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DESIGNING AN ENERGY COMMUNITY OPERATOR

Capabilities for citizen engagement in Nordic case studies

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Introduction

Transitioning to a low-carbon economy requires substantial shifts in our current energy infrastructure. Previously, the energy system was characterised by top-down, highly centralised structures controlled by a limited number of corporate entities and dominated by large-scale fossil fuel-based power generation. However, renewable energy sources, such as solar photovoltaics, biogas plants and onshore wind, are characterised by their distributed nature enabling individuals, cooperatives, small businesses and local communities to invest in and benefit from energy production. The novelty is that this transition has empowered previously passive energy consumers to become "prosumers" (Envall & Rohracher, 2023), meaning they become active participants in the energy system by consuming and producing energy, although often they are not yet fully self-sufficient.

A promising strategy to facilitate this critical transformation is through collective action energy projects commonly referred to as energy communities (ECs). Envall and Rohracher (2023, p. 766) define an EC as a "gathering of individuals or organisations who cooperatively produce, manage, or share energy or energy-related services". Recent research findings (see e.g. Envall & Rohracher, 2023; Shortall et al., 2022) suggest that energy-related behaviours are embedded within specific social and technological contexts. Hence, energy usage is intertwined with social practices that evolve alongside advancements in energy technologies (Devine-Wright, 2012). Therefore, EC initiatives may promote sustainable energy practices and cultivate a sense of ownership and responsibility of citizens towards the society in which they are embedded (Shortall et al., 2022). Moreover, collective action energy projects can promote

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energy justice and energy democracy by ensuring fair access to clean energy resources and democratising the decision-making process in energy management. Also, the European Green Deal recognises the importance of collective action associated with energy use in the energy transition (European Commission, 2019), as it can provide consumers and the local community with the means to enhance their participation in energy markets.

In an urban context, deploying new infrastructure is always a challenge, and getting acceptance from citizens is crucial for it. To engage citizens in this transition, there need to be intermediaries, i.e. agents who connect incumbents and communities. In this perspective, we argue that an EC operator, a central actor initiating and facilitating the EC creation process, requires capabilities to accommodate and influence institutions, including norms, standards and tariffs. These capabilities link to institutional entrepreneurship literature (Pacheco et al., 2010). Successful EC creation also demands aligning stakeholder interests since the EC operator must manage public and private organisations with different interests and related regulations. These capabilities lay the foundation for citizen engagement, which requires its own distinct set of capabilities.

Despite ECs' increased importance in advancing the energy transition, limited research has studied the required capabilities of the EC operator (Gohari et al., 2024). Fina and Monsberger (2023) study EC's interactions with various stakeholders on a conceptual level. Through four case studies in Nordic countries, specifically in Finland and Sweden, this chapter aims to empirically address this critical gap by focusing on the following research question: *What capabilities do energy community operators need to align stakeholder interests, navigate regulatory framework, and engage citizens while creating ECs?* The cases and the chosen analytical framework emphasise that citizen engagement is dependent on being able to analyse and influence the nascent regulatory framework of ECs, as well as on the orchestration of related stakeholders so that the involved actors have aligned interests in the process. These cases were instrumental in showing that integrating citizens into the complex creation process of ECs has its challenges, and mostly, engagement processes include ideation and informing and oftentimes shared ownership.

The chapter proceeds as follows. Next, the theoretical context is presented linking the EC as an enabler of energy democracy and justice. Afterward, the required capabilities of an EC operator are discussed. Then, the method is introduced, followed by the four cases. Subsequently, we present our findings. The chapter ends with implications for research and practice.

Theoretical background

Energy communities enabling energy democracy and justice

Within EC initiatives, the idea of energy democracy recognises the increasing role of societal actors, such as prosumers, energy cooperatives and

not-for-profit organisations, in shaping the energy landscape. These actors, however, challenge the traditional top-down model of energy governance by promoting greater democratisation, community ownership and participation in decision-making processes related to energy production and consumption. Thus, energy democracy represents a paradigm shift towards a more inclusive, participatory and sustainable future, where communities have a voice in how energy is produced, distributed and consumed. Szulecki (2018) conceptualises energy democracy as an analytical and decision-making tool structured around three dimensions: popular sovereignty, participatory governance and civic ownership. A similar concept used in the literature on transition studies discusses energy justice. It is often divided into three elements: distributional justice, referring to fair allocation of costs and benefits; procedural justice, meaning inclusive participation in decision-making during planning; and recognition justice, referring to the participation and needs of marginalised communities in decision-making (Van Bommel & Höffken, 2021). The two concepts, energy democracy and energy justice, are quite similar, and the key difference is the failure of the energy democracy literature to engage with questions of energy poverty and distributional (in)justice as energy justice frameworks do (Osička et al., 2023).

An interesting aspect is that both energy democracy and energy justice narratives, in line with the EC, challenge neoliberal capitalist paradigms that have historically shaped energy transitions, advocating for community-oriented energy projects as alternatives (Van Veelen, 2018). While some scholars have emphasised that ECs can contribute to the democratisation of the energy system by accelerating community building, increasing citizen engagement in the transformation process, and shifting the ownership of energy resources to grassroots (Dall-Orsoletta et al., 2022), other scholars (see e.g. Angel, 2017) show that participation is usually limited to those in higher socio-economic groups.

Despite EC being seen as an opportunity for disadvantaged communities (Weinrub & Giancatarino, 2015), more research is necessary to understand the role of social, economic and political power in energy transition. In general terms, while EC projects represent collective action towards renewables, research on and knowledge about effective involvement and collective pro-environmental actions is still lacking (Kalkbrenner & Roosen, 2016). In this chapter, we fill this gap by examining capabilities and activities implemented by EC operators, focusing on citizen engagement.

Different contexts of energy communities in the Nordics

Nordic EC projects happen in various contexts ranging from eco-villages to co-owned wind power plants. In this chapter, we focus on place-based, urban initiatives related to apartment buildings and their governance structures, which include the housing association. These are called *taloyhtiö* in Finland

and *bostadsrättningen* and *samfällighet* in Sweden, where the latter refers to joint property units, like parking halls or roads (Magnusson, 2022). In typical retrofit projects, it is required that people owning the apartments accept the project and contribute to the financing. Democratic decision-making within a housing association can be difficult in some instances (Lukkarinen et al., 2023). Within greenfield projects, real estate investors, who may include citizens, need to agree on the EC model to be invested in. Even though the up-front investment in on-site energy assets arguably brings lower operational costs and a good image for the real estate (Leskinen et al., 2020), it needs acceptance from these upstream actors who aim to profit from the construction project.

In projects including multiple properties, finding collaborative structures requires extending housing association processes. Some structures may exist already, based on community-owned roads or shared building management, for example (Magnusson, 2022). In greenfield projects, such collaboration must be planned and agreed upon by upstream organisations. Municipalities can influence the creation of such multi-property collaborations in urban planning. In the most ambitious cases, municipalities seek to create Positive Energy Districts (PEDs), which are neighbourhoods that produce more energy than they consume. Table 9.1 summarises the differences in different contexts.

Crafting a new actor with new capabilities: the energy community operator

Some studies mention the need for a new kind of coordinating actor within the local energy context (Gohari et al., 2024; Scharnigg & Sareen, 2023). Some authors see that public actors could act as such an intermediary between citizens and the existing incumbents facilitating the change, whereas others see business potential there for new private entities. Local context, regulations and resources matter in how such an actor may be formed, yet several capabilities can be seen as crucial in any setting. Here, we follow

TABLE 9.1 Different EC Contexts and Challenges they Pose for the EC Operator

	Single property	*Multi-property*
Greenfield	• Acceptance from upstream organisations is emphasised	• Acceptance from upstream organisations • Administratively more complex • Facilitator or municipal involvement
Renovation	• Acceptance from citizens	• Acceptance from citizens • Facilitator needed • Administratively more complex

Source: Developed by the authors.

the work of Mahzouni (2019) and analyse citizen engagement capabilities in three layers: institutional, organisational and citizen.

Capability 1: Creation of supportive institutions for customer engagement

On the institutional level, EC operators need to participate in the creation of the EC concept for a wider audience. This includes essential actors in the vicinity of the EC, including regulators, network operators and financiers, who, on their behalf, create the conditions for ECs and their members. Vernay and Sebi (2020) divide activities on this level into lobbying, networking financing and operational/technical support. Lobbying the concept of EC to policymakers helps to create support for them in the highly regulated and competitive energy sector. Although there is active support for ECs on the European level, their transposition and effects happen locally, and processes regarding permitting or linking to spatial planning might not exist (Scharnigg & Sareen, 2023).

The EC operator also acts as an intermediary between the project stakeholders and decision-makers, therefore lobbying for the interests of a broad range of stakeholders. ECs may include multiple sectors (energy, building, telecommunications, transportation), so the operator needs to manage and interpret various regulatory frameworks and actor practices. Participating in field-level networks or creating ones is also beneficial through knowledge sharing and creating the field-level identity for ECs (Vernay & Sebi, 2020). Better conceptualisation and understanding of ECs also make it easier for banks and other financiers to participate in projects. Therefore, the operator should have a plan on how financing could be implemented and, preferably, how citizens could be involved in it, e.g. through crowdfunding mechanisms.

Another institution-level capability is related to founding the legal entity. According to European-level directives regarding ECs, they are non-profit entities that aim for economic, environmental and social benefits rather than profits. In the Nordic countries, there are traditions regarding housing associations, which have in both case countries been applied in the EC context. Even if these institutions exist, the operator may need to adapt them to the local context and EC scope.

Capability 2: Aligning stakeholder interests from an organisational perspective

Regarding the internal stakeholders responsible for creating, organising and operating the EC, there needs to be a mutual understanding of the shared value proposition for the end user. Especially in ECs that involve

multiple stakeholders and domains like electricity, district heating (DH) and transportation, the alignment between partners needs to happen such that the end user receives a coherent service (Adner, 2017). ECs affect the businesses of several incumbents (Vanhanen et al., 2023). ECs may decrease the revenue of network companies and the local utility through increased self-sufficiency, which can make them less supportive of EC development. Consequently, the EC operator enacts in designing EC's internal tariffs and incentives for flexibility so that they are aligned with the tariffs of the network companies and utilities. Here, transparency and dialogue with future end users can alleviate misunderstandings, for example on dynamic tariffs that fluctuate throughout the day (Ryszawska et al., 2021). On the other hand, in greenfield projects, real estate developers need to make more up-front investments if they want to create ECs. How the costs and benefits of the investments are shared among the members constructing the EC needs to be appropriately planned to get all actors involved (Vanhanen et al., 2023).

Furthermore, EC design choices need to be carefully considered for long-term benefits. This matters in not only energy technologies and physical infrastructure like energy networks but also data infrastructure. Interoperable data infrastructure enables multi-actor collaboration, as it provides information on how and when energy is being used and produced, how essential appliances function and what kinds of flexibilities are available. In addition, energy storage systems, heat pumps and building automation systems may be coupled with their own data systems and applications. Integrating these different technologies to operate under the EC operator's terms requires open interfaces and collaboration.

Capability 3: Engaging citizens to participate and change behaviour

The EC operator needs to create interest and motivation among local people (including future citizens) on energy matters. On the one hand, the operator should interpret and use local norms, identities and culture as a springboard to legitimise the new EC model to locals, who may be unfamiliar with the concept (Kalkbrenner & Roosen, 2016). It can be made more understandable and framed as something positive by relating it to local culture or norms. On the other hand, the operator can invite citizens to participate in EC creation (Shortall et al., 2022). Surveying people in interviews or focus groups can give information on local values and needs. To obtain ideas or develop certain aspects in an EC, e.g. finances, goals, incentives and feedback systems, the operator can use workshops, forums or public events to engage with local people.

For more specific elements, such as development of the user interface, the operator can arrange co-creation and co-design sessions with potential end

users. One beneficial aspect of a participatory approach is that it supports possible behavioural changes during the operational phase, as the EC's identity is more based on the overall group identity in the neighbourhood. As ECs are moving towards smart and demand flexibility-oriented models, customer understanding and motivation to be a part of the system have an increased role (Hiteva & Foxon, 2021).

Methodology

The authors used a case study approach to examine how EC operators in two Nordic countries engage with citizens and promote participation. EC projects require collaboration among diverse actors, including government, individuals, companies, cooperatives, small businesses and citizens, and the case study method is ideal for exploring such complex settings (Yin, 2017). We focused on Finland and Sweden, as their advanced energy infrastructures and gaps in supporting EC frameworks offer unique insights for understanding how citizens engage in EC within these contexts.

Preconditions for citizen engagement in the case countries

The preconditions for citizen engagement in the two case countries are twofold. Both countries have highly developed energy infrastructures, with a high share of low-carbon sources through nuclear, hydro and wind power, with some of the lowest retail prices for electricity in Europe (Eurostat, 2024). Citizens have smart meters, which means they can have dynamic contracts, and they are frontrunners in the electrification of heating and transport (Tagliapietra et al., 2024). Finnish and Swedish citizens are also relatively active in switching electricity suppliers, indicating engagement in energy matters. On the other side, Finland and Sweden can be seen as laggards in EC development (ACER, 2023). Neither of the countries has a supportive framework for ECs except the model within an apartment building (in Sweden) or a property (in Finland). Additionally, there are some contradictions in the case countries that make both interesting contexts to examine. For example, while Sweden positions itself as a green frontrunner embracing citizen participation in fronts such as living labs for smart energy experimentation, political visions or policy goals related to ECs are nonexistent (Envall & Rohracher, 2023). The prevalent support mechanisms, expectations and policy instruments for energy transition point towards homeowners of detached houses and for-profit companies. In Finland, housing associations and neighbourhood-level ECs miss a strong and coherent regulatory framework and have ambiguous targets (Lukkarinen et al., 2023). This mix of strong infrastructure and weak policy support makes these countries valuable cases for understanding citizen engagement in EC.

Research approach and data gathering

We examined four cases – two from each country. In Sweden, we focused on Tamarinden (EC1), an emerging smart and sustainable urban district, and Stockholm Royal Seaport (EC2), Sweden's largest urban development project aimed at eliminating fossil fuel use by 2030. In Finland, we explored Hiedanranta (EC3), a greenfield project in a growing city, and Hepokulta (EC4), a large-scale renovation project where multiple properties are being retrofitted simultaneously.

Data was gathered from various secondary sources, including legislation on energy (such as EU Electricity Market Directive 2019/944), Renewable Energy Acts, and subsidy schemes. Additional insights were drawn from project homepages, national and local news, blogs, policy documents, reports, academic journal articles, theses, as well as online videos and podcasts. The various sources complemented each other and helped us triangulate information. The material was analysed through the lens of the three EC operator capabilities presented in the previous chapter. First, each case was examined within its local and national context to understand how specific policy frameworks, regulatory environments and community characteristics impact citizen participation. Following this, a cross-case analysis was conducted to identify how EC projects in each country engage with citizens and manage energy transitions.

Case descriptions

EC1 Tamarinden, Örebro, Sweden

Tamarinden, a sustainable district 2.5 km south of Örebro, began construction in autumn 2022, adding 800 households and a preschool. Focused on energy production, storage and sharing, it redistributes surplus energy among buildings using local sources like solar power and heat. Örebro city and five developers aim to make Tamarinden a model for Sweden's 2030 climate goals.

A tax exemption declared by the Council for Advance Tax Rulings for shared electricity marked a milestone for local energy systems. Among the project developers, these new rules were seen as game changers laying the foundation for innovative ways of constructing local energy systems. In parallel, the city of Örebro and ÖrebroBostäder, a municipal housing company, has embarked on a new partnership with more than 22 other Swedish municipalities, 6 government agencies, and the innovation programme Viable Cities' national initiative "Climate Neutral Cities 2030". Together, their goal is to address legal and regulatory barriers hindering significant progress in reducing climate impact.

EC2 Stockholm Royal Seaport, Stockholm, Sweden

Stockholm Royal Seaport, a former industrial area, plans to add 12,000 homes and 35,000 workplaces. Designated by Stockholm City Council as a testing ground for sustainable solutions, it aims to be fossil-free by 2030 and climate-positive by 2040. The project involves the city, urban planners, residents, businesses and research institutions. The area integrates schools, preschools and parks, with a focus on resource-efficient solutions, climate adaptation and community involvement. Collaboration and innovative thinking are pivotal in advancing creative solutions and encouraging community involvement. Workshops and focus groups, digital media and city walks, as well as physical and virtual spaces have facilitated meetings, activities and initiatives fostering personal involvement and a sense of ownership among residents and workers.

Concerning energy efficiency, the municipal housing company Stockholmshem built two plus-energy buildings in Stockholm Royal Seaport with 43 rental apartments designed to be net energy producers with the help of solar panels, geothermal heat, efficient insulation and ventilation, and recycling of excess heat from wastewater. For example, excess electricity production is sold to the grid and balanced against purchased electricity during colder periods. Torbjörn Kumlin, project manager at Stockholmshem, affirmed that over the year, solar panels produced more energy than the properties needed.

EC3 Hiedanranta, Tampere, Finland

Hiedanranta, a new sustainable district in Tampere, Finland, will eventually accommodate 25,000 citizens. Tampere aims for carbon negativity, using ECs to achieve three goals: (1) deploying customer-focused, community-based models; (2) giving customers feedback on energy use and the ability to control it; and (3) a system based on renewable energy that uses efficiently and flexibly electricity, heating and cooling networks.

In 2014, the city bought the land from a forestry company and transferred it to a city-owned housing development company, allowing more independence from city budget policies. The district will be constructed between 2025 and 2040. Currently, the local utility is developing a low-temperature bidirectional DH system, allowing apartment buildings and companies to sell excess heat to the network. However, creating this system is complex due to the lack of national procedures or tariff structures. Successful implementation requires clear business models understood by architects, building automation system designers, real estate developers and residents investing in the buildings.

An important steering mechanism in the district development is land transfer rules, which construction companies must fulfil when purchasing plots. These rules have provisions on, for example, open data interfaces and energy performance levels. These rules are meant to facilitate collaboration

but also long-term interoperability as technologies develop. A data platform is planned for facilitating data-driven innovations. The area has also hosted energy innovation demonstrations, such as Polar Night Energy's sand battery and biochar by Carbofex.

Although construction has not started yet, citizens have been involved in the planning process through events and workshops. In 2016, public events, including a workshop to generate ideas with local businesses, were held. In 2018, citizens could offer feedback on the district's urban plan in an event with various theme discussion tables.

EC4 Hepokulta, Turku, Finland

In Turku, Finland, eight housing associations in the Hepokulta suburb collaborated on a major, €80m renovation project, one of the largest in Finland. The upgrades included switching from DH to ground-source heat pumps, façade renovations, pipe repairs, new data systems and waste heat recovery. Hepokulta is a 1970s suburb with around 1,400 residents, mostly pensioners. This indicates that a large proportion of residents have lived in the area since its construction. The key institutional innovation in Hepokulta was applying for a green loan as a group. In 2016, it became clear individual housing associations would not be able to gain bank financing, so a new approach was needed. Importantly, there was an existing platform for collaboration between the eight housing associations: a common housing manager, namely Hepokullan Lämpö Oy. They facilitated planning of the group construction with renovation consultants Korjauspartnerit. According to the CEO of Hepokullan Lämpö, the benefits of tendering the renovations as a group amounted to 1.8 million euros.

Despite the extensiveness of the renovation, citizen involvement was limited. Information sessions were popular but saw reduced participation due to Covid-19. An online tool was introduced but was not widely adopted due to the high average age of residents. One link that was perhaps missing was between the housing association boards, who are generally the most knowledgeable residents, and other residents who receive less information. The renovation introduced apartment-based electricity and water metering, requiring residents to switch from collective to individual electricity contracts (which brought more options), but some residents were also hesitant and unfamiliar with the market offerings. Rising loan interest rates also heavily impacted residents.

Overview of the identified EC operator capabilities in the different contexts

The four cases show how interlinked the three distinguished capabilities are, even though they happen on different levels of action. Table 9.2 displays an overview of the identified EC operator capabilities and related activities. The

TABLE 9.2 Overview of Cases through the Lens of the EC Operator's Three Capabilities and Related Activities

Case and the identified EC operator	*Institutional entrepreneurship*	*Stakeholder alignment*	*Citizen engagement*
Tamarinden Sweden; Örebro Municipality	• Receiving new rule of tax exemption for local energy sharing • Engaging in the innovation programme Viable Cities	• Örebro's municipal authorities engage with developers, environmental experts, and citizens to create a sustainable neighbourhood	• Citizens are actively engaged in planning and decision-making
Hiedanranta, Finland; Housing developer company	• Creation of new municipal entity: housing developer company • Creating rules for bidirectional DH	• District-level platform for data management and sharing • Facilitating R&D and piloting • Creating land transfer rules for construction companies	• Workshops and feedback sessions during planning • Customer energy feedback
Hepokulta Finland; Hepokullan Lämpö Oy	• Facilitating group financing and getting a green loan	• Group manager and consultant collaboration covering multiple housing associations • Tendering together increasing negotiation power	• Information sessions • Online information-sharing platform • Individual smart metering
Stockholm Royal Seaport Sweden; City of Stockholm	• Identifying the regulations, financial instruments and organisational conditions required to ensure feasibility – from early planning to implementation	• The City of Stockholm owns the land, and this ownership allows them to implement stricter requirements beyond existing building codes and legislation	• Game elements and video games, presentations of the local development plan and resident consultation with the public, workshops with entrepreneurs

capability for institutional entrepreneurship refers to the EC operator's ability to create new ownership and governance models, such as the bidirectional DH model in Hiedanranta (case 3) or organising group tendering processes in Hepokulta for a green loan programme (case 4). It also refers to the application of non-established rules and regulations, such as new tax rules for local energy sharing (case 1). From the energy justice perspective, these institutional innovations support the ECs' internal functioning, but they need to respond to the critique of "cherry picking", i.e. distributional justice concerning all energy users. Critics may argue that ECs should not have special treatment, e.g. in taxation. However, in the future, ECs may also carry responsibilities that have previously belonged to the state, so there is a new balance to be sought in how benefits and costs are shared (Van Bommel & Höffken, 2021).

The EC operators' ability to align stakeholder interests happens through new coordination and interaction mechanisms. These include new ways to share data (case 2), public-private partnerships (case 1) and district-level service models (case 3) where customer value is put at the centre. The energy sector has its own characteristics when it comes to incentives and business model development, which have been rapidly changing in recent years. As ECs can cover organisations from building, energy, IT and transportation sectors, finding trust and a common language is not always easy. The whole creation process needs to be grounded in procedural justice so that all stakeholders are considered and heard. Some organisations are more willing to invest in local energy resources than others, which means that setting sustainability targets and requirements is not enough but needs to be accompanied by business models with, e.g., third-party service providers or well-planned financing (case 3). Greater purchasing power from a larger EC entity helps in finding economies of scale with these actors.

The third capability, customer engagement, can be divided into the mechanisms for joining in EC planning and behavioural changes during EC operation. Citizens were involved in various ways in the planning process, especially in the initial ideation. For example, in Sweden (case 1), citizens are actively engaged in planning and decision-making processes, contributing to the shaping of their neighbourhoods through workshops, feedback sessions and community events. This level of engagement aligns with the principles of energy democracy (Szulecki, 2018), where communities have a voice in how energy is produced, distributed and consumed. The decision-making process differs in greenfield and renovation projects, as real estate investors are the decision-makers in new areas, such as Hiedanranta (case 3) and Tamarinden (case 1). In renovation projects, the housing association makes the decision, which requires a thorough explanation of the project and its economics. During construction, the role of citizens is to understand the project's development and how it affects them. In Hepokulta (case 4), this was done through information sessions and an online platform. Due to the Covid-19 pandemic,

live meetings were harder to organise, so online interaction became more important. However, older people were not sufficiently introduced to the usage of the online platform and lacked much of the information. On the one hand, this brings to the forefront the challenge of energy equity and how access to participate could be guaranteed for different citizens. On the other hand, digitalisation enables equal rules for everybody, as apartments' energy usage can be metered accurately.

Implications for practice and policy

This Finnish-Swedish multiple case study examined the capabilities required by an EC operator to establish just and sustainable solutions in the various contexts. In that way, it has contributed to the research gap of crafting an EC operator, identified by Gohari et al. (2024). The studied cases are different to each other and no uniform EC model or management style can be found from them, but some similarities can be still identified. The positioning of citizens in the projects varied according to their roles as decision-makers and the phase of the EC project. The case studies illustrate how the creation of such models requires a broad range of capabilities in handling local politics, financing, business models, regulations, technology and social aspects. Regarding institutional entrepreneurship capabilities, the cases in both countries had similar challenges in navigating energy-related regulations. It could be argued that in Sweden, the innovation network related to ECs is more stable and industry-oriented with the Viable Cities platform, whereas the Finnish cases have been more closely related to research programmes. On the stakeholder alignment level, it is noticeable that in all cases, existing land governance and ownership enabled the creation of district-level collaboration structures. Lastly, citizen engagement was, in both countries, mostly about informing or ideation and not, for example, co-creating energy solutions with the users.

The demanding list of capabilities suggests that there would be potential for public-private partnerships, in which local public actors could take a more proactive role in helping with regulatory frameworks and energy network companies could support more with, e.g., accustomed tariffs. This aligns with the findings by Scharnigg and Sareen (2023), who emphasise the role of EC operators in interpreting regulation. The cases show that integrating citizens into the complex creation process of ECs has its challenges, and mostly, engagement processes include ideation and informing and, oftentimes, shared ownership. However, the long-term success of projects could be further developed through co-creation mechanisms. The best practices from case countries could be shared with regulators and EC operators in other countries. Sharing knowledge of new EC models and tariffs could be incentivised by making it a requirement for receiving governmental funding for the project. Arguably, these findings are also applicable in sectors such as food, transportation and

water management, where environmental issues and new technologies are driving community-driven solutions and a certain level of decentralisation.

Given the four EC cases examined in this study are ongoing projects, future longitudinal studies can be relevant to grasp a project's different phases and the various strategies used to increase citizen participation. Future studies should also expand the research methodology by conducting interviews and/or survey research in addition to secondary sources as this research is solely based on. Additionally, new studies identifying specific co-creation mechanisms, for instance, related to financing, maintenance duties or energy sharing, are needed to facilitate the emergence of an EC and its role in the sustainable energy transition.

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