I said that I can give up a piece of that land for a solar park if that's needed, and that's what happened. – Interview, EC #1

However, the ECs differed in how they engaged the members once they were founded. While EC #1 divided the responsibility for the maintenance of the solar panels between the members, EC #4 did not involve their members in any activities. Still, since both ECs were initiated by citizens and established through civil society organisations, they both received high member engagement scores.

4.1.2. Range of actors

Although the statutes of the two ECs did not formally restrict membership to local individuals and companies, their members were nearly all local. They also had relatively few members compared with the other ECs. In EC #1 this was intentional, as the solar plant was meant to supply a small village with solar electricity. In EC #4, the founders' intention was for the EC to inspire a social movement with many members, but since just a few local actors bought many of the shares, this intention was not realized.

4.1.3. Distribution of voting rights

In accordance with the law that regulates economic associations in Sweden, all ECs apply a "one member, one vote" system, where members have the same formal influence regardless of how many shares they hold. Additionally, both members and the board were allowed to submit motions at the annual meeting. This group therefore scored high on this element.

4.1.4. Decisions around scale of technology

The two ECs differed in terms of how the scale of their solar plants was determined. EC #1 scaled their plant in accordance with the members' electricity demands, while EC #4 scaled theirs to cover the available surface area. However, both ECs considered the local context before installation, making sure that neighbours were not disturbed and that no productive land was used:

> I own the land where the solar park is located, and I have leased it to the EC for the coming forty-nine years. So, there's no one who can oppose the solar park, and you can't really see it from the road. – Interview, EC #1

Because of the relatively small scale of both plants and the consideration given to the local context, both ECs scored relatively high on this element.

4.1.5. Distribution of financial benefits

Both ECs provided financial benefits to their shareholding members, but they used different models for distributing them. Members of EC #1 received a reduced electricity price compared with the spot market price, whereas EC #4 offered a yearly dividend per share, the size of which was decided at the annual meeting.

Since the members of both ECs were local actors the revenues stayed within the local area, but there was no mechanism to redistribute revenues to non-members in the local community. However, in the case of EC #4, a new ground-based power grid was installed to transfer power from the solar panels to the main grid. As part of the process, nearby households were also connected to this grid:

> … it was good for the village as well because there were about thirty households that got much better electricity facilities. It was a benefit that came with the collaboration between the EC and the DSO [Distributed System Operators] that nobody had thought of. – Interview, EC #4

Although this EC's solar installation thereby benefitted the local community, we followed Hicks and Ison's original idea and considered only direct financial benefits when assessing the ECs in this dimension. Both projects were therefore placed in the middle of the spectrum.

4.2. Group 2 – strong local connection but open to non-local members

As shown in Table 4, the three ECs in this group (#2, #3 and #5) also scored relatively highly when the scores for all five spectrums were summed up (see Appendix A for details). In contrast to the first group, however, they had non-local members.

4.2.1. Level of engagement

Two of the ECs (#2 and #3) were initiated by residents, whereas the third (#5) was initiated by an MUC. In all three ECs, however, community engagement began early through various channels, such as study circles on renewable energy or study visits to other solar ECs.

> … we organised a study visit to EC #5 and looked at their facilities and learned about how they had started their cooperative, and then we said on the bus home that if they can do this, we should be able to do it as well. – Interview, EC #3

The ECs engaged their members sporadically through lectures on renewable energy, but mainly through newsletters and annual meetings. EC #5 also provided support and guidance to its members in installing their own solar PV systems in accordance with its overall aim to demonstrate that solar PV was a viable option in Sweden.

In contrast to Group 1, this group also engaged non-members, using efforts such as giving lectures in schools, lobbying for better policies, and actively exchanging information with other ECs.

Table 3
Scores of the ECs in Group 1 in relation to the five elements in Hicks and Ison's framework (2018).

Energy community	Financial	Actors	Decision	Scale	Engagement	Overall score
#1						
Intended outcome	3	5	5	5	4	22
Actual outcome	3	5	5	5	4	22
#4						
Intended outcome	2	2.5	5	4	4	17.5
Actual outcome	3	4	5	4	4	20

Table 4
Scores of ECs in Group 2 in relation to the five elements in Hicks and Ison's framework (2018).

Energy community	Financial	Actors	Decision	Scale	Engagement	Overall score
#2						
Intended outcome	2.5	3	5	4.5	4	19
Actual outcome	3.5	3.5	5	4.5	4	20.5
#3						
Intended outcome	2.5	2.5	5	4.4	4	18.5
Actual outcome	4.5	2.5	5	4.5	5	20.5
#5						
Intended outcome	2	2.5	5	3.5	4	17
Actual outcome	3	3	5	3.5	4	18.5

4.2.2. Range of actors

The main aim of these ECs was to expand renewable energy locally, regionally, and nationally, and they financed their solar plants by selling shares. Consequently, they aimed to attract as many members as possible. They expressed no wish to have only local members and did not have any membership restrictions. Instead, they encouraged both local and non-local actors to join their ECs. EC #2 even chose to change its name to one that sounded more regional (rather than local) to attract members outside of its municipality. This indicates that these ECs are COIs rather than COPs, as illustrated by the following quote from EC #5's statutes, which states that membership in the EC is dependent on "[a] wish to promote and propagate the expansion of solar power and the development of related areas". The ECs in this group, therefore, received a lower score than ECs with only local members, and were placed in the middle of the spectrum.

4.2.3. Distribution of voting rights

In accordance with the law that regulates ECs (and other economic associations) in Sweden, all ECs applied a "one member, one vote" system, where members have the same formal influence regardless of how many shares they hold. Additionally, both members and the board were allowed to submit motions at the annual meeting. Like the other ECs, this group therefore scored high on this element.

4.2.4. Decisions around the scale of technology

The ECs in this group mainly had solar rooftop systems on apartment buildings or public buildings, which were small compared with the other two groups' plants in terms of installed capacity. The electricity from the plants was usually used and paid for by the owner of the building. EC #5 also had a ground-mounted solar plant and recognized that such plants needed to be installed with careful consideration of the local context. They also explored how the space below and around the solar installation could be used effectively:

> Can we try to seed them with flowers and what would that mean? Could we have honey farms and so on? – Interview, EC #5

Because of the small scale, which was adapted to the consumption of the building owners, as well as the concern for the local context in one of the cases, these ECs scored relatively high on this element.

4.2.5. Distribution of financial benefits

All three of these ECs stated their intention to distribute financial benefits to their members in their statutes. However, in practice, they reinvested most of their revenues into the development of new solar installations. Both the capital raised through share sales and the income from electricity production were historically allocated to further investment rather than distributed to members. This reinvestment strategy made it difficult to position these ECs within the framework's financial benefits spectrum, as reinvestment is not included as an explicit category. Nonetheless, both EC #2 and EC #5 had recently revised their economic models to begin offering financial returns to their members, resulting in a relatively low "actual outcome" score for this element.

4.3. Group 3 – initiated by municipal utility companies

The third group consists of six ECs (#6, #7, #8, #9, #10 and #11) that scored relatively low on most of the spectrums in the framework, as shown in Table 5 (see Appendix A for details). They are therefore considered to have a weak community orientation. The most striking similarity between them is that they were initiated by MUCs rather than directly by citizens.

4.3.1. Level of engagement

As mentioned, the six ECs were all initiated by their respective MUCs. Several of these MUCs (those related to EC #7, #6, #9 and #11) had politically-determined goals for expanding the amount of renewable energy production in the municipality, and the MUCs initiated the ECs as a means to achieve that goal. Once they had established a business model for the EC and found a suitable place to install the solar panels, they invited citizens to join the EC and become members.

The ECs offered a limited number of activities for the members to engage in, and the only two reoccurring activities were annual meetings and newsletters from the board. The interviewees said that it was difficult to create membership engagement. According to them, most

Table 5
Scores for ECs in Group 3 in relation to the five elements in Hicks and Ison's framework.

Energy community	Financial	Actors	Decision	Scale	Engagement	Score
#6						
Intended outcome	3	4	5	3	3	17
Actual outcome	2	3	5	3	2	15
#7						
Intended outcome	2	2.5	5	3	3	15.5
Actual outcome	2	2.5	5	3	3	15.5
#8						
Intended outcome	2.5	3	4.5	3	2	15
Actual outcome	2	3	4.5	3	2	14.5
#9						
Intended outcome	3	3.5	5	2	2	15.5
Actual outcome	2	3	5	2	1	13
#10						
Intended outcome	2	2.5	4.5	2.5	2	13.5
Actual outcome	2	2.5	4.5	2.5	2	13.5
#11						
Intended outcome	2	2.5	4.5	3	1	13
Actual outcome	2	2.5	4.5	3	1	13

members also seemed satisfied with the current level of engagement, as they had not experienced any demand for more activities. Nevertheless, two of the ECs stated an intention to engage members more in the future; for example, through hosting lectures on energy-related topics. However, due to their organisations being relatively young and the coronavirus pandemic, they had not yet been able to realize these plans.

Engagement with the surrounding community was also low. One of the ECs gave lectures and provided seminars and field visits to the solar park in order to inform the general public and other interested actors about solar PV.

In sum, the initiation of the ECs in this group was dependent on local politicians and their willingness to support both renewables and the establishment of an EC, whereas the engagement with citizens came later and was rather limited. Most of them, therefore, scored quite low on this element.

4.3.2. Range of actors

About half of the communities in this group stated they initiated the EC for the citizens and companies in the municipality, and their aim was to reach these groups through the EC. However, none of the ECs had any membership restrictions preventing non-local members from joining. Because of this open membership, several non-local actors decided to join. One example was EC #6, where the MUC aimed to engage municipal citizens by marketing the EC through their company channels. However, since the MUC had both local and non-local customers, the information was received by non-local actors as well. Because of the involvement of non-local actors, the ECs in this group were assigned a medium to low score for this element.

4.3.3. Distribution of voting rights

Similar to the two other groups, these ECs were regulated by the law for economic associations and applied a "one member, one vote" system, where members have the same formal influence regardless of how many shares they hold. Additionally, both members and the board were allowed to submit motions at the annual meeting. Like the other groups, this group therefore generally scored high on this spectrum.

However, in three cases (EC #8, #10, #11) the EC co-owned the solar plant with other organisations that were not EC members. All co-owners, including the EC, were members of what was termed an "operational association" (Swedish: "*driftförening*") that was founded specifically to operate and make decisions about the solar park. All members of the operational association had one vote, independent of how much of the park they owned. This implied that the EC only had one vote to represent all its members, which diluted the one member, one vote principle when it came to decisions about the solar plant. These three ECs therefore received a somewhat lower score for this element compared with the other ECs in the group.

4.3.4. Decisions around the scale of technology

The ECs in this group had all invested in large-scale solar plants placed on the ground in the municipality that owned the MUC. Local conditions had been considered when deciding the placement of the plants. The facilities were located on land that could not be used for other purposes, such as land close to airports or highways and land unsuitable for agriculture or housing:

> I'm really proud that we got the first phase in place, because we didn't just build a regular solar park, we built a solar park on an old landfill site …. We think it's good to reverse something bad from the past … and we're turning that around now to use this place for something environmentally friendly. – Interview, EC #11.

According to their statutes, all ECs apart from one (EC #8) will continue to invest in PV if there is an interest from citizens in becoming members. The idea is to ensure that everyone who wishes to become a member can do so regardless of where they live. Despite the consideration for local conditions, they therefore received a lower score for this element than the other ECs.

4.3.5. Distribution of financial benefits

All the ECs in this group provided financial benefits solely to their members. Most of the ECs offered their members a deduction on their electricity bill in accordance with their shareholding. One of the ECs in this group offered a yearly dividend per share instead, which was proposed by the board and approved at the annual meeting.

5. Discussion and conclusion

The idea behind ECs as presented in the CEP (European Commission, 2019) is to engage citizens in the transition towards a sustainable energy system. ECs, including COIs and COPs, embody this shift by fostering collective action in energy generation, consumption, and sharing. COIs are formed around shared interests or goals in renewable energy, encouraging participation from a wide array of stakeholders, irrespective of geographical location. COPs, on the other hand, are geographically-bound, leveraging local engagement and resources. In both policy documents and the academic literature, the dominant understanding of ECs is that COPs are defined by geographical boundaries involving residents within these areas in energy-related activities. In contrast, our analysis showed that most of the Swedish solar ECs allowed non-local actors to join, which puts them into the COI category. Moreover, either by accident or design, a vast majority of the ECs included members who joined based on an interest in solar power rather than their proximity to the solar panels.

Interestingly, COPs and COIs did not differ significantly in terms of the assessment of other key EC characteristics. Three of the ECs that were classified as COIs received relatively high overall scores and came out almost on par with the COPs in terms of the strength of their community orientation. These had historically reinvested their revenue in new production rather than distributed the revenue to their members. This indicates that the members' local connections do not determine whether or not the local community benefits. This finding challenges the traditional dichotomy between COIs and COPs (Walker et al., 2022), suggesting a more nuanced understanding of community engagement in energy projects is necessary. Given the diversity of EC organisational structures found here and also in earlier studies (Bauwens et al., 2022), researchers and policymakers need to be able to accommodate both COPs and COIs, recognizing the potential value and contribution, as well as strengths and weaknesses of each model.

Another notable result was that a majority of the ECs were initiated by MUCs rather than being purely citizen-driven, which is in line with earlier research showing that municipal energy companies can be important EC allies (Palm et al., 2025). This suggests that institutional actors can play an important role in the development of ECs, facilitating the expansion of renewable energy access and participation by offering resources, expertise, and infrastructure support that might not be readily available in purely citizen-driven initiatives (Neij et al., 2025). Thus, partnerships between citizens and MUCs, such as those in our sample, can offer knowledge exchange and support, and facilitate citizen participation in a sector with a high knowledge barrier (Barnes and Hansen, 2022). MUCs differ substantially from privately-owned energy companies in terms of aims and motives (Roelich et al., 2018), and projects that are initiated and owned by the local government can therefore provide a community logic and offer legitimacy for renewable energy projects even if the projects are not driven by citizens (Bergek and Palm, 2024; Dudka et al., 2023). However, the involvement of MUCs also raises questions about community autonomy, the distribution of benefits, and the potential for genuine community engagement and empowerment in the energy transition process (Palm et al., 2025), especially considering that earlier studies have shown that ECs initiated by companies and with a strong top-down approach have lower citizen involvement (Candelise and Ruggieri, 2020).

Previous research has indicated that patterns of citizen engagement

can vary between the different types of ECs (Dudka et al., 2023). Even if our results indicated that there were no major differences between the COPs and COIs in this regard, participation in decision-making processes varied from more passive forms of engagement—such as financial investment without direct involvement in daily operations—to having a more active role in deciding on investment or activities. These varying levels of engagement did not seem to have much to do with the goals, structure, ownership, or control of the EC. Instead, the level of engagement seemed more closely related to a lack of perceived benefits from participation, where also limited support for active engagement played a part. Passive engagement might limit the potential for community empowerment and education that ECs can offer (Blasch et al., 2021), potentially affecting the broader goals of the energy transition by reducing the sense of ownership and commitment among participants. To remedy that, policymakers could aim at facilitating inclusive participation, ensuring both local and non-local actors can contribute to and benefit from ECs, thus supporting a broader transition to renewable energy. Considering our results, however, more research is needed to understand the drivers and barriers in terms of citizen engagement.

In conclusion, the paper found that in Sweden, ECs predominantly function as COIs rather than COPs, indicating that geographical proximity plays a minor role in engaging citizens. The findings suggest that current assumptions in both policy and research—particularly the preference for COPs—should be reconsidered. Our analysis demonstrates that COIs can also support participatory, transparent, and socially-valuable renewable energy initiatives, particularly when led by MUCs reinvesting in the public good. Policymakers should therefore ensure that enabling frameworks accommodate both models, while being sensitive to differences in governance, accountability, and community benefit structures. Support schemes, such as subsidies or regulatory exemptions, may need to differentiate between EC types to avoid favouring one model over another. Finally, implementation of the EU directives should reflect the varied realities of how ECs function in practice rather than rely on a one-size-fits-all approach.

5.1. Limitations and avenues for future research

This study is limited by its focus on a single national context and a relatively small set of cases. While the Swedish setting offers significant variation in EC types, the findings may not be directly generalizable to countries with different institutional, regulatory, and energy system configurations. Moreover, since the analysis is based primarily on qualitative interview data, which provides in-depth insights into governance and engagement, it could be complemented in future research by quantitative data on financial structures, energy output, and member demographics.

Future research could take a longitudinal approach to examine how ECs evolve over time, particularly hybrid models that combine features of both COPs and COIs. Comparative cross-country studies would also help clarify how national regulatory frameworks influence EC configurations and outcomes. Further inquiry could explore how local citizens perceive indirect representation in MUC-initiated ECs compared to those initiated by citizens themselves, shedding light on questions of legitimacy and accountability. Another promising direction is the development and application of metrics for evaluating key aspects of ECs, such as trust, knowledge exchange, and social cohesion, to enable more systematic comparisons across contexts.

CRediT authorship contribution statement

Ellen Boije af Gennäs Erre: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Jenny Palm:** Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Anna Bergek:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

This work was supported by the Swedish Energy Agency under grant number 50951-1 and the Kamprad Family Foundation under grant number 20182014.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2025.145654.

Data availability

The data that has been used is confidential.

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