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Article

# The Role of Intermediaries in Supporting Local Low-Carbon Energy Initiatives

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**Abstract:** Recent scholarly attention shows that grassroots civil society low-carbon energy initiatives increasingly become part of the subnational climate change governance landscape. Despite their potency in view of consumer-owned distributed generation and enhanced citizen influence in the organization of the energy infrastructure, local low-carbon energy initiatives (LLCEIs) struggle to become viable alternatives to the centralized, private oriented energy system. To further LLCEI development, support needs to build their capacities; alleviate institutional hurdles and barriers stemming from the fossil fuel-based energy regime; and open up the system for the uptake, acceptance or breakthrough of LLCEIs. Evidence suggests that so-called “intermediaries” form a part of the solution in addressing these issues. Despite previous attempts at analyzing intermediary roles and activities vis-à-vis the development of community energy, the reality of the various roles and strategies intermediaries can employ and the support LLCEIs require to further develop have not yet been synthesized in a comprehensive analytical framework. This article aims to fill this gap by developing such a framework. We reflect on the analytical framework by evaluating the intermediary support structure in a specific case: the Province of Fryslân. From the analysis, we conclude that the Frisian case provided modest support to the claim that intermediary support is effective in addressing the needs of LLCEIs as the strategies and roles observed represent a complete and coherent support structure.

**Keywords:** intermediary; community energy; grassroots innovations; endogenous development; strategic niche management; asset-based community development; business incubator

## 1. Introduction

The daunting task to keep global warming within two degrees necessitates action on different levels, scales and domains. In recent years, initiatives comprising of groups of citizens that want to take matters into their own hands and strive to generate low-carbon energy in their local environment have been booming throughout Western Europe (e.g., [1–4]). In Germany, in the second half of the 2000s, the number of citizen energy production cooperatives increased rapidly: from 4 solar energy cooperatives in 2007 to over 200 by 2010 [1], with at least 600 newly formed citizen energy cooperatives in total in 2013 [3]. It is estimated that in Denmark in 2017, 20% of the installed wind energy capacity is owned by citizen cooperatives, farmers and local landowners [2]. In 2010, collective citizen initiatives accounted for around 40–50% of total installed wind energy capacity in Austria [5]. The Netherlands is no exception. Dutch energy cooperatives have been proliferating from around 70 to almost 400 in total in 2017 [6]. According to REScoop.eu, Europe is now home to over 1500 energy cooperatives,

which amount to over one million members [7]. Although what we term “local low-carbon energy initiatives” (LLCEIs) have received less scholarly attention in the US, Klein and Coffey [8,9] compiled several databases related to LLCEIs in the US into one central database and identified more than 5000 completed community energy projects. We refer to LLCEIs as the grassroots initiating and managing of a project or series of projects involving the generation, stimulation, and/or facilitation of low-carbon energy and/or energy efficiency by citizens/actors from civil society on a local scale. Success stories of the phenomenon of LLCEIs are for instance Klimakommune Saerbeck (Germany). In Saerbeck, local citizens were extensively involved in the realization and ownership of the Bioenergy Park that produces 29 MW worth of low-carbon energy—275% more energy than Saerbeck actually needs [10]. Another example is the Danish island of Samsø, which transformed large parts of its energy system with active citizen participation and managed to raise the low-carbon energy share from 13% to 75–80% within 10 years [11] (p. 888).

Not only do LLCEIs augment efforts to diversify the energy supply and decentralize energy generation, they also touch upon a wider range of issues. Enhanced citizen involvement in the energy transition by means of such bottom-up initiatives has inter alia the potential to facilitate socio-economic regeneration, foster social acceptance of low-carbon energy technologies, and promote behavioral change [12,13]. Scholars have therefore considered LLCEIs as instances of social innovation in the sense that much of the innovation centers around changes in social relations and practices with use of low-carbon energy technologies [14–16].

Despite the recent upsurge of LLCEIs, their further development greatly depends on a mixture of factors stemming from various domains, actors, levels and scales. The bottom-up and innovative nature of LLCEIs clashes with the centralized, monopolized, fossil fuel-based energy infrastructure dominated by multinationals that are only accountable to their shareholders. As such, LLCEIs challenge existing and prevalent practices, social relations, and regulations geared to the archaic energy regime—also referred to as “carbon lock-in” [17]. LLCEIs struggle to become a viable alternative to the status quo and are in need of capacity building. The issues that underlie the further development of LLCEIs can roughly be divided in three categories: (i) the bottom-up nature of the LLCEIs often implies a lack of resources and capacities and they require embedding in their communities (e.g., [13,18]); (ii) institutional hurdles and barriers stemming from the fossil fuel-based energy regime favor the status quo but hamper LLCEIs (e.g., [1]); and (iii) LLCEIs experience difficulties in opening up the regime for their uptake, acceptance or breakthrough (e.g., [19,20]). However, LLCEIs are in need of support to further develop. The core proposition of this paper is therefore as follows: the success of support for LLCEIs is determined by the extent to which it addresses these issues altogether. The various aspects that amount to the requirements of support for LLCEI development can be perceived as interdependent components of an ecosystem: the completeness and coherence of the support provided to LLCEIs positively influences their development.

Scholars have argued that so-called intermediaries form a part of the solution in engaging the complex interplay of resource deficiencies and unsupportive institutional settings in order to accelerate the development of LLCEIs (e.g., [19,21]). Intermediaries cut across the energy provider, user and regulator triad, and are defined by their “in-betweenness” [22] (p. 1481) [23]. Studies show a great variety in the roles that intermediaries can have and the various activities they can employ vis-à-vis LLCEIs [19,21,24–28]. Studies from different countries show that intermediaries are key players in inter alia fostering knowledge transfer, information flows, and capacity building; and are central in brokering partnerships between LLCEIs and actors from outside the community energy sector such as regime incumbents and central actors of the energy system [21,24,25]. Transition studies scholars have argued that intermediaries perform a key role in strategic niche development [29]. Despite previous attempts at analyzing intermediary roles and activities vis-à-vis the development of community energy (e.g., [19–21,30]), the reality of the various roles and strategies intermediaries can employ and the support LLCEIs require to further develop (i.e., capacity building and embedding LLCEIs in their communities, alleviating institutional barriers, and opening up the regime) have not

yet been synthesized in a comprehensive analytical framework. This article aims to fill this gap by developing such a framework. In doing so, we reflect on the analytical framework we developed on the basis of an extensive literature review by evaluating the intermediary support structure in an empirical case: the Province of Fryslân, the Netherlands.

The central research question of this paper is: *To what extent does the further development of LLCEIs depend on the completeness and coherence of the strategies and roles employed by intermediaries?*

The central research question can be broken down into three sub-questions:

- (1) What do LLCEIs require to further develop?
- (2) What strategies activities and roles by intermediaries help to address the requirements of LLCEIs to further develop?
- (3) How is the completeness and coherence of intermediary support reflected in an empirical case, the Province of Fryslân?

The first two sub-questions are answered by means of an extensive literature review. The product of the first sub-question is a classification of the aspects and issues that relate to the further development of LLCEIs. The product of the second sub-question is an analytical framework that can be used to assess the completeness and coherence of supportive activities provided by intermediaries. The third sub-question involves reflecting on our analytical framework by evaluating the intermediary support structure in an empirical case.

This paper is structured as follows. Section 2 provides an answer to what LLCEIs require to further develop, gives a conceptualization of intermediaries and classifies the various strategies, roles and activities that can be employed by intermediaries (answering sub-question 2). Section 3 addresses the research approach and methods used in this paper. Section 4 gives an answer to the third sub-question by reflecting on our analytical framework by means of evaluating an empirical case. In Section 5, the results of the analysis are discussed. We draw conclusions in the final section.

## 2. Conceptual Background and Theoretical Framework

This theoretical section provides an overview of the specific strategies, roles and accompanying activities intermediaries may employ to support LLCEIs. However, it is important to firstly substantiate what LLCEIs require to further develop and thus where intermediary's strategies, roles and activities should be directed to in order to be successful.

### 2.1. Further Developing LLCEIs

The further development of LLCEIs crucially depends on three areas of attention: (i) building capacities and embedding LLCEIs; (ii) alleviating barriers and lock-ins; and (iii) opening the existing regime for the uptake, acceptance or breakthrough of LLCEIs. Each of these areas are further discussed below.

#### 2.1.1. Capacity Building and Embedding LLCEIs

Various studies have highlighted the importance of practical capacities such as time, financing, skills and expertise for the development of LLCEIs [18,31]. In terms of skills, authors have noticed the importance of management and communication skills (e.g., bringing people together, using existing networks and creating new ones, and dealing with external bodies), as well as skills in accountancy and writing funding applications [4,26,28,32–34]. In addition, several studies point to the important role of local or tacit knowledge in the realization of community energy projects [4,31,33,35,36], as well as the prominent role of technical knowledge regarding low-carbon energy solutions [24,27,36–39]. Moreover, scholars have underscored the importance of social networks to provide access to resources for LLCEIs and build their capacity [26–28,33,35,40–45]. The presence of these practical capacities, or lack thereof, greatly influences the extent to which LLCEIs develop and become successful. For example, authors have observed a lack of funding application capacities in community energy

groups or difficulties in accessing grant funding in general [24,46–49]. Such deficiencies greatly impact the development of LLCEIs since access to grant funding is key for LLCEIs to realize their ambitions [4,18,25,27,28,32,34,36–39,50]. Scholars have also observed that LLCEIs struggle to sustain motivation and enthusiasm and carry on with their activities during “bad weather” or when they experience struggles in their respective communities [19,21,50].

Taking note of the above, the usage of capacities that lie within a local community can cover some of these insufficiencies as well as provide for a heightened degree of embeddedness—both crucial for LLCEI success. Embeddedness is here understood as linkages with the socio-institutional structure of the locality, involving social norms, practices and relations, identity and culture. The degree of embeddedness of an LLCEI in its local community influences its legitimacy, which organizational ecologists and institutional theorists consider a crucial condition for resource accessibility and organizational survival [51–56]. Furthermore, various scholars recognize the intricate relationship between an LLCEI and its local community as an influential factor for development and success. On the one hand, scholars point out that the local community influences the shape and mobilization process of LLCEIs (e.g., [26,28,57–60]). On the other hand, LLCEIs also actively mobilize the capacities (such as cultural, organizational and personal capacities) to harvest support and acceptance [32,44,58,61,62]. Examples are the involvement of the local village council when initiating an LLCEI, using the village name for branding the LLCEI, or providing opportunities for villagers to become involved in the LLCEI. These studies suggest that LLCEIs can put to use existing, *endogenous* capacities found within their community to counteract the lack of resources or capacities while simultaneously embedding the LLCEI in its community to further their development.

### 2.1.2. Alleviating Barriers

Insofar building the capacities of LLCEIs (or helping them to draw on their own) makes them successful organizations, system-level changes are needed for LLCEIs to become a viable alternative to the status quo. This proves to be a difficult endeavor as LLCEIs directly challenge prevalent practices that are inherent to the fossil-fuel based regime. The existing energy infrastructure is highly centralized, dominated by private interests, and is coordinated in an integrated fashion [2,63–65]. These characteristics do not sit well with a bottom-up movement that favors a local and community-based approach with a heightened degree of autonomy. This discrepancy typically gives rise to a number of conundrums. These involve inter alia difficulties associated with obtaining a connection to the grid [24,66,67]; competing with large energy companies that dominate the market and have lobby strength [1,2,61,68,69]; archaic energy regulations and legislation [70]; and getting projects financed [68,69,71,72].

Furthermore, studies have also observed that the existing institutional and policy frameworks and settings may impede on LLCEI development as well. The issues that arise here inter alia involve: unsuitable spatial planning regimes [68,69]; instable and uncertain policy frameworks [24]; funding schemes that are difficult to access for community energy groups or do not match their aspirations or plans [24,46,48,69,71]; problematic interactions with government bodies [49]; limited political support [1,49,61]; and limited access to policy makers and key decision-making forums [28,61,68].

### 2.1.3. Opening Up the Regime for the Uptake and Acceptance of LLCEIs

These barriers need to be addressed and the existing institutional landscape has to become open to LLCEIs in order for them to proliferate and diffuse. For a large part, the diffusion of LLCEIs hinges on the social acceptance by key actors and markets of the institutional changes and policies that foster distributed generation by communities [65]. Such acceptance is encouraged inter alia by the prevalence of strong institutional capacity, political commitment, favorable legal and regulatory frameworks, competitiveness of the new technology, mechanisms for information and feedback, and access to financing [73]. The acceptance and uptake of LLCEIs in the regime can for instance foster “energy

democracy” [74] (see also [75,76])—an enhanced sense of democratic and community control of energy generation, distribution, and the energy system itself—and “energy justice” [76]—safeguarding principles of procedural, distributive and recognition justice in the energy system. These concepts of enhanced citizen involvement and influence coalesce in a so-called “Thousand Flowers” transition pathway, which takes small-scale, distributed generation, local ownership and decision-making as a starting point for governing the low-carbon energy transition [77]. Within such a pathway, the social embedding of LLCEIs and the low-carbon energy applications they employ in their respective communities is an important process that generates further uptake and acceptance (cf. [65]). However, without support and careful coordination for such status quo challenging concepts and configurations, LLCEIs are not likely to outgrow their niche [19,63,78].

Thus, support strategies of intermediaries need to adhere to the issues that vex LLCEIs. Intermediaries need to assist in building LLCEIs’ practical and endogenous capacities as well as embedding, help with alleviating barriers to subsequently open the energy and governance systems for new practices and concepts. It is the conceptualization of intermediaries, their strategies, roles and activities that we attend to in the following subsections.

## 2.2. Conceptualizing Intermediaries

Studies of intermediaries show a great variety of actors that may perform intermediary activities, such as NGOs, governmental agencies, Energy Service Companies (ESCOs), consultancies, academic institutions, councils, business network platforms, and individuals [20,23,79–82]. That being said, governments can also perform intermediary activities in the form of an enabling mode of governing [83], as has been observed in previous studies on government support for LLCEIs [10,84]. Intermediaries are therefore best conceptualized in terms of their activities and the processes they undertake, instead of who or what kind of actors carry out these actions [81]. To begin with, the literature uses various adjectives to categorize the functions of intermediaries involving inter alia: transition intermediaries [85], innovation intermediaries [86,87], energy intermediaries [82,88], user intermediaries [89,90], and niche intermediaries [19,21]. Underlying the various types of intermediaries and the actors involved is the “relational” and “in-between” character of their work [22]. Intermediaries are actors that create “new possibilities and dynamism within a system” [87] (p. 726) and create “spaces and opportunities” [86] (p. 296–297) for others. Within these spaces and dynamics, intermediaries “mediate, they work in-between, make connections, and enable a relationship between different persons or things” [88] (p. 1408).

However, what guides the various roles and activities substantiated by intermediaries in their support for LLCEIs? Evidently, the issues discussed in Section 2.1 are the primary objects of intermediary support, but there are various ways in how intermediaries can do this. In other words, in what ways do different strategies shape intermediaries’ roles and activities in the support for LLCEIs? We attend to this matter in the following section.

## 2.3. Strategies Intermediaries Use

The numerous roles and activities of intermediaries—that are discussed in the following subsections—are guided by strategies. We argue that the support for LLCEIs would involve a combination of multiple strategies to successfully address the issues that hamper LLCEIs and further their development. One of the most dominant perspectives that substantiates such a strategy is that of *Strategic Niche Management* (SNM). SNM originates from studies looking into socio-technical transitions. In the realm of the low-carbon energy transition, proponents argue for the need of social and technological innovations to cope with climate change [91]. Radical innovations that potentially destabilize the existing socio-technical regime (i.e., low-carbon energy technologies challenging the fossil fuel-based regime) require nurturing in protected spaces before they can further diffuse [92]. These protective spaces, known as niches, are shielded from pressures of the incumbent regime [93]. Strategic Niche Management sheds light onto the processes and strategies of how niches can be

created and developed to spur a system-wide transition [92,94]. Three processes are of particular importance in the development of niches; managing expectations which relate to how niches are presented to the public and whether they live up to the promises they make about performance and effectiveness; building social networks to embrace a wide variety of stakeholders that can mobilize resources; and learning processes that contribute to knowledge and expertise on how to improve innovations as well as second-order learning in which actors critically reflect on the assumptions of regime systems [92]. Theory suggests that successful niches can influence the regime by enabling replication of projects within the niche, bringing about changes through multiple small initiatives; by enabling constituent projects to grow in scale and attract more participants; and by facilitating the translation of niche ideas into mainstream settings [15]. In the process of developing niches and making them more robust, intermediaries appear to be of particular significance [19,21,24,95,96]. Therefore, SNM mainly addresses issues related to alleviating barriers and opening up regimes for the acceptance and breakthrough of LLCEIs.

SNM differs from a *Business Incubator* approach to the provision of support in the sense that the latter strives to accelerate the creation of successful entrepreneurial businesses individually [97], without emphasizing the development of a specific niche. Rather, the business incubator forms a protective space itself by providing to business start-ups the following: shared office spaces and equipment; administrative services (e.g., reception and clerical services); business support involving (one-to-one) coaching and training activities (i.e., business planning, marketing, accounting, managerial support, and access to finance); and access to services via external networks [97–103]. This way, business incubators make sure that new ventures can attend to their core business, instead of having to deal with complementary issues such as accounting. Business incubators assist new ventures in getting past the first critical years [100] and thereby strive to enhance the survival rate of new ventures and accelerate their growth with the aim to engender self-sustaining, flourishing businesses. Policy makers commonly think of incubators as a tool to promote economic development and technological innovation [101]. In terms of LLCEI support, the business incubator approach is primarily concerned with building capacities of start-up LLCEIs and alleviating barriers associated with the start-up phase.

Two other perspectives that have hitherto not been connected to the community energy and intermediary literature provide useful suggestions for intermediary strategies as well. The findings of various studies that show that existent or potential internal capacities and (symbolic) resources are pivotal in community-based bottom-up developments [26,28,32,104]—can be directed back to the ideas of *endogenous development* and *Asset-Based Community Development*.

Originally introduced as an innovative approach to rural development, the key principle of *Endogenous Development* is that development will be more successful and sustainable if it: (i) starts from a base of local resources; and (ii) involves popular participation in the design and implementation of development action [105] (p. 524) (see also [106]). As such, endogenous development builds upon, stimulates and supports social innovation [107] (p. 59). The endogenous development approach ties people and their innovations, entrepreneurship and capital to the locality. The logic of the endogenous approach involves that a territory formulates its own development repertoire, understood as the resources or often used practices that an actor can choose from and draw upon in a given situation [105] (p. 525). This concept embodies the principles of endogeneity: “the idea of local *ownership* of resources and the sense of *choice* (local, collective agency) in how to employ those resources (physical and intangible) in the pursuit of local objectives” [105] (p. 525). Within this, the cultural-territorial identity is a central resource for communities to draw upon. Ray [108] argues that culture – understood as a set of place-specific forms (e.g., language and dialect, local knowledge, folklore, music, and landscape)—can be used to animate and define development [108] (p. 263). In this sense Bomberg and McEwen [28] showed that community culture, values and identity can sustain community mobilization. Similarly, Forrest and Wiek [26] noted that a significant solidarity from a common village identity and sense of pride was also a critical success factor. Ray [109] suggests that territorial initiatives can use these

cultural and identity symbols to revalorize place and to localize economic control. When applying the rationale of endogenous development to LLCEI support, the approach seeks to further the development of LLCEIs by safeguarding ownership, participation and embeddedness.

In a similar vein, the *Asset-Based Community Development* (ABCD) approach was developed in response to socio-economic problems in US cities in the 1990s. The core axiom of the ABCD approach is to retain a focus on the assets and capacities of the community, instead of its needs, deficiencies and problems in community revitalization efforts [110]. Consequently, ABCD leaves control with the initiators themselves and instills confidence in communities [111]. Furthermore, ABCD presupposes that the development process is relationship-driven, making use of the social capital present in the community [110,111]. Indeed, Hicks and Ison [27] observed the importance of bridging, bonding and linking capital in successful LLCEIs (see also [41]). As a strategy, ABCD supports LLCEIs by animating existing capacities and assets of the local communities wherein LLCEIs are situated.

Table 1 gives an overview of the strategies mentioned above. We do not perceive these strategies as mutually exclusive. Within a particular intermediary role or activity one may discern multiple strategies. The various strategies that we have outlined help to illuminate the key assumptions that guide the intermediaries' roles and activities and assist in assessing the comprehensiveness of the intermediary support structure. We argue that intermediary support structures that draw on all of the strategies listed in Table 1 are more likely to be successful in supporting LLCEIs and furthering their development. In the following section, we elaborate upon the various roles and activities of intermediaries.

**Table 1.** Overview of intermediary strategies.

Strategy	Theoretical Rationale	Assumptions Regarding Needs LLCEIs Have	Type of Support to LLCEIs
Strategic Niche Management	Build and nurture a protective space for individual experiments and technological innovations to enhance their potential to engender a transition by means of replication, growth in scale, or translation. The niche is further developed by managing expectations, creating social networks, and fostering learning processes.	Niches and the experiments therein are regarded as improvements to the existing regime. If niches are not able to open up and influence the regime, they cease to exist. Support is directed at further developing of the niche.	Alleviating barriers, opening up systems for new practices
Business Incubator	New ventures are provided with resources and capacities to accelerate their growth and enhance their survival.	Support is needed in the start-up phase of the LLCEI, after which it is expected to survive on its own. Help is supported toward development of business models.	Alleviating barriers, building practical capacities
Endogenous Development	Using local resources, stakeholders and markers stemming from the territorial-identity to revitalize the locality. People at the local level know best how to tackle local problems. Stimulate social innovation.	LLCEI support is contextualized and ensues by means of popular participation and ownership in its design and implementation.	Building endogenous capacities and embedding LLCEI in its social context
Asset-Based Community Development (ABCD)	Development is based on the capacities and assets that are present, instead of a focus on needs and deficiencies.	LLCEIs need to be supported by focusing on existing assets.	Building and using existing assets and capacities

#### 2.4. Roles and Activities of Intermediaries

Similar to the variety of actors who may function as intermediaries and the various strategies that may be employed, the roles and activities of intermediaries also vary to a great extent. Below, we discuss the various roles of intermediaries in accordance with the support LLCEIs require for their development.



#### 2.4.1. Building Capacities and Embedding LLCEIs

In distinguishing intermediary roles within innovation processes, Stewart and Hyysalo [86] argue that intermediaries may assume a *facilitating* role to build capacities for other actors. This role involves collecting and distributing financial, technical and institutional resources, and providing skills and knowledge. Howells [87] noted that intermediaries assist in finding funding, and processing, generating and combining knowledge. Within this role, one might expect activities such as conducting feasibility studies [24] or the provision of technical and legal advice, as well as guidance on funding sources and applications [20,23,24,28,34,46]. The facilitating role is further characterized by endogenous development, asset-based capacity building and embedding measures by means of: updating the personal, organizational, and entrepreneurial capacities of participants in order to ensure project survival (e.g., giving training workshops, activating and updating project champions, developing complementary business initiatives to make LLCEI financially sustainable); linking and developing relationships with key individuals in the locality to tap into their skills and capacities; reviving the community spirit; and ensuring ownership of the installation by the local community [112]. Furthermore, this role also involves facilitating and organizing networking channels between LLCEIs [27,113]. Researchers further found that intermediaries facilitate access to information, as well as information flows and interactions between LLCEIs to share experiences [20,25]. In addition, face-to-face mentoring and training workshops appear to be of particular help to LLCEIs (see also [19,27]).

Geels and Deuten [95] state that intermediaries engage in *knowledge aggregation and distribution*, involving the transformation and de-contextualization of local knowledge into robust, abstracted and standardized knowledge that can be shared between local practices. In practice, intermediaries aggregate experiences and lessons learned in formats such as case-studies, toolkits and handbooks [21] or common templates for subsidy application [20]. In their study on local climate initiatives and enabling experimentation, Matschoss and Heiskanen [114] (p. 89) observed that intermediaries aggregate lessons and experience by pooling knowledge and experiences from diverse participants (through co-creation, events, meetings, awards); by drawing in new non-local knowledge from experts and research; and by collecting knowledge and exemplars from other countries or experiments.

#### 2.4.2. Alleviating Barriers within the Status Quo

*Brokering* activities point to the network manager role of intermediaries in innovation processes (see also [23,87]). This involves bringing relevant actors into the innovation network; maintaining their commitment and interest; and safeguarding a degree of openness of the innovation network to other interests. Additionally, brokering activities encompass conducting negotiations on behalf of individuals and institutions that appropriate the innovation. Hargreaves et al. [21] too conceptualized a brokering role for intermediaries in the community energy sector. Within the *brokering and managing partnerships* role, intermediaries introduce community initiatives to potential partners, broker collaborations between community energy groups and large companies, and specify the terms and conditions of partnerships to safeguard community energy groups' interests. In a similar vein, Matschoss and Heiskanen [114] argue that intermediaries can challenge established practices by introducing new actor configurations.

Additionally, intermediaries engage in lobbying activities to influence policy. These activities are commonly undertaken in light of getting new sources of investment and developing new business propositions for community energy groups. On the topic of rural and urban revitalization in the US in the 1980s, intermediaries supported community development corporations by helping to link up the interests of these local initiatives with local funders to shape a common vision, and by assuming a brokering, advocacy and fundraising role [115]. Guerreiro and Botetzagias [112] found that an intermediary in their case lobbied for funds for LLCEIs. Intermediaries also have a representative function to outsiders (see also [116]) as they engage with policy makers to show what issues arise on the ground when LLCEIs deal with policies [20], and form a communication channel between

LLCEIs and government [25]. Furthermore, Bird and Barnes [20] (p. 213) observed that intermediaries link community energy groups with policies. In a similar way, Wade et al. [113] described that intermediaries may function as a strategic interface between centralized formal structures (government, energy companies) and the decentralized nature of LLCEIs.

#### 2.4.3. Opening Up the System for the Uptake, Acceptance or Breakthrough of LLCEIs

*Configuring* activities involve the shaping of the innovation by configuring content of the innovation such as setting rules for uses; prioritizing, aligning and shaping particular uses, goals and form of projects as well as the goals, expectations and needs of other stakeholders [86] (see also [87,117]). In a similar vein, Guerreiro and Botetzagias [112] observed that intermediaries can ensure a social fit of the technology in concern. The work of intermediaries in developing new financing and business models is also relevant here [112] (see also [81,118]), as well as scaling up local initiatives to a level where funding agencies are interested in providing financing [113]. In other words, configuring LLCEIs along with the low-carbon energy applications involved generates acceptance which is crucial for their wider diffusion and development.

To further generate acceptance of LLCEIs and broaden the impact of LLCEIs beyond their local context, intermediaries may engage in framing and coordinating. Whereas framing and coordinating rather brings to mind activities such as influencing decision-making arenas in favor of LLCEIs, Geels and Deuten [95] argue that the provision of guidance, advice and templates substantiates this role. Furthermore, Hargreaves et al. [21] argue that in this role, intermediaries provide face-to-face mentoring and training workshops to build capabilities and confidence. To prevent conflating this role with the abovementioned facilitating kind, we deviate from these authors. In our understanding, intermediaries coordinate between actors in decision-making arenas to prevent lock-in and ensure progress in terms of diffusing innovative processes and activities. As an example, Bird and Barnes [20] (p. 213) observed that the intermediaries in their study assisted in developing a shared vision that transcended the day-to-day practicalities and activities of LLCEIs and provided a systemic picture of the community energy sector. Furthermore, intermediaries may frame debates and discourses in various ways to achieve favorable outcomes in decision-making processes [119]. For instance, Rohracher [120] found that intermediaries attempt to reframe energy markets by establishing green electricity labels. These labels aim to provide guidance and transparency in green electricity offers and articulate demand for such products [120] (p. 2015).

Geels and Deuten [95] identified another role for intermediaries, which is the creation of an *institutional infrastructure*. The creation of a shared institutional infrastructure facilitates the standardization and stabilization of the innovation to link up with the demands and expectations of mainstream users [95], and aims to identify the shared rules or development trajectory for the community energy sector [21]. However, the authors of both studies predominantly interpret the institutional infrastructure as a forum to store, exchange and circulate knowledge. In the understanding of Hall and Taylor [121] (p. 938), institutions refer to “the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or political economy”. Here, the institutions involved pertain specifically to the community energy sector, where notions such as small-scale, distributed generation, local ownership, community benefits and decentralized decision-making prevail and define actor interactions. Communities aspiring to establish an LLCEI can link up with this infrastructure to accelerate their development. Such an infrastructure that actively supports and legitimizes LLCEIs’ activities and goals afford LLCEIs a wider reach, enhanced capacities and generates acceptance.

An overview of the roles and activities of intermediaries is provided in Table 2. The intermediary roles and accompanying activities listed in Table 2 along with the strategies summarized in Table 1 form the basis for evaluating the intermediary support structure in the case that we have selected. Similar to the proposition pertaining to the various strategies, we argue that the completeness of the

various roles and associated activities listed in Table 2 has a positive influence on the development of LLCEIs.

**Table 2.** Overview of intermediary roles and activities.

Relevant Support Required by LLCEIs	Associated Roles from Literature	Activities
Building capacities and embedding into community	Facilitating	Distributing financial, technical, institutional, knowledge resources, providing advice, building capacity, and skills.
	Aggregation of knowledge	Developing toolkits, handbooks, and templates, and distributing these.
Alleviating barriers within the status quo	Brokering	Advocacy, negotiation with other parties, representative function, lobbying, engaging with policy makers, introducing new actor configurations, and embedding in current policy frameworks. Identifying and challenging institutionalized practices.
Opening up the system for the uptake, acceptance or breakthrough of LLCEIs	Creating institutional infrastructure	Setting up a supportive environment in which local initiatives are embedded and integrated, and which governs interactions and activities.
	Configuring	Embedding technology in the local community. Prioritizing or shaping certain uses of the technology, developing new (business) models, and engaging in pilots.
	Framing and coordinating	Articulating demand, framing discourses and debates, and coordinating between actors in decision-making processes.

### 2.5. Interaction Effects of Intermediary Strategies, Roles and Activities

In practice, however, the completeness of the strategies, roles and activities of intermediaries—and their underlying agendas—outlined in the subsections above might amount to a coherent intermediary support structure, but could also lead to conflictive and unproductive interactions between intermediaries. The latter may negatively influence the effect intermediaries have on the development of LLCEIs. Ambiguity may for instance arise when intermediaries emphasize their boundary role as a resource to advocate for unconventional practices that clash with the status quo, but thereby lose access to networks of influence (i.e., government) which is an important resource for both themselves and their target groups [119] (p. 15). The result may be that intermediaries choose to support innovations that do not challenge prevalent practices to safeguard resource access. We therefore complement our core assumption regarding the completeness of the intermediary support structure. We argue that, next to the completeness, the coherence of the intermediary support also positively effects the development of LLCEIs.

## 3. Research Design and Methodology

To study the roles and strategies of intermediaries to support LLCEIs and hence answer the main research question of this paper, a case-study research design was used. We did this to understand the research phenomenon of interest to this study in its real life complex environment and learn from practices [122]. The geographical domain of our case study is Fryslân, a province in the northern part of The Netherlands. In the following subsections, case selection, data collection and analysis of the study are presented.

### 3.1. Case Selection

The Dutch Province of Fryslân was selected as the empirical context of this study. Compared to other Dutch provinces, Fryslân forms a rather extreme case. Firstly, it is home to a relatively large number of LLCEIs. Within Fryslân there are over 50 LLCEIs, of approximately 400 total in the Netherlands, and Fryslân has the highest number of LLCEIs per capita in the Netherlands [6].

Furthermore, Fryslân is home to the largest installed capacity of community-owned solar PV (9953 KWP in Fryslân, compared to the runner-up province of Noord-Holland with 5674 KWP) [6]. As such, Fryslân has an extreme score in terms of how LLCEIs and the low-carbon energy applications they employ proliferate. The Frisian case is therefore suitable to develop new hypotheses—in this paper the suggestion of novel approach to analyzing intermediary support [123]. Moreover, extreme outcomes allow better for development of new theory than typical outcomes do. Hence, we theorize that the confluence of (multiple) intermediaries who supported Frisian LLCEIs effectively achieved the number of LLCEIs established and the realized installed capacity of solar PV. As a province, Fryslân represents not only a geographical entity but also an administrative entity, having some decentralized administrative authorities of its own (e.g., spatial, environmental, and water policies). Many of the provinces in The Netherlands also entail energy transition programs (typically offering subsidies and other supportive policies). When compared to other Dutch provinces, Fryslân can be considered as active, as it entails a relatively large portion of policies to support regional socio-economic development (also related to the issue of regional demographic and socio-economic decline and livability), including policies to support and facilitate LLCEIs, often indirectly via the involvement of several intermediary organizations. As a rural province, Fryslân experiences issues related to regional shrinkage, which evidently has an impact on local socio-economic conditions. Enhancing the livability of Fryslân and tackling the issues inherent to shrinkage are at the top of the political agenda. The province sees LLCEIs as one way to spur regional development and augment livability. Moreover, Fryslân has a long cultural tradition of (endogenous) local community empowerment and entrepreneurship (which favors the establishment and presence of LLCEIs). Finally, the province also entails a comprehensive set of actors that can serve as intermediaries. Whereas some of them are government-affiliated, others are NGOs or private firms.

For the reasons mentioned, the Frisian context represents a case that suits the theoretical conditions that we excerpt. Although Fryslân represents a rather unique case, it is fair to conceive other regional entities (also outside The Netherlands) having comparable conditions favoring intermediary support to LLCEIs (i.e., having a culture of local empowerment and supporting entrepreneurship, likely to cope with issues like demographic and socio-economic decline, having a regional authority in place target these issues with regional support policy, and having a wide set of organizations in place that can and will act as intermediaries). Theoretically, strong intermediary support to LLCEIs may also occur in other regions meeting these conditions.

Within the Frisian case, the foremost (six) intermediary organizations in support of LLCEIs were selected: the Province of Fryslân, Doarpswurk, the Frisian Environmental Agency, Ús Koöperaasje, Energie VanOns, and the Energy Workshop. More detailed information on these intermediaries is presented in Section 4.

### 3.2. Data Collection and Analysis

Empirical data were collected by means of seventeen in-depth interviews with advisors and strategic officers employed at intermediary organizations, local and regional government officials, as well as initiators of LLCEIs. Interviews were recorded and transcribed. Furthermore, meetings of intermediaries and LLCEIs were attended as well. Next to interview data, text documents were collected, involving inter alia internal strategic documents, policy documents, subsidy applications, concept notes, and the websites of the intermediaries. These documents were provided by interviewees or collected by means of searching the websites with relevant search terms.

Data analysis concerned text interpretation and coding of interview transcripts and text documents. Interpretation of data involved reflection on key concepts used on the roles and strategies of intermediaries in support of LLCEIs (see Section 2, in particular Table 2 on these concepts). This led us to construct and present case descriptions on the roles of intermediaries and the strategies they employed. This includes historical information on their organization and role, and practices in support of LLCEIs they engaged in. In some cases, we used quotations

from interviews to illustrate particular phenomena we encountered that are of special conceptual interest. Finally, for all observed intermediaries, information is analyzed and presented reflecting on the associated intermediary activities, roles and strategies. This information is clustered in Table 4 to allow for cross-intermediary comparison.

## 4. Results

### 4.1. Description of the Frisian Case

The Province of Fryslân is located in the northern part of The Netherlands. Each province in the Netherlands has its own provincial government, comprising the Provincial Executive and Provincial Council. The province is characterized by a rural landscape, dairy farms, and has its own official language and cultural identity. It is home to over 400 rural townships and small villages (many with a population of less than 1500). The LLCEIs in Fryslân typically evolve in these small villages and townships. This is, however, not only for reasons of sustainability. The Province of Fryslân suffers from demographic decline. Large parts of the province have been designated as “shrinkage regions”. To cope with the issues of demographic and economic decline, much of the provincial government’s political attention is directed to tackling these issues while enhancing (rural) livability and seeing LLCEIs as one of the means to do so. Furthermore, throughout history, self-organization and collective action of Frisian communities have been defining elements of the Frisian identity [124]. For instance, in the late 19th century, Fryslân was home to 66 cooperative dairy plants of a total of 112 in the Netherlands [125]. The 53 LLCEIs considering a total of 650,000 inhabitants is also a case in point. Dutch provinces “Noord-Holland”, “Noord-Brabant”, and “Gelderland” have, respectively, 58, 53, and 54 LLCEIs [6]. However, these are significantly larger provinces in the sense of population with, respectively, 2.7 million, 2.5 million, and 2 million inhabitants. Whereas the majority of the Frisian LLCEIs were established no more than 4–5 years ago, some of them have existed since the 1990s. Moreover, the LLCEIs in Fryslân show a large variety in size, scope, and type of organization. For instance, the region houses an initiative that has close to 1000 customers, whereas the majority of the LLCEIs have a customer base in the 20–100 range.

### 4.2. Observed Intermediary Strategies, Roles and Activities

Various actors can be discerned in the intermediary support structure for LLCEIs in Fryslân. Firstly, we describe the intermediary support issued by the provincial government. Next, we provide descriptions of four actors that have intermediary roles and engage in intermediary activities: “Doarpswurk”, “Friese Milieu Federatie”, “Ús Koöperaasje”, and “Energie VanOns”. The latter two organizations form an institutional infrastructure that is included in the descriptions of the actors. Lastly, Doarpswurk, Friese Milieu Federatie and Ús Koöperaasje collaborate in a platform, named the “Energy Workshop”. The majority of the supportive activities of these organizations having intermediary roles are therefore compiled and analyzed in the subsequent description of the “Energy Workshop” platform itself. The individual actors’ characteristics and their interrelations are summarized in Table 3.

#### 4.2.1. Province of Fryslân

One of the primary policy instruments of the Frisian provincial government designed to build the capacity of bottom-up initiatives is the “*Iepen Mienskipfûns*” (“Open Community Fund”; authors’ translation). The Open Community Fund is a grant funding scheme that facilitates bottom-up initiatives that contribute to the livability of their locality. An initiative is judged by a panel of representatives of citizens living in the region and is based on the following criteria: public support, continuity, collaboration, empowerment, and ecology. This way, initiatives stemming from the local community (i.e., ideas should display public support) that address local issues (the ecology criterion lists themes such as the energy transition, strengthening cultural-historical and landscape structures, or stimulating

cultural tourism and a sense of identity) and stimulate the use of local resources and capacities (e.g., collaborating with local stakeholders or empowering socio-economically vulnerable groups) are supported by the province [126,127]. This signals both strategies of endogenous development and asset-based community development. The majority of the provincial money used for this fund stems from its rural policy budget [128] (p. 59), which was €15.8 million for the period 2016–2019 [127].

#### 4.2.2. Doarpswurk

“*Doarpswurk*” (“Village work”; authors’ translation) was established in 2008 to support Frisian rural villages in transition processes regarding the overall livability of the Frisian countryside. Low-carbon energy supply is seen as one of the means to stimulate the livability and social cohesion in rural villages while promoting social innovation at the same time. Doarpswurk has an expansive social network in the province and knows how to make use of the social structures of the villages and townships, signaling asset-based community development:

*“So the villages are organized. The social capital that we draw on is organized in the villages (...) you can nicely comprehend those organized villages, we can do our tricks with them and then something nice will come out of it.”*

Such “tricks” involve inter alia a visioning process, giving support to the organizational processes of grassroots initiatives, and embedding the ideas of initiators in the local community. Doarpswurk places responsibility and ownership at the village itself [129] and supports villages and citizen initiatives that contribute to a sense of community and social cohesion in the villages by means of offering pro-active, innovative and accessible support [129]. Doarpswurk guides initiatives in the process of organizational development, but does not aim to take over control of the process itself. This way, the ideas and developments remain in the hands of the local initiators, and therefore are more likely to fit in well with the community itself. These activities correspond with a capacity-building role of an intermediary and signal an endogenous development approach, emphasizing the importance of popular participation, ownership, and a sense of choice in the implementation process.

#### 4.2.3. Frisian Environment Federation

The “*Friese Milieu Federatie*” (FMF; “Frisian Environmental Federation”, authors’ translation) is an umbrella organization consisting of 38 nature and environment organizations. FMF is dedicated to maintaining the Frisian nature and environment and has experience with organizing innovative projects and managing processes, and communication and information campaigns that have to do with various domains of sustainability. More specifically, FMF addresses the issues of climate change, biodiversity, landscape preservation and development. It collaborates with a comprehensive set of kinds of stakeholders in society (e.g., citizen initiatives, governments, and business firms). As such, FMF has a broad and diverse network of partners with whom it collaborates. The majority of supportive activities by FMF ensue in the “Energy Workshop”, which are further discussed below (Section 4.3).

#### 4.2.4. Ús Koöperaasje

“*Ús Koöperaasje*” (“Our Cooperative”; authors’ translation) was established in 2013 to represent the interests of Frisian LLCEIs. As such, Ús Koöperaasje is an umbrella cooperative where individual LLCEIs can become a member of. The original idea of an overarching cooperative came from the energy coordinator of the Municipality of Leeuwarden that, based on several visits to LLCEIs, concluded that these initiatives typically face similar problems. The Municipality of Leeuwarden facilitated the establishment of Ús Koöperaasje by allowing its energy coordinator (a civil servant) to work on the project one day a week and granting a subsidy in the start-up phase of the cooperative. Ús Koöperaasje’s main goal is to stimulate the development of Frisian LLCEIs to make sure that Fryslân residents retake control of their (low-carbon) energy affairs. As one means to do so, Ús Koöperaasje makes promotional material available such as banners, t-shirts and flyers to its members which can be

used during events organized by Frisian LLCEIs. Furthermore, Ús Koöperaasje provides templates for websites that can be used by start-up LLCEIs that do not have their own website yet. These activities indicate an incubator strategy, providing means of marketing and communication to assist start-up LLCEIs that lack the individual capacities to arrange this themselves. In addition, Ús Koöperaasje has considerable expert knowledge on legal, fiscal and technological issues that pertain to the reality of LLCEIs. For instance, LLCEIs are provided with standardized statutes for establishing a cooperative organization. As such, Us Koöperaasje also displays a facilitating and knowledge aggregation role.

Furthermore, Ús Koöperaasje holds two general assemblies each year, in which LLCEIs set the agenda for discussion and express what kind of support they require, such as an organization that lobbies for and represents their cause:

*“If you talk about what kind of roles Us Koöperaasje has, sometimes it is in the sphere of lobbying. Recently a letter was sent to the national government to ask whether a part of the feed-in tariff could be reserved for local initiatives”*

(...)

*“What’s also important is to advertise what we are doing (...) we often tell what we are doing throughout the country (...) so the representative and the ambassador functions, those are of course important tasks.”*

The representation and lobbying activities of Ús Koöperaasje demonstrate its role as an intermediary that challenges and strive to alleviate barriers that impede on the development of LLCEIs. Ús Koöperaasje makes an effort to organize a disparate movement consisting of LLCEIs that have varying ambitions, signaling a strategy of niche development. By bringing together LLCEIs under one flag and by engaging various stakeholders, Ús Koöperaasje actively builds social networks, which is considered a key process for niche development.

Another important function of Ús Koöperaasje is its shareholder role in the grassroots energy supplier named “Energie VanOns” (“Our own Energy”; authors’ translation) that was specifically established for the LLCEI movement:

*“We are a cooperative of cooperatives that links people to our own energy supplier.”*

This role can be interpreted as one of coordination, since the main aim of Ús Koöperaasje here is to help establish as many LLCEIs as possible in order for the latter to become resellers of the energy supplied by Energie VanOns. As such, Ús Koöperaasje articulates the demand for regionally generated and distributed low-carbon energy. For LLCEIs individually, Ús Koöperaasje represents their interests vis-à-vis the regional energy supplier.

#### 4.2.5. Energie VanOns

As mentioned above, Ús Koöperaasje is a shareholder of the energy supplier Energie VanOns. The other two shareholders are two umbrella cooperatives that were established for the neighboring provinces of Drenthe and Groningen, respectively, the “Drentse Kei” and the “Gronninger Energie Koepel”. Energy supplier Energie VanOns was established in 2014 by the three umbrella cooperatives with help of a €300,000 loan, provided by the provinces of Fryslân and Drenthe. The Groningen province issued a subsidy of €100,000. Energie VanOns and the umbrella cooperatives form an institutional infrastructure that works as follows. LLCEIs are members of the three umbrella cooperatives, who are in turn owners of Energie VanOns. Individual LLCEIs function as resellers for energy supplied by Energie VanOns. The rights and duties (such as billing and payment) for both parties are embedded in a reseller contract. As such, customers (e.g., households, business firms, and local churches) of the LLCEI use energy that is supplied by Energie VanOns. The LLCEI receives a yearly remuneration of €75 for each customer. For instance, a particularly successful Frisian LLCEI, the “Ameland Energie Coöperatie” (“Ameland Energy Cooperative”; authors’ translation), has close to 1000 customers that generate €75,000 every year because of this scheme. This forms a great means of financial income for the LLCEI in concern. In doing

so, the institutional infrastructure supports the capacity building of LLCEIs and opens up the system by articulating demand for locally generated low-carbon energy. As such, it embeds LLCEIs in a model that is able to compete with existing practices in energy markets by providing consumers with a viable alternative to status quo energy supply contracts. Furthermore, the institutional infrastructure comes with a new actor configuration, with LLCEIs and energy suppliers mutually reinforcing one another and challenging established centralized energy systems. One can derive a combination of strategic niche management, ABCD and endogenous capacity building in the sense that the infrastructure seeks to mainstream LLCEIs and does so by encouraging LLCEIs to focus on building a client base in their locality and generating a much-needed source of income in this way. This combination of strategies also becomes apparent in the primary objective of Energie VanOns, which is to buy and sell the low-carbon energy that is generated by LLCEIs. This way, it ascertains that energy is generated and used in the local environment and benefits the local economy:

*“It is the intention to bring this ‘flywheel’ in motion so that this process reinforces itself. (...) With this flywheel comes the self-sufficiency of people (...) helping with making your environment more sustainable, and therefore also the Frisian component, and the strengthening of the Frisian economy, those elements come together.”*

In addition, the institutional infrastructure brings focus into, and coordinates the range of LLCEIs that have been emerging in the province:

*“We have created a structure with Ús Koöperaasje and Energie VanOns to foster a flow of capital, to unite people, and to give them something to hold onto (...) a focus in what they want to do.”*

**Table 3.** Actors, their characteristics and interrelations in the Province of Fryslân.

Actor	Characteristics	Relation
Provincial government	Decentralized government that is responsible for spatial planning, environmental management, and infrastructure. Monitors local governments.	Subsidizes Doarpswurk and FMF as these are go-to partners for implementing livability and sustainability policies. The provincial government provided a financial loan to Ús Koöperaasje.
Doarpswurk	Semi-governmental organization. Independent foundation that has its own strategy, vision and mission. Maintains livability and social resilience of Frisian rural countryside.	Subsidy and policy implementation relation with the provincial government. It collaborates with FMF and Ús Koöperaasje in the Energy Workshop.
Friese Milieu Federatie (FMF)	Umbrella organization that has its own strategy, vision and mission. It concerns a network organization that sets up campaigns and projects for maintaining the environment, nature and combating climate change, and brings together actors in decision-making processes.	Subsidy and policy implementation relation with the provincial government. Collaborates with Doarpswurk and Ús Koöperaasje in the Energy Workshop.
Ús Koöperaasje	Grassroots umbrella cooperative that represents the interests of LLCEIs.	Received a financial loan from the provincial government. Collaborates with Doarpswurk and FMF in the Energy Workshop.
Energie VanOns	Regional energy supplier, that was established to serve the interests of the LLCEI movement.	Ús Koöperaasje is a shareholder of Energie VanOns. LLCEIs are re-sellers of the energy supplied by Energie VanOns.

#### 4.3. The Energy Workshop

Having noticed the increase of Frisian LLCEIs (3 LLCEIs in 2012, 27 in 2014, and 50 in 2017) and thereby the demand for support, Doarpswurk, FMF and Ús Koöperaasje jointly developed a program entitled the *“Energiewerkplaats”* (“Energy Workshop”, authors’ translation) in 2013 to support LLCEI grassroots development in a more integrated fashion. The “Energy Workshop” provides support



for each of the different stages LLCEIs go through and groups these LLCEIs together—akin to an incubator strategy. Firstly, communities that have “green” aspirations for their locality (and thus are not considered LLCEIs yet) are supported by means of inspiration sessions:

*“The only thing we do for communities that are interested in doing something with sustainability in their village is giving them inspiration. We show them examples, show them what is possible, and prove to them that the ideas that they have can indeed be realized”.*

Subsequently, when communities decide to come in action, the Energy Workshop assists them in developing a vision and plan that guides them into achieving an “energy neutral” goal locally. Together with the community, the Energy Workshop maps the energy consumption of the designated geographical domain (i.e., as an energy audit); what is required before subsequently coming up with technological solutions to make it energy neutral; and what the community deems the most suitable solutions (e.g., solar, wind, geothermal, or energy saving measures such as insulation). Thus, the Energy Workshop is also characterized by a strategy of endogenous development since it actively involves the community in the designing and drafting of low-carbon energy solutions. Furthermore, start-up initiatives were advised that they need to contact the local government early in the process if their plans to achieve energy neutrality would require legal permits or zoning alterations, but also for explaining how local governments work, and that it typically takes time for governments to respond to inquiries. This signals a brokering role. When the Energy Workshop started its activities in 2014, the majority of the support it offered was directed at mobilizing initiatives and providing guidance for communities on how to start and maintain a viable community organization. This incubator strategy helped building LLCEI capacities. Furthermore, the Energy Workshop also facilitated local governments on multiple occasions and informed them how to cope with LLCEIs, and how to evaluate the projects that LLCEIs aspire. In this sense, the Energy Workshop functioned as a translator and broker between LLCEIs and local governments.

Having provided substantial social-organizational support to soon-to-be LLCEIs and existing LLCEIs, the Energy Workshop organized various communities of practice (CoP) for start-up LLCEIs that wanted to follow-up on their plans:

*“We do not have the resources to provide individual support to each start-up initiative. A lot of the questions and concerns that arise in the start-up phase are relatively generic. These issues can be dealt with just fine in small groups of around eight to twelve participants”.*

To serve the CoPs, the Energy Workshop organized several sessions to tackle complex issues and when needed hired external experts to facilitate them in doing so. The CoPs discussed inter alia the application process for the national feed-in tariff (the “*Stimulerend Duurzame Energie*” (SDE+): Stimulation Sustainable Energy (authors’ translation) and the national tax relieve scheme that was specifically developed for LLCEIs (the *Regeling Verlaagd Tarief*; “*postcoderoos*”: commonly referred to as the “zip-code rose scheme”). Throughout these sessions, LLCEIs shared information and experiences with each other:

*“Those two [Ús Koöperaasje and the Energy Workshop] have been of crucial importance for us in the sense that we had easy access to knowledge and got in touch with other LLCEIs where we got to learn a lot from each other. What has been done by one LLCEI can easily be shared with the others.”*

As a result of these CoPs and accompanying sessions, the Energy Workshop developed and issued various standardized application forms, statutes needed for establishing a legal entity, toolboxes and templates. This standardized knowledge was made open source and hence became publicly available to all Frisian LLCEIs. The CoP instrument illustrates a range of capacity-building activities, such as providing access to social networks; organizing opportunities for (shared) learning; and aggregating and distributing knowledge. Moreover, the sessions organized to apply for subsidies signal a brokering activity to embed LLCEIs in the existing policy structure.

Once the LLCEIs went through the relatively generic issues, more complicated and case-specific issues may arise that require specialist, expert and tailored support:

*“At a certain moment, they [LLCEIs] reach a point where they need tailor-made support (...), we then discuss matters such as the location of the installation and what that means for the connection to the grid (...) and we calculate business cases”.*

Here, the Energy Workshop supported individual LLCEIs and often hired external experts to assist in tackling complex legal, financial, technical or business-case related issues for individual LLCEIs. For instance, the Energy Workshop assisted in getting investment capital for a 1200 solar PV panel-roof plant initiated by an LLCEI. Furthermore, the Energy Workshop came to the assistance of an LLCEI that wanted to terminate its activities because it became demotivated by the multiple rejections of its subsidy applications. To motivate the LLCEI again, the Energy Workshop assisted in writing a new subsidy application and recalculating its business case. In conceptual terms, this capacity building role signals face-to-face mentoring and coaching activities, as well as fundraising and helping to sustain motivation.

Next to the multi-phased, incubator-like support provided to start-up as well as relatively advanced LLCEIs, the Energy Workshop actively developed innovative models and concepts in an attempt to further the transition to low-carbon energy with enhanced citizen influence and participation. These activities are discussed below.

#### 4.3.1. Developing New Financial Schemes and Business Models

In 2016, the Energy Workshop started a pilot for an LLCEI-owned Energy Service Company (ESCO) to realize energy neutral housing for homeowners in a small rural village. At the start, the Energy Workshop took up the initiative to write a subsidy application to get the pilot funded. The process started with an expert who made an integrated overview of the energy demand for the individual households that participated in the pilot. The aim of the pilot was to develop a financial construction to cover the required investment capital by piling together all the individual measures in an integrated funding application. The corresponding business model would become an LLCEI-owned ESCO that implements the required measures for making the individual houses energy neutral, along with a guaranteed output from the measures for fifteen years. This new business concept was an illustration of a configuring intermediary activity by scaling up individual projects to make them appealing to investors. Engaging in such experiments within a protective space (by dubbing it a pilot) to challenge the existing regime (existing practices in financing energy measures) fosters learning and is therefore indicative of a strategic niche management approach. The pilot started in late 2016 but became gridlocked after a while. The Energy Workshop was not able to reach an agreement regarding the interest rate with the private entity that manages the provincial investment fund—the primary source of funding for innovative low-carbon projects in the region. Consequently, the Energy Workshop reached out to the Provincial Council and raised the idea of a provincial guarantee fund for LLCEIs. As a result, the Council adopted a resolution allowing the Energy Workshop to investigate the potential and parameters of such a fund. However, not much progress was made since:

*“The bottleneck is not that we want it [LLCEI-owned energy installations], and neither that the technology cannot do it. Rather the bottleneck is: how can we do it financially? And this is the reality where we find ourselves in.”*

Thus, within and beyond the boundaries of this pilot, the Energy Workshop lobbied and developed new concepts to arrange upfront investment capital for LLCEI projects.

In this regard, the Energy Workshop developed a business model that made it virtually possible for LLCEIs to sell shares stemming from their low-carbon energy installation, also covering upfront investment capital. The model allows a private person to virtually buy several (for example) solar PV panels of the LLCEI-owned solar PV installation as a financial investment. The LLCEI pays

the investor back (along with an interest rate) with revenues stemming from the generated energy (subsidized by the national feed-in tariff) that is sold back to the grid. The creation of this model allows the local community to become (financially) involved in the production of low-carbon energy, signaling both a strategy of endogenous development and asset-based community development. However, people from outside of the local community are able to participate as well, broadening the scope of the LLCEI and thereby signaling an approach of strategic niche management as well. The participation model can furthermore be seen as an expression of a configuring activity, because it enables the energy installation to become socially embedded in the locality by developing a novel financial participation model. Additionally, by enabling financial participation in a LLCEI-owned project subsidized by the national feed-in tariff, the Energy Workshop improved the link between LLCEIs and existing policies, thus effectively functioning as a (policy) broker. Here, one can observe the thin line between alleviating barriers and opening up the regimes for LLCEIs.

#### 4.3.2. Mienskipsenergie

In 2017, the Energy Workshop developed a specific guarantee of origin (GO) for Frisian community low-carbon energy projects. This GO, dubbed “*Mienskipsenergie*” (“Community Energy”, authors’ translation), was a response to the aspiration of a group of Frisian LLCEIs to set up a quality certificate that would articulate and circumscribe the core aspects and values of community low-carbon energy. Furthermore, Frisian LLCEIs and Ús Koöperaasje wanted to come up with an appropriate response to enhance transparency in the GOs market system that is often seen as pestered by green washing [130]. Mienskipsenergie functions as an additional qualitative layer to the existing GOs, which means that by implementing Mienskipsenergie actual GOs are traded. In other words, Mienskipsenergie is able to articulate the demand for low-carbon energy coming from local sources. By means of Mienskipsenergie, the Energy Workshop seeks to translate niche ideas into mainstream settings by articulating market demand, signaling an SNM approach.

The Energy Workshop started using the term Mienskipsenergie in its communications towards local and provincial governments. As a result, the concept began to show up in official documents used by provincial council members as well as resolutions proposed in municipal councils. While the Energy Workshop effectively set the agenda by framing discussions on energy usage by Frisian subnational governments in favor of LLCEIs, Mienskipsenergie had not yet been defined properly. Ús Koöperaasje asked during a general assembly if it should further develop the concept on behalf of the member LLCEIs. After having received a green light to proceed, a set of principles was formulated that served as a basis for Mienskipsenergie. Projects that are eligible for receiving the Mienskipsenergie label have to meet three requirements: (i) the project is developed by means of a democratic process (in terms of both substantive participation in decision-making as well as broad community involvement); (ii) the project has to be broadly supported by the community in the locality (opposition have to be dealt with appropriately, location, size and conditions have to be agreed upon); and (iii) the energy generated and benefits stemming from it flow back to the community. By formulating these principles, Ús Koöperaasje prioritized particular forms of LLCEIs, and thus actively engaged in configuring. To safeguard impartiality and quality, a separate foundation was established that has the legal mandate to issue Mienskipsenergie GOs.

In 2018, an LLCEI named “*Enerzjy Koöperaasje Garyp*” (“Energy Cooperative Garyp”; authors’ translation) that managed to establish a 27,000 solar PV panel farm received a Mienskipsenergie certificate. The intermediary did not invite the national press for the first public disclosure of the certificate since neither the intermediary nor the LLCEI were directly interested in effectuating a broader impact outside of the region. Energie VanOns—the regional energy supplier of which Ús Koöperaasje is a shareholder—made it possible to validate that the energy they supply indeed stems from the Mienskipsenergie certified installation and that a GO has been used in the process of supplying. This means that next to local inhabitants, local businesses can demonstrate (by means of a logo) that they use Mienskipsenergie. For instance, a local brewery has now succeeded in brewing beer with

the use of locally generated energy. As such, it even displays the logo of Mienskijsenergie on the bottles in which the beer is sold. The trademark is able to make the achieved results more visible while emphasizing the community's cultural-territorial identity in the process, which is suggestive of endogenous development:

*“Within a local product, the locally generated energy is also considered an ingredient”.*

Mienskijsenergie was not solely developed for LLCEIs, though. The Municipality of Súdwest-Fryslân collaborated in 2016 with the Energy Workshop to develop a spatial planning requirement that harnesses similar principles. They involve: projects have to be developed according to a rigid democratic process and have to be broadly supported by the public of the locality. Additional criteria imply that projects have to contribute to achieving the local government's low carbon policy goals and that the project has to be feasible financially. When a project meets the abovementioned requirements, the municipality will *ex ante* agree with any required zoning plan modifications, which gives the initiators certainty to prolong their activities. Still, the requirements for getting an environmental permit remain in effect and initiators have to integrate the installation in the landscape as well. Nevertheless, the Energy Workshop alleviated barriers pertaining to spatial planning procedures by developing a new model for energy spatial planning in concert with a local government. An overview of the key results on strategies and roles of intermediaries in supporting the development of LLCEIs is presented in Table 4.

**Table 4.** Intermediary strategies, roles and activities of actors in support of the development of LLCEIs.

Observed Intermediary Activities	Associated Intermediary Roles from Literature	Associated Intermediary Activities from Literature
Provincial Iepen Mienskijs Fûns	Facilitating	Providing financial resources.
Social organizational support by Doarpswurk	Facilitating, framing	Capacity building, building skillset of initiators. Framing low-carbon energy as a means to advance livability and social resilience.
Representing and lobbying by Ús Koöperaasje	Brokering, framing and coordinating	Lobbying, engaging with policy makers, representative function, advocacy.
Providing advice, communication and marketing tools by Ús Koöperaasje	Facilitating	Capacity building, providing advice knowledge, and institutional resources.
Providing standardized tools by Ús Koöperaasje	Aggregation of knowledge	Developing and distributing templates.
Decentralized energy infrastructure by Energie VanOns and Ús Koöperaasje	Institutional infrastructure	Integrating LLCEIs in a supportive system, reinforcing the movement by steering their operations.
	Framing and coordinating	Articulating demand.
	Facilitating	Building capacity by providing remuneration fees.
	Brokering	Supporting formation of new actor configurations.
<i>Energy Workshop</i>		
Phased support for LLCEIs	Facilitating	Capacity building, providing knowledge, augmenting skills, providing guidance, establishing social network, learning, developing vision, coaching, and fundraising.
Communities of Practice	Facilitating and knowledge aggregation, brokering	Providing access to expert knowledge and support, and opportunities for learning and networking. Providing and distributing standardized templates and schemes, embedding LLCEIs in existing policies.
Guiding interaction between local governments and LLCEIs	Brokering	Mediating between LLCEIs and local government.
Pilot energy neutral housing	Configuring, brokering	Scaling up LLCEIs for investment capital, social fit of technology, fundraising for investment capital.
Developing a financial participation model	Configuring, brokering	Developing new participation concepts, social fit of technology, embedding LLCEI in existing policy frameworks.
Mienskijsenergie	Configuring	Prioritizing particular forms of LLCEIs, developing new spatial planning arrangement.
	Framing and coordinating	Articulating demand, agenda setting, and framing debates.
	Brokering	Introducing new actor configurations.

## 5. Discussion

The observed intermediary practices in the Province of Fryslân demonstrate a variety of roles and strategies. The integration of different conceptualizations of intermediary roles and strategies stemming from various fields of study in a comprehensive analytical framework enhanced the understanding of the variety of activities performed by intermediaries supporting LLCEIs. As the number of Frisian LLCEIs increased, so did the completeness of the intermediary support structure. At the outset, the intermediary support structure for LLCEIs was mostly characterized by isolated, individual actors providing intermediary support in accordance with their own agendas and expertise. For instance, Doarpswurk and the provincial government predominantly facilitated LLCEIs by building their capacities according to the rationales of endogenous development and ABCD. The first step in fostering more integrated support for LLCEIs was the establishment of Ús Koöperaasje, an organization that represented the interests of LLCEIs, engaged in lobbying to alleviate barriers, and built the capacities of LLCEIs by aggregating knowledge and by providing marketing and communication equipment. Here, the support given to LLCEIs was mainly characterized by a business incubator strategy, along with several elements of SNM, in which Ús Koöperaasje sought to build a coherent social network of LLCEIs and coordinate the movement as such.

The creation of the decentralized energy infrastructure comprising the umbrella cooperative Ús Koöperaasje and the regional energy supplier Energie VanOns formed the next step in further intensifying the support for LLCEIs in Fryslân. This infrastructure effectively enabled enhanced community ownership and participation in the regional energy system while simultaneously building the capacities of individual LLCEIs and upscaling their operations by linking them to their own energy supplier to articulate the demand for LLCEI-generated energy. The three requirements for successful support of LLCEIs and their development (i.e., capacity building, alleviating barriers, and opening up the regime) can arguably be seen as the various roles that materialize in the infrastructure (creating institutional infrastructure, facilitating, framing and coordinating, brokering) and signal SNM, endogenous development and ABCD.

Lastly, the collaboration between the three main intermediary actors—that each brought to the table their specific understanding of what LLCEIs need in terms of support—in the Energy Workshop showed that the support for LLCEIs in Fryslân became highly integrated along the way. The Energy Workshop accommodates the totality of roles and strategies that we argued to be crucial for addressing the issues that further the development of LLCEIs. The support given by the Energy Workshop ranged from inspiring communities that were interested in “green” solutions for their localities to developing new financial and business models to enabling the uptake of LLCEIs by their respective communities and regime incumbents. The various steps that we have discerned here indicate that the different intermediary actors started institutionalizing their collaborative activities, ensuring that the various aspects that pertain to the successful support of LLCEIs were integrated in a comprehensive support structure. As such, the intermediary support structure is characterized by its completeness, as well as its coherence.

Although fostering the transition potential of LLCEIs with activities such as the introduction of specialized guarantees of origin on the market (i.e., Mienskipsenergie) and the connection with regime actors (i.e., LLCEIs’ own regional energy supplier, significant financial support by both local and provincial government) (cf. [131])—the axiom of the intermediary support structure in Fryslân rather hinges on greater ownership and control of energy supply and demand by the Frisian local communities to promote regional economic development and maintain livability and social resilience. As has also been argued in other studies, it is therefore hard to build a case for a strategic LLCEI niche as such [14,21,132]. It signals that the technological innovations are subordinated to the social-economic regional agenda of the provincial government and NGOs within the community energy niche [132]. This is why the conceptualizations of intermediary roles we used for the analysis seem rather incompatible as the majority of these turned out to be associated with processes pertaining to technological innovations. Indeed, LLCEIs focus on changing the role of the citizen and energy

consumer in the energy system, emphasizing social innovation. The focus on social innovation is reflected in the intermediary roles in our case as well. For instance, instead of prioritizing particular uses of an innovation cf. [86], the configuring role materialized in our case as inter alia activities that sought to embed LLCEIs in their communities (i.e., developing a financial participation model), embed LLCEIs in existing institutional frameworks (upscaling LLCEIs to secure investment capital), and embedding LLCEIs by developing a new energy planning model (Mienskijsenergie implemented by local government). In a similar vein, the three intermediary roles proposed by Geels and Deuten [95] crystallized differently in the case of intermediaries supporting LLCEIs in Fryslân. Rather than creating an institutional infrastructure for LLCEIs to obtain globalized knowledge, it was observed that intermediaries provided LLCEIs with an institutional infrastructure to integrate them into a supportive system, effectively reinforcing the movement by providing more focus to their operations. In terms of framing and coordination, the intermediaries developed new concepts to articulate market demand for energy generated by LLCEIs, instead of merely focusing on replication of successful cases.

However, despite the apparent “internally” oriented niche (where technologies and innovations function to serve a special need for specific social groups without the intention to induce transition) [132], intermediaries were found to actively challenge the status quo and strive to open up the regime for the uptake of LLCEIs by creating new concepts, models, and practices. For instance, the Energy Workshop in the pilot energy neutral housing attempted to set an example, pushing through one experiment to open up the socio-technical regime for other LLCEIs to follow. Thus, whereas the pilot arose from a local need, the impact may be in the order of a process that stretches and may even transform parts of the regime (cf. [93]).

This apparent ambiguity between the aim to serve local socio-economic needs (representing an internally oriented niche) and the observed intermediary activities directed at further opening up the regime for the uptake of LLCEIs (indicating processes of strategic niche management) can be explained by theories of multi-level governance [133–136] or polycentric governance [137,138]. One of the core tenets of these frameworks is that local initiatives may have a wider impact that transcends their scale as a result of the interconnectedness of the political arenas involved. To safeguard interests at the local level, actors may have to engage with other stakeholders both horizontally and vertically. Thus, intermediaries engage with other actors and perform activities within various arenas to secure the interests of LLCEIs. As such, intermediaries necessarily engage with processes of SNM, even if the overall aim of their support centers on developing an internally oriented niche. Intermediary roles that are associated with engaging other stakeholders, i.e., brokering, configuring, framing and coordinating, creating an institutional infrastructure, therefore predominantly indicate strategies of SNM.

## 6. Conclusions

This study set out with the following research question, *“to what extent does the further development of LLCEIs depend on the completeness and coherence of the strategies and roles employed by intermediaries?”*.

As a first step to answering the research question, we determined that the support LLCEIs require to further develop is threefold: the need for capacity building and embedding, the alleviation of barriers, and opening up the regime for the acceptance and uptake of LLCEIs. The literature suggests that intermediaries can have a crucial role in furthering the development of LLCEIs. However, having determined the absence of an analytical framework that effectively synthesizes the support requirements of LLCEIs with the supportive work of intermediaries, we developed a comprehensive analytical framework with the main proposition that the completeness and coherence of the strategies and roles employed by intermediaries encourages the development of LLCEIs by successfully addressing their needs. In our effort to make sense out of the sheer variation in the work of intermediaries supporting LLCEIs, we used four theoretical perspectives, of which some have hitherto not been associated with community energy: endogenous development, business incubator, asset-based community development, and strategic niche management. The combination of these four perspectives helps to understand the underlying rationale and assumptions of the support

provided to LLCEIs. The results of the analysis suggest the utility of this novel take on intermediary support for LLCEIs as our framework appears to withstand the test of empirical assessment in the evaluation of the case of Fryslân. The results of the analysis show that the four strategies all permeate the various roles that we have distinguished. To build the capacities of LLCEIs, intermediaries assume a facilitating role by providing knowledge and guidance, augmenting skills, establishing social networks, fostering learning, assisting with fundraising and coaching of individual LLCEIs. Furthermore, intermediaries aggregate experiences and lessons, and translate these in standardized templates and toolkits. In terms of embedding, we observed various activities related to a configuring role, in which intermediaries developed business models and concepts to embed LLCEIs in their communities. With regard to alleviating barriers, intermediaries assume a brokering role, advocating and lobbying for policy reform, linking LLCEIs with existing policy and institutional frameworks, and functioning as a representative for the LLCEIs. To foster the uptake of LLCEIs by the regime, intermediaries create institutional infrastructures, configure LLCEIs by scaling up LLCEIs for getting investment capital, and employ a framing and coordinating role to articulate market demand, frame discourses and debates and coordinate the innovation processes involved. The completeness of the strategies and roles effectively addresses the multiple aspects that underlie further development of LLCEIs. Furthermore, we observed that as the number of LLCEIs increased, so did the overall coherence of the support provided by intermediaries. The different intermediary actors started institutionalizing their collaborative activities, ensuring that the various aspects that pertain to the successful support of LLCEIs were integrated in a comprehensive support structure. This support structure has provided more focus to the LLCEIs by enabling membership of an umbrella cooperative that represents the movement and which links them to their regional energy supplier. Moreover, the core values of LLCEIs are captured by creating a specific guarantee of origin for LLCEIs. At the surface, however, this coherence appears to be contrasted with the ambiguity that we observed between the aim to serve local socio-economic needs (representing an internally oriented niche and strategies of endogenous and asset-based community development) and the activities directed at further opening up the regime for the uptake of LLCEIs (indicating processes of strategic niche management). Nevertheless, we argue that this can be explained by theories of multi-level or polycentric governance since intermediaries engage with other actors and perform activities within and across various arenas to secure the (local) interests of LLCEIs.

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