Energy Research & Social Science 140 (2026) 104924

Contents lists available at ScienceDirect

Energy Research & Social Science

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

Original research article

When Goliath embraces David: Italian and Finnish utilities as intermediaries in energy community development

Ella Tolonen [a,*], Salvatore Ruggiero [b], Simone Franzò [c]

[a] School of Technology and Innovation, University of Vaasa, Wolffintie 32, 65200, Vaasa, Finland
[b] School of Engineering, Lappeenranta-Lahti University of Technology, Yliopistonkatu 34, 53850, Lappeenranta, Finland
[c] Department of Management, Economics and Industrial Engineering, Polytechnic University of Milan, Via Raffaele Lambruschini 4B – Edificio 26, 20156, Milano, Italy

ARTICLE INFO

Keywords:
Energy community
Energy transition
Energy utility company
Incumbent
Intermediation
Niche upscaling

ABSTRACT

This study examines the emerging role of incumbent energy utilities as intermediaries in the energy community (EC) sector. Some energy utility companies in Europe have recently begun developing EC projects for community groups, but little is known about the nature and rationales of this new business or its influence on the niche. In this paper, we explore this emerging phenomenon from a company perspective through a comparative case study of two energy utilities active in the EC sector: the Italian Sorgenia and the Finnish Keravan Energia. We conducted semi-structured interviews to examine these companies' EC-related business activities, motivations, and expectations. We found clear business rationales and several types of business operations, many of which supported the emergence and development of ECs. The majority of these operations provided individual citizens, projects, and the EC niche with various functions, which we argue can be understood as intermediation. However, our findings suggest that although utilities could play an increasingly important role in developing and managing new EC projects, their support is not a silver bullet for resolving all challenges associated with scaling up the EC niche. Overall, our study demonstrates incumbent firms' potential to perform intermediation in sustainability transitions, which we argue is important for both intermediation and incumbency research areas.

1. Introduction

How Europeans relate to energy could be slowly changing. Through energy communities (EC), citizens can collectively take up more active roles in the energy system, for example, as energy producers or flexibility providers. Different types of ECs have been progressively spreading across Europe over the last two decades. Between 2000 and 2021, there were some 20,800 local energy projects running in the EU, with over 2 million participants in total [1]. However, current energy markets do not provide a level playing field for new entrants such as ECs. The energy production system remains dominated by energy utility companies (hereon energy utilities), and from the energy system perspective the role of ECs is still minor or modest at best. There are growing political ambitions in the EU to upscale ECs as part of a more secure, affordable, and clean energy system. Consequently, the question of how to support new ECs and strengthen their role in the energy system has attracted growing interest in energy research.

In this paper, we approach the topic of scaling up ECs from the aspect of intermediation, which refers to mediating activities between actor groups or between actors and artefacts [2]. ECs are complex configurations that require a range of resources. Therefore, the work, practical support, and services provided by intermediary organisations are instrumental in upscaling the sector [3,4]. Intermediaries can support the development of ECs, for example, by establishing new ECs, creating networks, sharing information, raising finance, interfacing with policy, or managing relationships [3]. As the operational environment of ECs is showing signs of growing regulatory and digital complexity [5–7], the role of intermediaries may become even more crucial to developing ECs in the near future. More specifically, in this research, we employ transition literature's understanding of intermediation, which stretches beyond the notion of in-betweenness, and can also capture normative and systemic efforts to foster sustainability transitions [8].

ECs have traditionally been seen as an alternative to utility-scale energy production [9]. The existing literature has thus largely overlooked energy utilities potential to support ECs, with some exceptions [7,10–12]. However, recent developments increasingly challenge this view, as studies report that some energy utilities have begun to design and develop EC projects for community groups [5]. Services provided by

* Corresponding author.
E-mail addresses: ella.tolonen@uwasa.fi (E. Tolonen), salvatore.ruggiero@lut.fi (S. Ruggiero), simone.franzo@polimi.fi (S. Franzò).

https://doi.org/10.1016/j.erss.2026.104924
Received 26 February 2026; Received in revised form 10 June 2026; Accepted 12 August 2026
Available online 25 August 2026

utilities can have a notable influence on EC projects. Yet, there is limited understanding of what these services actually include and why the energy utilities are providing them. Since incumbent firms are powerful actors that can support niches for different reasons [13], it is also unclear what a corporate expansion into the EC sector might signify for the development of the niche as a whole. This evolving landscape highlights the need to reconsider the potential role of utilities as relevant actors in supporting and shaping EC development.

Therefore, this paper sets out to explore energy utilities' emerging business operations in the EC sector. The study is guided by the following research question: *What types of services do energy utility companies provide to ECs, and what are the underlying rationales for these activities?* Empirically, we draw on two case studies. The first case is Sorgenia an Italian private energy utility that has supported the development of municipality-based renewable energy communities (RECs). The second is Keravan Energia a Finnish municipally owned energy utility that has supported the development of housing-company based local energy communities (LECs). Italy and Finland present two different operational environments for both ECs and companies in terms of socio-cultural, economic, political, and geographical factors. They also differ in the manner in which they have transposed the core directives and legislative packages on ECs to their national legislations. Using semi-structured interviews and a complementary review of relevant documents and corporate reports, we examine how these companies engage in intermediation in the EC sector and the rationales underlying their behaviours. In doing so, the paper contributes novel empirical insights into scaling up ECs. Our findings also demonstrate how incumbent firms can act as transition intermediaries to support individual user adoption, projects, or even niche growth.

2. Energy community research

ECs are a highly heterogeneous phenomenon [14]. They take different shapes and forms due to, for example, diverging motivations behind their developments and local contextual factors [15]. Broadly speaking, ECs can be described as a phenomenon in which citizens collectively participate in the energy system beyond mere passive consumption. The activities that ECs engage in may include, for example, energy generation – either onsite or offsite, flexible consumption, trading, management, distribution, and supply [16]. Reconfigurations of social practices and relations around energy are foundational to these activities, which makes ECs inherently a form of social innovation [17].

There are three main mechanisms through which a social innovation such as ECs tends to grow: replicating projects, growing existing projects in terms of scale, and translating selected ideas and practices from niche to mainstream [18]. However, there are limits to what and how much community groups are able to achieve alone [9]. Replicating EC projects from the bottom up requires, among other things, access to finance, the expertise to design and execute projects, as well as the time to do so [19]. Citizens or community groups do not have equal access to these resources and capabilities to develop ECs or become active members of EC projects [20,21]. Upscaling existing projects in terms of size also increases the resources required and associated risks and, consequently, community groups' ability to deliver them [22]. Community groups rarely operate in isolation. They are embedded within networks of actors and institutions whose actions can significantly influence their development and, consequently, the growth of the EC niche [5,23].

2.1. Role of intermediaries to upscale the niche

There are numerous intermediary organisations active in the EC sector in Europe, both on national and local levels. For example, Hargreaves et al. identified in their study [3] 94 different intermediary actors operating in the EC sector in the UK. These intermediary organisations were initiating new EC projects, sharing information and creating networks, providing practical tools and resources, offering professional services, managing or evaluating funding programmes, and interfacing with policymakers and energy companies [3]. Several studies have since concluded that the work of intermediary organisations is critical to upscaling local EC niches [9,24,25]. For example, Seyfang et al.'s study in the UK [9] concluded that both policy support as well as intermediary networks are pivotal for ECs to secure resources and facilitate learning, whereas Guerreiro & Botetzagias' research in Indonesia [24] highlighted also intermediaries roles in enhancing communities technical, entrepreneurial and managerial capacities, and establishing innovating financing models. However, the diverse interests, aims, ideologies, and local contextual situations of ECs can make it extremely challenging even for dedicated intermediary organisations to scale up these niches [3]. So, although the absence of intermediary organisations or insufficient work on their part can directly hinder EC niche upscaling [4], it is important to remember that their presence and intermediation work does not necessarily guarantee niche growth [26], and that intermediation may not always have positive influence on the niche [3].

The role of intermediary actors in offering legal, commercial, financial, and technical expertise to develop ECs may become even more important in the future. The current policy trajectory in the EU, with reduced subsidies and support schemes, together with increased market competition,[1] could result in increasingly more complex and commercially driven EC projects that must engage more deeply with the energy markets to break even [5,7]. At the same time, digitalisation of the energy system is creating new requirements also for ECs.[2] This means that the resources to set up ECs will likely expand, which may create new barriers to entry for community groups. Nolden et al. [7] anticipated that intermediary-facilitated ECs would become one of the main EC business models in the UK's post feed-in-tariff era. They foresaw that by combining different areas of expertise and offering their 'brokering and relationship management' services to ECs, intermediaries could reduce risks and improve the economics of EC projects. In other words, such intermediaries could standardise EC project developments by developing framework agreements and other protocols. They also foresee that, in addition to the other functions noted earlier by Hargreaves et al. [3], intermediaries could increasingly broker and manage relationships, as well as raise finance for EC projects [7].

2.2. Position of energy utilities vis-à-vis the niche

According to Barnes and Hansen [5], the skills and competencies that ECs generally lack, and thus may need to acquire from external intermediary parties, are those typically possessed by energy utilities. Energy utilities are an especially powerful group of actors who can influence ECs' development in numerous ways [23]. They engage in energy generation, transmission, distribution, and trading in regulated energy markets. In Europe, partnerships or joint ownership of renewable energy production plants between energy utilities and community groups is not unusual. The majority of renewable energy cooperatives in the Netherlands have a contractual partnership with a utility [10]. And in several countries, such as Denmark and the United Kingdom, joint ownership is a legal requirement under certain conditions [5]. ECs may themselves voluntarily facilitate partnerships and co-ownership with

[1] At the EU level, policymakers' attention has slowly shifted from simply fostering new renewable energy generation capacity to effective integration of these assets into the production mix [5]. Recent changes in the EC support schemes, such as replacing feed-in-tariffs with feed-in-premiums, and increasing market competition, are challenging extant EC projects and decreasing the attractiveness of new initiatives [12].

[2] Hansen et al.'s case study of 'smartness' in the context of ECs in Europe found that those communities started by commercially-oriented businesses used more sophisticated digital technologies than those started by the community groups [6].

energy utilities for strategic reasons, such as de-risking investments [22], ensuring operational continuity [10,12], and developing projects more quickly and cost-effectively [7].

Companies typically facilitate these partnerships with community groups to foster local support and social acceptance, though co-ownership may also help them expand their production portfolios, strengthen market position, and share risks [10,11,27]. Certainly, utilities may also find local citizens' participation in renewable energy projects simply the right thing to do and, thus, an objective in itself [22]. However, there are also tensions related to these company-community partnership schemes. For shared ownership projects, fundamental ideological differences make it unlikely that full win-win solutions can be achieved [22]. And, if or when ECs expand, the energy utilities' traditional operations based on centralised energy production may face increasing pressure. This is because ECs fundamentally challenge the contemporary energy system design and ownership structures [28], and may potentially conflict with the traditional business models of energy utilities [10].

As the decarbonisation of the energy system in Europe progresses, non-community actors are increasingly leveraging ECs to advance both business and policy objectives. This trend favours externally induced partnerships and hybrid forms of ECs, rather than purely community-led initiatives [29]. More recently, a new mode of collaboration has begun to emerge, in which some energy utilities design and develop EC projects for local community groups. Through such arrangements, utilities adopt intermediation roles and directly support the development of new ECs. A key distinction from earlier forms of collaboration is that these relationships are grounded in commercially oriented market exchanges between utilities and communities, rather than in co-ownership structures. This type of EC business model was previously identified in conceptual work on EC governance by Barnes & Hansen [5], who describe a ‘someone else does it for you’ model, exemplified by a utility-led local energy trading pilot in Germany, where community groups act primarily as customers of externally provided EC services. Beyond this example, however, the phenomenon remains largely unexplored in the contemporary EC literature.

3. Transition theory

3.1. Incumbent firms and niche innovations

In sustainability transition research, incumbent firms are a notable group of regime actors that have a central position in reproducing the existing socio-technical system through their activities [30]. Thus, they have significant power and influence on how transitions develop [30,31]. Following the example of earlier transition research in the field of EC [4], we conceptualise ECs as a niche that poses at least some form of external pressure towards incumbent energy utilities in the regime, due to ECs inherent ability to challenge their traditional operations.

Initially, the study of incumbents was focused heavily on niche-to-regime perspectives on change and incumbent industry regimes' defensive behaviours in the face of new niche innovations [32]. However, more multidimensional and complex views have since emerged, according to which firms may act differently in the same transition context, support niche developments and contribute to transitions through their innovation activities [33–41]. Inspired by these recent studies, several frameworks have been developed to illustrate the pluralistic and heterogenous behaviours and roles of incumbents in transitions [30,32,39,42,43].

Due to the emergence of these new perspectives on incumbency in socio-technical transitions [32], insights on incumbents' activities in and influence on the niches has been rapidly evolving in recent years. It has been established, for example, that the relationship between niches and incumbents is not static but constantly evolving, since the resources and power positions between the two may shift over time [44]. As transition processes become more complex and contested, the boundaries between niche and regime actors tend to become increasingly unclear [45]. According to Pugliese et al. [39], incumbents can collaborate with niches through four core strategies. First, they can join the niche development by establishing a dedicated space for innovation experimentation, such as an innovation lab. Second, they can actively scout new, ripe opportunities from the niche that they could integrate into their business. Third, they can directly engage with niche actors to co-create projects and share resources. Fourth, with the support of intermediaries, they can more actively try to facilitate the implementation of this niche innovation into their business through an iterative learning process.

The literature provides several explanations as to why incumbents might engage with niches. These include both external and internal factors, such as market incentives and investment opportunities respectively [46], projections of a promising new market due to changing consumer preferences [35], and regulatory compliance [47]. Common to all these factors is that they strive to either maintain or improve the firms' position in the market. So, although incumbent firms can positively influence niche development through their activities, as long as they are market-oriented actors the underlying motivation for this behaviour is never solely pure goodwill to drive sustainability transitions. On the contrary, transition actors, including incumbents, are primarily self-interested, act strategically, and try to anticipate which actions best serve their own goals [48].

Incumbent firms constantly strive to stay relevant and compliant with the changing demands of the socio-technical system, whilst they also try to actively influence it through their behaviour [40,49,50]. The relation between incumbent firms and their operating environment is thus bi-directional and co-evolutionary, and actors' behaviours are guided by their interpretation of what is happening around them [49]. Incumbents might have vastly different motivations or rationales for engaging with niches. As these rationales shape the manners and conditions of the engagement, for example, how much the company is willing to invest in the niche, they are an important avenue to evaluate incumbents' potential influence on niche development and transitions in the near future. The main strategic rationales underlying incumbents entering niches include, for example, green marketing, an intrinsic drive to innovate, regulatory compliance, the development of commercial opportunities, learning about opportunities and threats presented by the transition, and influencing the configuration of the existing or emerging system [13].

According to Bakker [13], actors' rationales for engaging with transitions can be explained with a joint investigation of their interests and expectations. In this paper, we follow Bakker's suggestion to study both of these aspects. The underlying premise is that actors are only likely to support a transition if, or as long as, they expect that the emerging system can somehow be compatible with their interests, which are the most basic objectives of an actor. Because the interests may develop and change over time when transitions unfold or operational environments otherwise change, there is a need to consider both short- and long-term interests. Expectations, on the other hand, are about how actors make sense of what is the proposed (technological) transition, and how it might influence the actor. Thus, it is about observing and translating developments in the operational environment, and then designing strategic action to influence these developments in turn. Incumbents' interests thus guide how they will respond to expectations that can arise either internally at the individual company or collectively in their industry.

Incumbents' interest towards and actions in niches does not mean they will abandon their existing business logic and give unconditional support to transitions. There is, in fact, a well-established understanding that incumbents often engage simultaneously with niches, while keeping their core regime business intact [51,52]. In general, the incumbency research has been conceptually moving towards a more complex understanding of what these actors do and why, abandoning the dichotomy of incumbents being either for or against transitions [30,53].

3.2. Intermediation in transitions

Intermediaries are organisations which operate between actor groups or between actors and artefacts [2]. They have been studied in many different strands of research, e.g., technology transfer and infusion, innovation management, innovation systems, and service organisations [54]. Initially in the transition literature, intermediaries were viewed primarily in relation to niche level activities [55]. It was noted that intermediaries can support niche innovations, for example, by aggregating lessons from local projects, establishing institutional infrastructure, and framing and coordinating action on the ground [56]. However, this understanding has since drastically expanded.

Transition research has become interested in so-called 'transition intermediaries' that foster systemic change and thus stretch beyond niches. Transition intermediaries are characterised in the transition literature as "actors and platforms that positively influence sustainability transition processes by linking actors and activities, and their related skills and resources, or by connecting transition visions and demands of networks of actors with existing regimes" [8]. This understanding of intermediation goes also beyond brokage and operational neutrality, broadening the concept in contrast to the other literatures. It highlights intermediaries' active, even interventionist, role in driving change and championing the development of certain technologies [45,57], and acknowledges intermediaries as niche builders and promoters that shape innovation trajectories. So, although intermediaries can focus simply on realising individual projects and translating new innovations to users without a greater transition agenda [8], they may also target more system-level transition and transformation of the regime [40].

Researchers conventionally give the label 'intermediary' to actors whose main purpose is to intermediate. Typical intermediaries in this regard include, for example, innovation networks and centres, (non-profit) change agencies, and consultants. However, one can also conceptualise actors as intermediaries based on the functions they perform [8]. Rather than restricting intermediation to a specific type of actor, intermediation can therefore also be understood as a flexible role that can be carried out and adopted by different actors. Intermediation does not need to be these actors' main purpose, but their activities can nevertheless provide intermediation functions.[3] As intermediation is not necessarily the reason for existences of these actors, this perspective also directs attention to the diverging motivations behind intermediation. Studies have found that the roles and motivations of private profit-seeking intermediaries are critically different from public or non-profit intermediaries. Private intermediaries typically emerge as a response to market opportunities or pressures to change [2,58,59], whereas public intermediaries are motivated by policy goals. As a result, private intermediaries tend to be more context-specific whilst public ones are more systematic [54]. Their intermediation can thus be seen as different but complimentary, as suggested by Bastås and Mignon [58].

This multiplicity of what transition intermediation can be, based on the idea of intermediation as a function, was captured by Kivimaa et al. [8] in their much-referenced typology of five transition intermediaries, reproduced in Table 1. These types include systemic intermediary, regime-based transition intermediary, niche intermediary, process intermediary, and user intermediary. Systemic intermediaries aspire to facilitate systemic change processes on a societal level by, for example, disrupting dominant regime structures and engaging in niche market creation [60]. Regime-based transition intermediaries operate between multiple actors and strive to foster transitions within a mandate of the dominant regime. There have been calls to research these regime-based intermediaries further [40], and empirical research has since provided many examples of such intermediation [39,61–63]. Niche intermediaries are endogenous niche actors that connect local projects to facilitate market formation and standard creation to develop a niche [8]. Process intermediaries facilitate development of individual niche projects. These actors are typically unbiased towards a transition [60]. Finally, user intermediaries operate between emerging technologies and related user practices, by forming knowledge networks and by facilitating learning. Together, collections of these different actors that perform intermediation with diverging competencies, focus areas, and operational models form larger 'ecologies of intermediation' [8,59,60]. Furthermore, the actors, their activities, and the influences of their intermediation also vary between transition phases. For example, new process intermediaries are likely to form when transitions accelerate, as existing actors begin to adopt these functions [60].

However, despite these advancements, the transition intermediation literature still appears to overlook regime-based incumbent firms as potential actors to enact intermediation. Kivimaa et al.'s typology [8] does not mention incumbent firms. In another definition, intermediaries are described as actors that are "typically not e.g., profit-seeking established firms" [60]. Private intermediaries in general have remained empirically understudied [61] and focused on non-incumbents. At the same time, as for example Pugliese's framework [39] illustrates, incumbency research also tends to conceptualise intermediation as a process that mediates interactions between niche and regime structures, rather than recognising it as a potential role that incumbent actors themselves can adopt in transitions. So, while these two corners of transition literature do not explicitly suggest that incumbency and intermediation are incompatible, a clear conceptual link between these actor roles is yet to be established.

4. Methodology

The starting point of our research is that in contrast to the prevalent understandings of intermediation and incumbency in transition research, energy utilities' business operations in the EC sector could be conceptualised as a form of transition intermediation. In order to understand the potential influence of these business activities on the energy transition, it is important to explore precisely what these business activities are, and the incumbent actors' rationales for engaging therein. To this end, we conducted a comparative case study on energy utilities operating in Europe who have this type of business activities in the EC sector.

For identifying the exact operations that the case companies engaged in, we did not follow any specific framework. However, to structure our business operations -related findings, we followed the example of Busch & Hansen [55] by drawing on the project-phase based conceptualisation proposed by Glaa & Mignon [66]. This means that we organised the business operations related data according to three project phases: pre-development, development, and post-development. The study of business rationales, on the other hand, was guided by Bakker's [13] suggestion to explore actors' interests and expectations simultaneously. However, we complemented Bakker's work by extending the analysis of expectations from the specific technological and institutional configuration viewpoint towards expectations regarding the larger operational environment in which these configurations emerge, including the development of the economic and socio-political environments.

4.1. Research contexts

The selection of research contexts was informed by pragmatic considerations, namely the research team's established connections with companies and language competencies in Italian and Finnish. These factors facilitated access to relevant data and enabled deeper contextual understanding, which are essential to rigorous qualitative analysis [70].

Italy and Finland present two quite different operational environments for ECs. One important factor here is their diverging

[3] In addition, it must be noted that although many transition intermediaries perform intermediation intentionally, not all of them are necessarily aware of it [60].

Table 1
Typology of transition intermediaries, reproduced from Kivimaa et al. [8]. The column "Example studies" includes our own compilation of the literature.

Category	Level of intermediation	Position vis-à-vis niche	Interest	Typical actors	Example studies
Systemic intermediary	System level between multiple actors & interests	Outsider	Facilitate transitions	Established to intermediate (e.g., innovation networks, innovation centres)	[57,62,63]
Regime-based transition intermediary	System level between multiple actors & interests	Outsider	Facilitate transition within the mandate of dominant regime actors	Existing actors who adapt intermediary roles or are established to intermediate (e.g., research foundations, change agencies)	[39,61,64]
Niche/grassroots intermediary	Between local projects	Insider	Advance the particular niche	Emerge together with the niche (e.g., not-for-profit agencies)	[3,26,56,65]
Process intermediary	Day-to-day action within projects or specific processes	Outsider	No specific transition agenda	Established or employed actors (e.g., consultants, project managers)	[66,67]
User intermediary	Between technology and users	Insider or outsider	Facilitate adoption of specific technology	Emerges among the users (e.g., internet forums, advocacy groups)	[68,69]

transpositions of the two core EC-related EU directives: the Renewable Energy Directive (EU 2018/2001) and the Internal Electricity Market Directive (EU 2019/944). These directives introduced the term EC, its specific definitions—renewable energy communities (RECs) and citizen energy communities (CECs), and the rules and enabling frameworks to support their development.

The Italian EC sector was long stagnant until the first partial transposition of the before-mentioned EU directives in 2020, where Italy introduced a premium tariff for self-consumed energy in RECs. Simultaneously, Italy started to offer financial grants[4] to small municipalities to support the construction of renewable energy production infrastructure [71]. The second, full transposition of the directives was undertaken in 2024, introducing RECs and CECs into Italian legislation and further expanding the size and operational scope of the RECs[5] [71]. Together, these provisions have played an instrumental role in increasing interest in setting up ECs in Italy. The EC sector in Italy currently centres strongly around RECs, whose basic operational logic is to virtually match local renewable energy production with local self-consumption. Companies whose core business is energy cannot make use of the new financial incentives, nor be members of RECs, but they can function as facilitators and consultants on these initiatives and provide RECs with different services.

In Finland, the EC sector has been diversifying towards collective solar energy production initiatives, but the sector remains constrained by the lack of full transposition of the EU directives. The updated legislation defines CECs but not RECs, which restricts ECs' operations to the same grid connection point [71]. The new EC developments are predominantly local energy communities (LECs), which are specific types of CECs. These form around existing housing companies, within single property lines and grid connection points [71]. The community both produces and self-consumes energy, and any excess is sold to the electricity market. There are currently no specific financial benefits available to LECs in Finland, although some financial grants have been given to support solar energy investments directed at multi-apartment buildings [71].

4.2. Case selection

We applied two primary criteria to identify suitable cases from these countries. First, a company that is an energy incumbent, that is, a well-established, traditional market player engaging in energy production and/or retail. Second, a company that has business operations in the EC sector.

For Italy, we identified two potential cases from our earlier work. In Finland, we conducted a thorough exploration of Finnish energy utilities' websites and reporting, finding three companies that fit the selection criteria. However, two refused an interview—citing internal reorganizational activities (past or present). Ultimately, we decided to proceed with one case study from each country: Sorgenia SpA from Italy and Keravan Energia Oy from Finland.

Sorgenia is a company owned by private investors that focuses on energy generation, retail, and energy services, with over half a million customers across Italy. It was involved in setting up two RECs: Turano Lodigiano and Bertonico. A third, larger REC in Trento is currently awaiting authorisation to commence operations [72]. Keravan Energia, by contrast, is comparatively smaller and operates as a municipally owned energy company. Its operations focus on district heating, energy retail, and distribution, but it also has some renewable electricity generation capacity. The company has been involved in setting up six LECs organised around existing housing companies. The case companies are described in more detail in Table 2.

4.3. Data collection and analysis

We conducted one interview with both of our case companies in the spring 2025. For Sorgenia, the interviewee held a senior manager position and worked closely with the company's REC business. For Keravan Energia, two company representatives attended the interview. One was a senior manager and the other held a managerial position, and both had been closely involved in the company's LEC projects. The interview details are summarised in Table 3.

The interviews followed a semi-structured format. The questions related to the following topic areas: the current and planned operations in the EC sector, the company's views on the EC niche and its influence on the firm's operations, and the company's expectations regarding the development of the EC niche. We conducted the interviews via Microsoft Teams, through which we were also able to record the conversations and obtain artificial intelligence (AI) assisted transcriptions. These transcription documents were then translated into English using Google Translate.

In addition to the primary interviews, for Sorgenia we also used information gathered through another interview. This interview was originally conducted for other research purposes by the researchers in our team in spring 2024. We decided to include this data because the topics discussed in the interview related strongly to the present study and were in part its underlying inspiration.

We conducted inductive content analysis of the interview data. We used the qualitative data analysis software NVivo to systematically identify key data points. To ensure that the AI-translated transcription documents were correctly interpreted, both the original and translated versions of the interviews were coded together under the same node. We then began to develop the individual case studies through iterative data analysis. At this point, we complemented the insights gained from the interviews with publicly available company materials, such as their sustainability reports and websites. This was done to develop a more comprehensive understanding, verify and clarify some selected

[4] 5.7 billions euros [72].

[5] The operational scope of RECs expanded from secondary to primary substation, which on average serves 30,000 inhabitants, while the maximum size of the plants expanded from 200 kW to 1 MW [72].

Table 2
Main characteristics of the two case studies. Data on Sorgenia is from 2024 [72]. For Keravan Energia, the date of the data is not specified [73].

Case company	Founded	Ownership	Country and scope	Core operational areas in the energy system	Customers	Operations in the EC sector
Sorgenia SpA	1999	Private investment groups: F2i (62%) and Sixt street (38%)	Italy, national	Generation and retail: 1087 GWh electricity from renewables, 6244 GWh electricity from natural gas Energy services: Over 15 Mwe photovoltaic systems installed (+ electric vehicle charging stations, condensing boilers etc.)	~650,000	Supported setting up two officially authorised RECs in Italy: Turano Lodigiano (45 kW total power) and Bertonicol (34 kW total power) A third, larger REC in Trento is currently waiting authorisation (400 kW total power)
Keravan Energia Oy	1906	Privately owned by two municipalities: Kerava (96,5%) and Sipoo (3,5%)	Finland, regional	Generation: 48 GWh electricity from solar and biomass, 314 GWh district heating, 72 GWh process heat Energy retail: 522 GWh electricity, 321 GWh district heating, 3,4 MWh natural gas Distribution: 588 GWh electricity	~39,000	Supported setting up six housing company-based LECs in the municipality

Table 3
Overview of the interviews.

Case company	Interview	Timing	Length
Sorgenia SpA	Senior manager who works closely with their REC business	Spring 2025	69 min
	Manager who deals with the development of REC projects promoted by the company	Spring 2024	99 min
Keravan Energia Oy	A joint interview with a senior manager and manager, who have both been closely involved with the company's LEC projects	Spring 2025	79 min

statements made in the interviews, and gain additional insight particularly into the companies' interests, which were difficult to approach in an interview format. These data sources are explicitly referenced whenever they are presented.

5. Results

5.1. Sorgenia

5.1.1. Interests

Sorgenia has a general mission to accelerate the energy transition and share of renewables. The company strives to achieve this both by increasing the share of renewables in its own energy production and fostering new distributed energy solutions. It offers a range of energy services, management tools, and green-technology solutions to both private and business customers. These include, for example, solar energy systems, battery energy storage systems, electric vehicle charging stations, and energy diagnostics [72]. Providing customers with "more tools and skills that enable them to take a more active role in the energy transition" is part of Sorgenia's core business strategy [72].

Due to its existing energy service operations, Sorgenia already had some relevant know-how and skills, which it could leverage when starting to develop its REC-related business operations around 2020. The company initially became active in the REC sector when it was approached by the mayor of Turano Lodigiano. The mayor proposed that Sorgenia could compensate for the impacts of its gas-fired power plant located in the area by helping the municipality develop a REC. The REC business was thus kickstarted by short-term interest to meet these demands, while also learning about the RECs and developing competences and potential business approaches in this area, rather than by direct commercial motivation. However, the company soon learned that it was able to design RECs efficiently and profit from these in two primary ways: selling energy production technology and installation services to the communities and gaining a quota from the self-consumed energy. Thus, Sorgenia began to see itself as a natural partner in developing RECs for the community groups.

5.1.2. Business operations

Sorgenia had business operations in all three project phases. In the pre-development phase, it conducted feasibility assessments and offered other technical advisory services to determine how to design RECs practically. An assessment included, for example, the following factors: who are the potential members of the community, what is their energy consumption profile, what kind of energy production system would best serve the community, and where could the production plant be located. Once the initial design of a REC had been established, Sorgenia played a role in raising awareness about the planned projects in the area, as it strived to find households or businesses that would want to join the community as consumers to ensure its viability. Since the establishment of the new financial mechanisms to support RECs, Sorgenia has also adopted a more proactive role in encouraging and helping municipalities to apply for the funding.

In the development phase, Sorgenia supplied and installed all the energy system infrastructures around which the RECs were formed. These production systems were connected to public buildings, such as schools or libraries, and financed either by local businesses, municipalities, or citizen groups that had initially started the REC development projects. In the exceptional case of Turano Logidiano, the construction of the plant was fully financed by Sorgenia, which donated the plant to the municipality after completion as part of its environmental compensation activity. After the physical infrastructure and membership base were established, the company supported the community groups in legally establishing the REC. According to Sorgenia, this bureaucratic process is highly complex and challenging for the ordinary citizens to execute without support from the energy professionals.

Once operational, Sorgenia continued to provide practical support and digital tools to manage the REC's everyday operations. This included advisory services through their call line for both the community managers and individual community members, and maintenance services when needed. All the members of a REC also had access to an energy management platform developed by the company. On this platform, the members could find information regarding, for example, the history of the REC, the benefits it has generated for the local community, and the share of self-consumed energy within the community as well as within the single household. The digital platform and other support services were only available for RECs developed with Sorgenia. Their REC business is thus a form of package deal.

5.1.3. Expectations

Sorgenia's own expectations towards the niche were perhaps at first cautionary, but they have since become highly positive. This has been driven by the strong regulatory push and development of support schemes in transposing the EU's directives, as discussed in Section 4.1. The company also thought there is increasing willingness among citizens, local companies, and municipalities to take on a more active role in

the energy system. The company thus seemed to share the common expectation that RECs will become important to Italy's energy system, and that these projects will grow both in terms of their size and number.

Sorgenia expects that as the support mechanisms are directed towards municipalities, they will be the primary actors to set up RECs in the future. Further, it expects that the growth of RECs will not drastically change the role of households, because they would rather participate as consumers—which is simple, relatively effortless, free, and does not involve risks—than invest heavily in becoming prosumers. Although the economic benefits available through self-consumption are not that significant to individual households, Sorgenia expects that the environmental and social motivations, such as retaining value in the territory, will make participation attractive. Concerning Trento, the heart of the upcoming REC is a relatively large (400 kW) energy production system located on the rooftop of a local SME, while some 250 households are joining the community as consumer members who are expected to self-consume around 63% of the annual energy production [72]. In the future, new technologies and storage solutions could extend the sphere of operations also for households and enable more RECs that are actually managed by the citizens themselves.

For these reasons, Sorgenia saw strong business potential in the REC sector and has in recent years systematically developed its business operations and increased capabilities in the area. The company has developed a pipeline supporting around 30 municipalities' REC development in the coming years [72]. As RECs advance and continue to take on a more prominent role in the Italian energy system, Sorgenia expects it will develop even more long-term partnerships with community groups and support the management of the RECs overall energy package in an efficient manner.

5.2. Keravan Energia

5.2.1. Interests

Keravan Energia aims to achieve carbon neutral energy production by 2030 [73]. As a municipally owned company, providing the region with fossil-free and affordable energy and distribution services is at the core of its operations. The company also provides different smart and low-carbon energy services and solutions, including solar panel leasing and solar system-development related services.

The first LEC developed with the support of Keravan Energia entered into service in 2023. The collaboration started with the housing company making a direct request for help. This was triggered by a regulatory change, which officially enabled the creation of a housing-company based EC. In contrast to earlier, the new LEC model now allowed housing companies to distribute energy produced by collectively owned energy production systems to individual households rather than just common spaces. Simultaneously, the legislative change also made it compulsory for distribution grid operators such as Keravan Energia to support LECs' connection to the power grid, and to connect them to the Finnish electricity markets' centralised data exchange system Fingrid DataHub.

Keravan's representatives stated that due to the existing operations and new legal obligations, it made sense to combine these individual services under a single LEC offering. They also wanted to make the development process more transparent and straightforward for housing companies interested in LECs. Thus, the development of the LEC service offering was relatively organic. Especially at the outset, Keravan actively sought to generate new understanding and competences in the area, and to see if it could develop new commercial opportunities in this space. For example, it looked to actively market its LEC development services to housing companies.

5.2.2. Business operations

Keravan Energia was initially approached directly by a community group who needed support in developing LECs, and the company has since tried to market its EC-related services directly to housing companies more proactively. It has combined information about housing-company based solar energy LECs and all of its services in this area to a dedicated webpage [74], to make information more easily accessible and its offering more transparent. After a project initiation, the company would conduct a feasibility assessment, which included the evaluation factors such as the community's electricity use and available rooftop space [74]. Based on the assessment, Keravan Energia would then make a proposal to the housing company on an optimal solar power system design matching the community's energy needs and available resources.

In the development phase, Keravan Energia supplied and installed the energy production technology for the LECs. These systems were directly financed by the household members. Often in Finland this means the housing company takes out a loan, and households can decide whether they pay off their share immediately or follow the monthly payment plan. If requested, Keravan Energia also assisted the housing companies in deciding whether they should use the SMA or SMB model to distribute the self-produced energy and associated profits from the sale of excess energy among the community members. The company also supported communities in drafting any contracts necessary for getting the ECs up and running. In Finland, the distribution system operators are required by law to support ECs' registration on the national centralised data exchange system for the electricity retail market Datahub.

Keravan Energia offered the communities initial user training, and supported the ECs in any issues that arose throughout the solar panels' operational lifetime [74], but did not proactively support the management of ECs' everyday operations once they were up and running.

5.2.3. Expectations

After the initial optimism of this sense-making and exploration period, Keravan Energia's expectations towards the LECs have decreased. In Finland, the policy signals around ECs in general have remained relatively weak, and the profitability of the communities low or modest at best [71]. Keravan has found that economic gain is the main driver of housing companies' LEC developments. All six of the LEC projects' investment decisions were made during the energy crisis between 2023 and 2024, when the price of electricity was high and the return on investment for the solar power systems seemed secured. As energy prices have stabilised, there has been notably less demand for LECs and no new projects in the pipeline, despite Keravan having more proactively marketed their LEC services to housing companies. The current Finnish legislation, which does not recognize ECs crossing property lines, is also restricting the EC niche, as it largely restricts the EC phenomenon to these housing companies. Enabling more distributed communities and energy sharing across property lines, as in the case of Italy, could create new opportunities and operational models.

Keravan Energia thus anticipated that on the current development trajectory, interest in community projects would remain limited. While Keravan Energia's overall sentiment towards the EC phenomenon was positive, the company was sceptical whether ECs would in fact scale up in the future in Finland, and whether it would even be needed. The representatives of Keravan Energia highlighted the need to critically assess the motivations and reasons for scaling up ECs in the first place. Assuming that overall energy prices continue to remain low, the share of (domestic) renewable energy production high, and the security of the supply good, the interviewees felt there is a need to critically assess what benefits ECs actually bring and to whom, and how they may influence the energy system at large. However, the company contemplated that perhaps new and cheaper storage solutions, which would enable more flexible self-consumption and give the communities more control over when to sell energy, could improve the profitability of community schemes and make them more attractive in the future.

Thus, Keravan Energia had a ‘wait and see’ type of approach towards ECs. The company considers it has a duty to provide its customers with the means to produce renewable energy, and support the establishment of LECs, but due to unclear expectations sees no intrinsic value or

business potential in ECs as such.

5.3. Comparative analysis

The two companies' business operations, summarised in Table 4, were fairly similar to one another. This was especially the case in the development phase, where both took part in the design, technical set-up, as well as organisational set up. However, Keravan Energia primarily directed its services at establishing LECs, whereas the emphasis of Sorgenia's activities was in providing REC management services in the post-development phase. The specific operation from which these companies made business was the supply and installation of energy system infrastructure. The energy system design, feasibility assessment, and energy system maintenance services were closely related to this. In addition, Sorgenia profited directly from the communities' self-consumption. However, most of the business operations that we identified did not have a direct transactional market logic connected to them and they were chargeless for the community groups.

Despite these similarities, the two utilities had quite diverging rationales behind their behaviours. These insights are summarised in Table 5. Sorgenia saw vast business potential in the REC sector and was systematically building its service offering in the area. This was due to the combined factors of customer demand, skills fit, alignment with goals and values, positive expectations shaped by regulatory changes, and favourable support mechanisms. Keravan Energia's operations, on the other hand, were driven primarily by their keenness to provide value added for customers and support citizens in their EC development endeavours, despite not seeing vast business potential to scale up these activities due to stagnant demand and a lack of regulatory drivers. Even if Keravan Energia was less actively developing its business, the company also portrayed a welcoming tone towards new community developments.

Overall, ECs were perceived by both our case companies as a new customer group and a complementary business opportunity, rather than an imminent threat to the utilities' own energy production activities. For Sorgenia, the business case was in the supply of energy technology and management services, and for Keravan Energia, in the supply of energy technology. In addition, supporting ECs also presented these utilities with an excellent opportunity to practically illustrate their commitment to the energy transition.

6. Discussion

The role of intermediary organisations is deemed crucial in scaling up the EC niche [3], and there are signs that their importance might continuously grow due to increasing regulatory and digital complexity that communities need to navigate [5–7]. The intermediary potential of energy utilities have to date mostly been disregarded in EC research, but some energy utilities have recently started to systematically design and develop commercial EC projects for community groups. The aim of this paper is to further explore this emerging phenomenon.

6.1. Evidence of energy utilities' EC intermediation

Our case companies provided various types of support for ECs. The services we identified included initiating new groups, sharing information, providing tools and resources, and offering professional services. These are all typical intermediation functions in EC research [3,7]. More specifically, we identified activities such as helping with funding applications, raising awareness, conducting technical feasibility assessments, providing bureaucratic support, recruiting new members, and offering management assistance. All of these operations extend beyond the companies' traditional business operations and facilitate the development of niche projects owned and legally operated by community groups. From the energy utilities' perspective, the main purpose behind developing these intermediation services was to bring in new customers and expand operations. Intermediation was thus undertaken for instrumental reasons. Their initial interest was to learn more about ECs and to establish ECs as a new customer group to which the companies could supply energy technology and related services. However, we believe that our findings indicate that even though energy utilities engage with EC niches for economic reasons, these intermediation activities may benefit the niche beyond transactional project development. Therefore, we argue that these energy utilities can be conceptualised as intermediaries in energy community development.

6.2. Implications for understanding the EC niche upscaling

Both utilities' operations had been kickstarted by direct support requests from the community groups. This could indicate increasing enthusiasm but a lack of competences or resources to set up feasible ECs among citizens and existing community groups. In responding to these requests and offering help throughout the EC project developments, both our case companies had an important role in realising these ECs in their operational areas. Thus, our findings support the emerging understanding among EC scholars [5,7,23] that commercial actors could be acquiring an increasingly significant role in fostering the replication and upscaling of EC developments.

As our findings indicate that initial demand among community groups was crucial to activating utilities in this sector, we reason that citizens must first regard ECs as financially profitable or otherwise beneficial and value-adding to spark their interest. Utilities which already offer energy services and have decarbonization as a core strategic goal are then inclined to pick on these demand signals and activate them in developing different intermediary services. Our interpretation aligns with Bulah et al.'s [35] views, who argue that incumbents' entry timing to niches can also be influenced by projections of a promising market driven by changing consumer demands, rather than regulatory pressure to change. This view is an often-overlooked perspective in transition research.

Table 4
All the support activities that the case companies enacted through their EC business.

Project phase	Activity area	Support that energy utilities provided for ECs	Sorgenia	Keravan Energia
Pre-development	Project initiation	Market ECs directly to community groups		*x*
		Encourage and help communities to apply for EC project funding	*x*	
	Spreading information	Raise awareness about a planned REC in its operational area	*x*	
		Provide general information about ECs to potential community groups (e.g., benefits, set up process)		*x*
Development	Design	Technical feasibility assessments	*x*	*x*
		Energy system design	*x*	*x*
	Technical set-up	Supply and installation of the energy system infrastructure	*x*	*x*
	Organisational set-up	Support the bureaucratic set-up process	*x*	*x*
		Finding new consumer-members from the territory	*x*	
		General advisory	*x*	*x*
Post-development	Managing operations	Technical support and user advisory	*x*	*x*
		Providing a digital management platform for community members to support their decision-making	*x*	
	Maintenance	Energy system maintenance services	*x*	*x*

Table 5
The case companies' rationales and the factors behind them.

	Interests of the company		Expectations towards the niche		Rationale for the behaviour in the EC sector
	Short term	Long term	Own	Collective	
Sorgenia	Answer new customer demands Learn more about the potential opportunities presented by RECs	More sustainable energy production Integration of digital services into energy system Support citizens' participation in the energy system Develop new commercial opportunities	Highly positive expectations towards the niche – more and bigger RECs formed around municipalities	Positive expectations with strong alignment of the EU's political ambitions and the national regulation	Initially to learn about the opportunities presented by RECs Now the company sees clear business potential in RECs formed around municipalities
Keravan Energia	Answer new customer demands Learn more about the potential opportunities presented by housing-company based LECs Compliance with the changing regulation Support customers' participation in the energy system	Fossil-free energy production Maintain low electricity distribution costs for the Kerava and Sipoo regions of Finland Value added for customers	Initially optimistic expectations have since turned into scepticism due to stagnant demand	Unclear expectations due to incomplete transposition of the EU's directives into national regulation, and lack of clear support mechanisms to scale up ECs	Initially to learn about the opportunities presented by LECs Now the company wants to support housing companies' LEC endeavours and create new customer value

What financial and other support mechanisms are in place, and what types of ECs are permitted, determines how lucrative running or joining an EC is for different actors, and, thus, how energy utilities could develop a business case around these EC activities. In Finland, insufficient political support was not making ECs appealing to the community groups. This was hindering Keravan Energia's expectations towards the niche and restraining its business development around LECs. In Italy, on the other hand, strong policy development around RECs was sparking citizen groups' interests towards these developments, creating a clear business case for Sorgenia.

Our findings indicate that energy utilities' support alone cannot compensate for the regulatory or policy shortcomings to scale up the EC sector. Energy utilities should not be expected to scale up the EC niche without institutions first paving the way with successful conditions for them. In this regard, our findings contribute to the emerging understanding around intermediary-facilitated EC business models, and how utilities' intermediation might fundamentally differ from that of other (e.g., non-commercial, non-regime based) organisations. Nolden et al. [7] suggested in their paper that intermediaries could improve ECs' profitability in technologically complex post-subsidy operating environments, and, thus, help counteract potential regulatory shortcomings. Although in theory utilities would have the know-how to do this, in the light of our findings we argue they would be unlikely to develop intermediation services if citizens have negative attitudes towards ECs. Thus, overall, the utility perspective further underlines the importance of supporting regulation for scaling up ECs in the EU, as routinely noted by researchers in the field [9,71].

6.3. Acknowledging incumbents' intermediary potential in transition research

Our findings demonstrate that incumbent firms can perform transition intermediation related to users, processes, and niche development activities, as conceptualised by Kivimaa et al. [8]. The operations we identified in the pre-development phase could be conceptualised as user intermediation, as these activities targeted the adoption of (in this case, social) innovation by spreading information among new user groups. Operations in the development and post-development phases, which focused on facilitating day-to-day project development and management activities, could be conceptualised as process intermediation. Sorgenia's activities went beyond this and could even be conceptualised as niche intermediation: the company was actively striving to adopt a larger role in developing the niche, for example, by drawing lessons from individual projects and developing digital tools to better support RECs' operations.

As transitions are likely to become more contested and the boundaries between niches and regimes blurred, we deem that it is important to recognize incumbent firms' potential to provide these transition intermediation functions. Our study suggests that intermediation can be an effective horizontal diversification strategy [42], through which incumbents expand their operations beyond their core business models to seize new opportunities and hedge risks. An incumbent may still continue to provide intermediary support for individual users and projects, even when they do not have high expectations for a niche, in order to increase customer satisfaction and demonstrate commitment to sustainability. This finding indicates that creating new customer value could in itself be a sufficient rationale for incumbents' niche support, which compliments the earlier work of Bakker [13]. Overall, we argue that intermediation can provide another interesting perspective to incumbents' engagement with niches and thus generate novel insight into their dynamics.

6.4. Limitations and avenues for further research

Recruiting energy utilities to the study proved a challenging task. In the future, it would be interesting to conduct similar types of investigation among a larger sample of energy utilities operating in different EU countries. This could also expand understanding in the context of other ECs' organisational models beyond RECs and LECs. It is also important to note that in this paper we have intentionally not engaged with the normative dimensions of community-company engagement, nor with communities' viewpoints on these matters, in order to focus fully on understanding the utility perspective. We acknowledge that there are numerous potential issues that corporate involvement in EC projects may raise, including undermining the role and power of citizens. These concerns should not be overlooked, and we should always critically analyse incumbents' behaviour in transitions. We see that future research should also seek to provide more symmetrical perspectives on companies' business operations in the EC sector, which simultaneously observes both community and company perspectives, thus setting the stage for more normative deliberations.

7. Conclusion

Energy utilities are emerging as new intermediary actors in the European EC sector. Our research explored two European utility companies' new EC business. We found that these business operations span across all EC project development phases and provide citizens and community groups with a variety of support functions that facilitate EC development. These companies could thus potentially play a significant role in upscaling the sector. However, it is important to remember that their reasons for engaging with ECs are deeply strategic, and that their involvement cannot compensate for lack of supporting regulation to scale up ECs. As our results provide novel empirical evidence of incumbent firms providing intermediation functions for a niche, we encourage both incumbency and intermediation researchers to better acknowledge incumbent firms' intermediary activities and their potential influence on niche development.

CRediT authorship contribution statement

Ella Tolonen: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Salvatore Ruggiero:** Writing – review & editing, Validation, Investigation, Conceptualization. **Simone Franzò:** Writing – review & editing, Validation, Investigation.

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.

Data availability

The data that has been used is confidential.

References

[1] V.J. Schwanitz, A. Wierling, H. Arghandeh Paudler, C. Von Beck, S. Dufner, I. K. Koren, T. Kraudzun, T. Marcroft, L. Mueller, J.P. Zeiss, Statistical evidence for the contribution of citizen-led initiatives and projects to the energy transition in Europe, Sci. Rep. 13 (2023) 1342, https://doi.org/10.1038/s41598-023-28504-4.

[2] T. Moss, Intermediaries and the governance of sociotechnical networks in transition, Environ. Plan. A 41 (2009) 1480–1495, https://doi.org/10.1068/a4116.

[3] T. Hargreaves, S. Hielscher, G. Seyfang, A. Smith, Grassroots innovations in community energy: the role of intermediaries in niche development, Glob. Environ. Chang. 23 (2013) 868–880, https://doi.org/10.1016/j.gloenvcha.2013.02.008.

[4] S. Ruggiero, M. Martiskainen, T. Onkila, Understanding the scaling-up of community energy niches through strategic niche management theory: insights from Finland, J. Clean. Prod. 170 (2018) 581–590, https://doi.org/10.1016/j.jclepro.2017.09.144.

[5] J. Barnes, P. Hansen, Governing energy communities: the role of actors and expertise in business model innovation, in: Energy Communities: Customer-centered, Market-driven, Welfare-enhancing?, Elsevier, 2022, p. 16.

[6] P. Hansen, J. Barnes, S. Darby, First things first: laying the foundations for smart energy communities by exploring concepts and realities in European case studies, European Council for Energy Efficient Economy, 2021. https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2021/5-a-smart-new-start-for-sustainable-communities/first-things-first-laying-the-foundations-for-smart-energy-communities-by-exploring-concepts-and-realities-in-european-case-studies/.

[7] C. Nolden, J. Barnes, J. Nicholls, Community energy business model evolution: a review of solar photovoltaic developments in England, Renew. Sust. Energ. Rev. 122 (2020) 109722, https://doi.org/10.1016/j.rser.2020.109722.

[8] P. Kivimaa, W. Boon, S. Hyysalo, L. Klerkx, Towards a typology of intermediaries in sustainability transitions: a systematic review and a research agenda, Res. Policy 48 (2019) 1062–1075, https://doi.org/10.1016/j.respol.2018.10.006.

[9] G. Seyfang, J.J. Park, A. Smith, A thousand flowers blooming? An examination of community energy in the UK, Energy Policy 61 (2013) 977–989, https://doi.org/10.1016/j.enpol.2013.06.030.

[10] M. de Bakker, A. Lagendijk, M. Wiering, Cooperatives, incumbency, or market hybridity: new alliances in the Dutch energy provision, Energy Res. Soc. Sci. 61 (2020) 101345, https://doi.org/10.1016/j.erss.2019.101345.

[11] P.A. Strachan, R. Cowell, G. Ellis, F. Sherry-Brennan, D. Toke, Promoting community renewable energy in a corporate energy world, Sustain. Dev. 23 (2015) 96–109, https://doi.org/10.1002/sd.1576.

[12] R.H. Warlenius, S. Nettelbladt, Scaling up community wind energy: the relevance of autonomy and community, Energy Sustain. Soc. 13 (2023) 33, https://doi.org/10.1186/s13705-023-00411-6.

[13] S. Bakker, Actor rationales in sustainability transitions – interests and expectations regarding electric vehicle recharging, Environ. Innov. Soc. Trans. 13 (2014) 60–74, https://doi.org/10.1016/j.eist.2014.08.002.

[14] N. Rossetto, S.F. Verde, T. Bauwens, A taxonomy of energy communities in liberalized energy systems, in: Energy Communities, Elsevier, 2022, pp. 3–23, https://doi.org/10.1016/B978-0-323-91135-1.00004-3.

[15] J. Hicks, N. Ison, An exploration of the boundaries of 'community' in community renewable energy projects: navigating between motivations and context, Energy Policy 113 (2018) 523–534, https://doi.org/10.1016/j.enpol.2017.10.031.

[16] I. Reis, I. Gonçalves, M.A.R. Lopes, C. Henggeler Antunes, Business models for energy communities: a review of key issues and trends, Renew. Sust. Energ. Rev. 144 (2021) 111013, https://doi.org/10.1016/j.rser.2021.111013.

[17] R.J. Hewitt, N. Bradley, A. Baggio Compagnucci, C. Barlagne, A. Ceglarz, R. Cremades, M. McKeen, I.M. Otto, B. Slee, Social innovation in community energy in Europe: a review of the evidence, Front. Energy Res. 7 (2019) 31, https://doi.org/10.3389/fenrg.2019.00031.

[18] G. Seyfang, A. Haxeltine, Growing grassroots innovations: exploring the role of community-based initiatives in governing sustainable energy transitions, Environ. Plann. C Gov. Policy 30 (2012) 381–400, https://doi.org/10.1068/c10222.

[19] J.J. Park, Fostering community energy and equal opportunities between communities, Local Environ. 17 (2012) 387–408, https://doi.org/10.1080/13549839.2012.678321.

[20] S. Ruggiero, H. Busch, T. Hansen, A. Isakovic, Context and agency in urban community energy initiatives: an analysis of six case studies from the Baltic Sea region, Energy Policy 148 (2021) 111956, https://doi.org/10.1016/j.enpol.2020.111956.

[21] E. Tolonen, S.R. Shakeel, J.K. Juntunen, Promoting just transition or enhancing inequalities? Reflection on different energy community business models in terms of energy justice, in: M. Shafie-khah, A.S. Gazafroudi (Eds.), Trading in Local Energy Markets and Energy Communities, Springer International Publishing, Cham, 2023, pp. 151–180, https://doi.org/10.1007/978-3-031-21402-8_6.

[22] F. Goedkoop, P. Devine-Wright, Partnership or placation? The role of trust and justice in the shared ownership of renewable energy projects, Energy Res. Soc. Sci. 17 (2016) 135–146, https://doi.org/10.1016/j.erss.2016.04.021.

[23] E. Creamer, W. Eadson, B. van Veelen, A. Pinker, M. Tingey, T. Braunholtz-Speight, M. Markantoni, M. Foden, M. Lacey-Barnacle, Community energy: entanglements of community, state, and private sector, Geogr. Compass 12 (2018) e12378, https://doi.org/10.1111/gec3.12378.

[24] S. Guerreiro, I. Botetzagias, Empowering communities – the role of intermediary organisations in community renewable energy projects in Indonesia, Local Environ. 23 (2018) 158–177, https://doi.org/10.1080/13549839.2017.1394830.

[25] M. Martiskainen, The role of community leadership in the development of grassroots innovations, Environ. Innov. Soc. Trans. 22 (2017) 78–89, https://doi.org/10.1016/j.eist.2016.05.002.

[26] G. Seyfang, S. Hielscher, T. Hargreaves, M. Martiskainen, A. Smith, A grassroots sustainable energy niche? Reflections on community energy in the UK, Environ. Innov. Soc. Trans. 13 (2014) 21–44, https://doi.org/10.1016/j.eist.2014.04.004.

[27] J. Knauf, R. Wüstenhagen, Crowdsourcing social acceptance: why, when and how project developers offer citizens to co-invest in wind power, Energy Policy 173 (2023) 113340, https://doi.org/10.1016/j.enpol.2022.113340.

[28] S. Agnew, C. Smith, P. Dargusch, Causal loop modelling of residential solar and battery adoption dynamics: a case study of Queensland, Australia, J. Clean. Prod. 172 (2018) 2363–2373, https://doi.org/10.1016/j.jclepro.2017.11.174.

[29] A. Smith, T. Hargreaves, S. Hielscher, M. Martiskainen, G. Seyfang, Making the most of community energies: three perspectives on grassroots innovation, Environ. Plan. A 48 (2016) 407–432, https://doi.org/10.1177/0308518X15597908.

[30] G. Kungl, Incumbent firms in sustainability transitions – different conceptions, heterogeneous roles and ideal types, Environ. Innov. Soc. Trans. 57 (2025) 101010, https://doi.org/10.1016/j.eist.2025.101010.

[31] J. Köhler, F.W. Geels, F. Kern, J. Markard, E. Onsongo, A. Wieczorek, F. Alkemade, F. Avelino, A. Bergek, F. Boons, L. Fünfschilling, D. Hess, G. Holtz, S. Hyysalo, K. Jenkins, P. Kivimaa, M. Martiskainen, A. McMeekin, M.S. Mühlemeier, B. Nykvist, B. Pel, R. Raven, H. Rohracher, B. Sandén, J. Schot, B. Sovacool, B. Turnheim, D. Welch, P. Wells, An agenda for sustainability transitions research: state of the art and future directions, Environ. Innov. Soc. Trans. 31 (2019) 1–32, https://doi.org/10.1016/j.eist.2019.01.004.

[32] R. Saleh, Defensive, reactive, or proactive? A critical review and conceptual framework of the role of incumbent firms in sustainability transitions, Energy Res. Soc. Sci. 127 (2025) 104256, https://doi.org/10.1016/j.erss.2025.104256.

[33] K. Ampe, E. Paredis, L. Asveld, P. Osseweijer, T. Block, Incumbents' enabling role in niche-innovation: power dynamics in a wastewater project, Environ. Innov. Soc. Trans. 39 (2021) 73–85, https://doi.org/10.1016/j.eist.2021.03.004.

[34] E.-L. Apajalahti, A. Temmes, T. Lempiälä, Incumbent organisations shaping emerging technological fields: cases of solar photovoltaic and electric vehicle charging, Tech. Anal. Strat. Manag. 30 (2018) 44–57, https://doi.org/10.1080/09537325.2017.1285397.

[35] B.M. Bulah, M. Tziva, C. Bidmon, M.P. Hekkert, Incumbent entry modes and entry timing in sustainable niches: the plant-based protein transition in the United States, Netherlands, and United Kingdom, Environ. Innov. Soc. Transit. 48 (2023) 100735, https://doi.org/10.1016/j.eist.2023.100735.

[36] G. Kungl, Challenges of the current discourse on incumbent firms in sustainability transitions, Energy Res. Soc. Sci. 108 (2024) 103367, https://doi.org/10.1016/j.erss.2023.103367.
[37] J. Mylan, C. Morris, E. Beech, F.W. Geels, Rage against the regime: niche-regime interactions in the societal embedding of plant-based milk, Environ. Innov. Soc. Trans. 31 (2019) 233–247, https://doi.org/10.1016/j.eist.2018.11.001.
[38] G.I. Pereira, E. Niesten, J. Pinkse, Sustainable energy systems in the making: a study on business model adaptation in incumbent utilities, Technol. Forecast. Soc. Chang. 174 (2022) 121207, https://doi.org/10.1016/j.techfore.2021.121207.
[39] M.S. Pugliese, A. Boffelli, M. Brumana, M. Kalchschmidt, Weaving a new path: rethinking incumbents' role in sustainability transitions through a multilevel perspective, Creat. Innov. Manag. (2025) caim.70020, https://doi.org/10.1111/caim.70020.
[40] B.K. Sovacool, B. Turnheim, M. Martiskainen, D. Brown, P. Kivimaa, Guides or gatekeepers? Incumbent-oriented transition intermediaries in a low-carbon era, Energy Res. Soc. Sci. 66 (2020) 101490, https://doi.org/10.1016/j.erss.2020.101490.
[41] M. Steen, T. Weaver, Incumbents' diversification and cross-sectorial energy industry dynamics, Res. Policy 46 (2017) 1071–1086, https://doi.org/10.1016/j.respol.2017.04.001.
[42] A. Mori, How do incumbent companies' heterogeneous responses affect sustainability transitions? Insights from China's major incumbent power generators, Environ. Innov. Soc. Transit. 39 (2021) 55–72, https://doi.org/10.1016/j.eist.2021.02.003.
[43] A. van Mossel, F.J. van Rijnsoever, M.P. Hekkert, Navigators through the storm: a review of organization theories and the behavior of incumbent firms during transitions, Environ. Innov. Soc. Trans. 26 (2018) 44–63, https://doi.org/10.1016/j.eist.2017.07.001.
[44] M. Altunay, A. Bergek, Interaction between energy incumbents and solar entrants: relationship status complicated, Environ. Innov. Soc. Trans. 46 (2023) 100695, https://doi.org/10.1016/j.eist.2023.100695.
[45] P. Kivimaa, A. Bergek, K. Matschoss, H. Van Lente, Intermediaries in accelerating transitions: introduction to the special issue, Environ. Innov. Soc. Trans. 36 (2020) 372–377, https://doi.org/10.1016/j.eist.2020.03.004.
[46] J.H. Wesseling, E.M.M.I. Niesten, J. Faber, M.P. Hekkert, Business strategies of incumbents in the market for electric vehicles: opportunities and incentives for sustainable innovation, Bus. Strateg. Environ. 24 (2015) 518–531, https://doi.org/10.1002/bse.1834.
[47] M.M. Smink, M.P. Hekkert, S.O. Negro, Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies, Bus. Strateg. Environ. 24 (2013) 86–101, https://doi.org/10.1002/bse.1808.
[48] F.W. Geels, J. Schot, Typology of sociotechnical transition pathways, Res. Policy 36 (2007) 399–417, https://doi.org/10.1016/j.respol.2007.01.003.
[49] F.W. Geels, Reconceptualising the co-evolution of firms-in-industries and their environments: developing an inter-disciplinary Triple Embeddedness Framework, Res. Policy 43 (2014) 261–277, https://doi.org/10.1016/j.respol.2013.10.006.
[50] B. Turnheim, F.W. Geels, The destabilisation of existing regimes: confronting a multi-dimensional framework with a case study of the British coal industry (1913–1967), Res. Policy 42 (2013) 1749–1767, https://doi.org/10.1016/j.respol.2013.04.009.
[51] C. Berggren, T. Magnusson, D. Sushandoyo, Transition pathways revisited: established firms as multi-level actors in the heavy vehicle industry, Res. Policy 44 (2015) 1017–1028, https://doi.org/10.1016/j.respol.2014.11.009.
[52] S. Patala, I. Korpivaara, A. Jalkala, A. Kuitunen, B. Soppe, Legitimacy under institutional change: how incumbents appropriate clean rhetoric for dirty technologies, Organ. Stud. 40 (2019) 395–419, https://doi.org/10.1177/0170840617736938.
[53] E. Tolonen, Keeping up with the decarbonization: conceptualizing and investigating incumbents' responses to transition pressures in the post-Paris world, J. Clean. Prod. 476 (2024) 143520, https://doi.org/10.1016/j.jclepro.2024.143520.
[54] J. Howells, Intermediation and the role of intermediaries in innovation, Res. Policy 35 (2006) 715–728, https://doi.org/10.1016/j.respol.2006.03.005.
[55] H. Busch, T. Hansen, Building communities in times of crisis - impacts of the COVID-19 pandemic on the work of transition intermediaries in the energy sector, Energy Res. Soc. Sci. 75 (2021) 102020, https://doi.org/10.1016/j.erss.2021.102020.
[56] F. Geels, J. Deuten, Local and global dynamics in technological development: a socio-cognitive perspective on knowledge flows and lessons from reinforced concrete, Sci. Public Policy 33 (2006) 265–275, https://doi.org/10.3152/147154306781778984.
[57] W. Kanda, M. Kuisma, P. Kivimaa, O. Hjelm, Conceptualising the systemic activities of intermediaries in sustainability transitions, Environ. Innov. Soc. Trans. 36 (2020) 449–465, https://doi.org/10.1016/j.eist.2020.01.002.
[58] L. Bastås, I. Mignon, Comparing public and private intermediaries co-existing in ecologies of intermediation, Environ. Innov. Soc. Trans. 56 (2025) 100972, https://doi.org/10.1016/j.eist.2025.100972.
[59] S. Hyysalo, E. Heiskanen, J. Lukkarinen, K. Matschoss, M. Jalas, P. Kivimaa, J. K. Juntunen, F. Moilanen, P. Murto, E. Primmer, Market intermediation and its embeddedness – lessons from the Finnish energy transition, Environ. Innov. Soc. Trans. 42 (2022) 184–200, https://doi.org/10.1016/j.eist.2021.12.004.
[60] P. Kivimaa, S. Hyysalo, W. Boon, L. Klerkx, M. Martiskainen, J. Schot, Passing the baton: how intermediaries advance sustainability transitions in different phases, Environ. Innov. Soc. Trans. 31 (2019) 110–125, https://doi.org/10.1016/j.eist.2019.01.001.
[61] L. Ingeborgrud, J. Lukkarinen, R. Toivanen, Private intermediaries in multi-system coupling: wood construction in Norway and Finland, Environ. Innov. Soc. Trans. 60 (2026) 101126, https://doi.org/10.1016/j.eist.2026.101126.
[62] K. Matschoss, E. Heiskanen, Innovation intermediary challenging the energy incumbent: enactment of local socio-technical transition pathways by destabilisation of regime rules, Tech. Anal. Strat. Manag. 30 (2018) 1455–1469, https://doi.org/10.1080/09537325.2018.1473853.
[63] H. Van Lente, M. Hekkert, R. Smits, B. van Waveren, Roles of systemic intermediaries in transition processess, Int. J. Innov. Manag. 7 (2003), https://doi.org/10.1142/S1363919603000817.
[64] E. Boyle, C. Watson, G. Mullally, B. Ó Gallachóir, Regime-based transition intermediaries at the grassroots for community energy initiatives, Energy Res. Soc. Sci. 74 (2021) 101950, https://doi.org/10.1016/j.erss.2021.101950.
[65] R.H.W. Boyer, Intermediacy and the Diffusion of Grassroots Innovations_The Case of Cohousing in the United States, 2018.
[66] B. Glaa, I. Mignon, Identifying gaps and overlaps of intermediary support during the adoption of renewable energy technology in Sweden – a conceptual framework, J. Clean. Prod. 261 (2020) 121178, https://doi.org/10.1016/j.jclepro.2020.121178.
[67] M. Martiskainen, P. Kivimaa, Creating innovative zero carbon homes in the United Kingdom — intermediaries and champions in building projects, Environ. Innov. Soc. Trans. 26 (2018) 15–31, https://doi.org/10.1016/j.eist.2017.08.002.
[68] S. Hyysalo, J.K. Juntunen, M. Martiskainen, Energy internet forums as acceleration phase transition intermediaries, Res. Policy 47 (2018) 872–885, https://doi.org/10.1016/j.respol.2018.02.012.
[69] I. Mignon, Intermediary–user collaboration during the innovation implementation process, Tech. Anal. Strat. Manag. 29 (2017) 735–749, https://doi.org/10.1080/09537325.2016.1231299.
[70] J. Gerring, Case selection for case-study analysis: qualitative and quantitative techniques, in: J.M. Box-Steffensmeier, H.E. Brady, D. Collier (Eds.), The Oxford Handbook of Political Methodology, 1st ed., Oxford University Press, 2009, pp. 645–684, https://doi.org/10.1093/oxfordhb/9780199286546.003.0028.
[71] L. Neij, J. Palm, H. Busch, T. Bauwens, S. Becker, A. Bergek, A. Buzogány, C. Candelise, F. Coenen, P. Devine-Wright, T. Hoppe, A. Kortetmäki, K. Pantazis, F. Palaiogiannis, M. Margosi, D. Petrovics, J. Plöchl, G. Ruggieri, S. Ruggiero, K. Standal, P. Scherhaufer, I. Soutar, Energy communities—lessons learnt, challenges, and policy recommendations, Oxf. Open Energy 4 (2025) oiaf002, https://doi.org/10.1093/ooenergy/oiaf002.
[72] Sorgenia Sustainability Report. https://www.sorgenia.it/shared/files/2025-09/Sorgenia_Report_2024_ENG.pdf, 2024.
[73] Keravan Energia, Tietoa Keravan Energiasta, Keravan Energia, 2025. https://www.keravanenergia.fi/yrityksestamme/. (Accessed 19 May 2026).
[74] Aurinkopaneelit taloyhtiöön, Keravan Energia, 2025. https://www.keravanenergia.fi/yrityksille/aurinkopaneelit/aurinkopaneelit-taloyhtioon/.