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Modes of Governing and Policy of Local and Regional Governments Supporting Local Low-Carbon Energy Initiatives; Exploring the Cases of the Dutch Regions of Overijssel and Fryslân

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Abstract: Recent scholarly attention shows increasing involvement of local low-carbon energy initiatives (LLCEIs) in governance and policy, in particular in relation to innovations regarding low-carbon energy and energy efficiency. The future perspective of active citizenship in the production of locally generated low-carbon energy is largely dependent on the existing institutional and policy frameworks and settings. Subnational governments, in particular, can have a prominent role in this process by engaging in institutional adaptation and policy innovation. The central research question of this paper is: *In what ways do local and regional governments innovate in governing to respond to the emergence of LLCEIs?* The research question is answered by comparing two case studies: the Dutch regions of Overijssel and Fryslân. We have conceptualized a meta-governing approach of experimentation, characterizing the innovations in governing that emerge when governments respond to the emergence of LLCEIs. We specifically focus on two capacities that subnational governments can use to enhance their governing capacity vis-à-vis LLCEIs and which substantiate the experimental meta-governance mode: institutional adaptation and policy innovation. We then formulated hypotheses that specify the expected policy innovations and institutional adaptations employed vis-à-vis LLCEIs. Data collection involved in-depth interviews and use of secondary data. The results show that a balancing process of authoritative and enabling modes of governing particularly characterized the type of policy innovations that were developed and the institutional adaptations that took place. Both provinces govern LLCEIs at arm's length and issue significant capacity-building strategies that vary in terms of their conditions. Municipalities, however, incline towards impromptu and opportunistic responses, some of them having lasting effects by patching up existing institutional settings, others having more of an episodic character. The results will further the understanding of subnational low-carbon policy and governance innovation processes vis-à-vis the role of LLCEIs.

Keywords: local low-carbon energy initiatives; low-carbon policy; policy innovation; institutional adaptation; governance; energy transition; subnational governments

1. Introduction

Over the past decades, local low-carbon energy initiatives (LLCEIs) have proliferated across Western-European countries. Countries such as Denmark and Germany have shown how LLCEIs

shaped the organization and structure of the energy system in favor of extended civil involvement and ownership. The Danish wind energy cooperatives and community district heating projects proliferated from the 1970s onwards. German wind energy cooperatives emerged in the 1980s and were followed up by solar energy cooperatives and local utility companies partially owned by citizens in the first decade of the new millennium. The Netherlands also witnessed the development of LLCEIs in the shape of wind energy foundations and cooperatives in the late 1980s and early 1990s (25 initiatives in total; [1,2]). These LLCEIs sprung from anti-nuclear and pro-environmental sentiments [1,3] and typically (used to) exploit one or more collectively owned wind turbines. This surfacing of LLCEIs in the Netherlands, however, did not evolve in the same way as it did in Denmark or Germany. Nonetheless, in recent years, the Netherlands has known a strong upsurge of a 'new style' of LLCEIs distinct from the first wave in the Netherlands [3]. 'New style' LLCEIs deploy a range of mechanisms with the objective of enhancing sustainability in their localities. They typically pursue the local production of low-carbon energy in collective ways, aim to supply low-carbon energy to their members, promote energy savings, and disseminate information and give advice on low-carbon energy technology and energy efficient equipment [3,4]. After 2010, there was a steep increase in the number of LLCEIs, from little over 20 energy cooperatives in 2011 to 201 energy cooperatives in 2015 [2]. Often still in their developmental phase, they strive to formulate feasible business models and achieve a degree of professionalization in order to realize their ambitions.

Alluding to the fundamental role of civil society in governance for sustainable development and climate change mitigation e.g., [5], LLCEIs struggle to become a viable alternative for the existing socio-technical configurations of current energy systems which favor large-scale, centralized energy production, distribution and supply by traditional, incumbent energy sector actors. Amidst these tensions, it is, in particular, subnational governments that have a key role in shaping the playing field and enabling the development of LLCEIs [6–16]. Subnational governments are commonly the first venue LLCEIs resort to for support (e.g., seeking assistance in permit procedures, financial support or capacity building). Furthermore, the prominent role of subnational governments is evident since they are more accessible [12], better attuned to local needs than national level actors [17], and able to reconcile national top-down policy drivers and bottom-up drivers of community energy groups [13].

In contrast to local governments, the national government is more involved in providing a stable and supportive policy framework for LLCEIs [3,8,12,18]. However, many scholars have suggested that civil involvement in the administrative environment is prone to uncertainties and ambiguities e.g., [19–24]. In consolidation with the challenge to escape 'carbon lock-in' [25], scholars have argued for the importance of innovation in the governing of climate change mitigation [26–30]. It is against this backdrop that we are interested in how local and regional governments exactly respond to the proliferation of LLCEIs. On that premise, this paper seeks to analyze policy and institutional dynamics directed at LLCEIs on a subnational administrative level in order to gain insights into the characteristics of the innovations in governing that emerge. The central research question in this paper therefore is:

> *In what ways do local and regional governments in the Dutch regions of Overijssel and Fryslân innovate in governing to respond to the emergence of LLCEIs?*

The cases studied in this article—the Dutch regions of Overijssel and Fryslân, and the regional and local governments they embed—are not representative for all (Dutch) subnational governments engaging with LLCEIs, but serve to test a number of hypotheses concerning how they innovate in governing cf. [31]. In doing so, we use the cases to reflect and elaborate on a theoretical framework in order to distillate suggestions for future research. The theoretical framework used in this paper synthesizes notions on institutional adaptations and policy innovations that are expected to occur. They are used to elucidate how they are characterized by a balancing process of enabling and more authoritative modes of governing. In this regard, we draw on Jordan and Huitema's recently introduced conceptual framework on policy innovation [26,27,32], notions of institutional adaptation (e.g., [33–36]), and Bulkeley and Kerns' modes of 'governing through enabling' and 'governing by authority' [37]. We stress that despite increasing scholarly attention to LLCEIs, the concepts and

theoretical notions that we use in this paper have not been used in research on LLCEIs, thus reiterating the relevance of this scientific endeavor.

The paper is structured as follows. In Section 2, we present the theoretical background of the paper and subsequently formulate an analytical framework. In this section, we also conceptualize LLCEIs, discuss their role in low-carbon energy transitions and argue that (subnational) governments are central players within this setting. The research approach and methodology is discussed in Section 3. The two case studies are presented in Section 4, as well as the results of the (comparative) analysis. In Section 5, the results of the analysis are discussed and in Section 6 a conclusion is drawn. We finalize the paper by providing suggestions for future research.

2. Theoretical Framework and Conceptual Background

2.1. Conceptualizing Local Low-Carbon Energy Initiatives

We refer to Local Low-Carbon Energy Initiatives as the bottom-up 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. In this regard, LLCEIs are interpreted as 'self-organization' initiatives in the context of low-carbon energy transitions [38–41]. 'Local' is referred to as low-carbon energy technology being either at individual household- (e.g., lighting bulbs, weather-strips, advice on energy-saving measures on appliances, water-use, heating us, roof-based solar photovoltaic (PV) panels, insulation measures) or meso-level (collectively owned low-carbon energy installations) (cf. [42]). Additionally, local refers to the 'situatedness' of the actors that participate in a meaningful way [43]. This situatedness is circumscribed by Cox' spaces of dependence' which are "those more-or-less localized social relations upon which we depend for the realization of essential interests and for which there are no substitutes elsewhere; they define place-specific conditions for the material wellbeing of people and their sense of significance" [44] (p. 2).

LLCEIs are locally dependent in that their "primary interest is in defending or enhancing the flow of value through a specific locality: the territory that defines a geographically circumscribed context of exchange relations critical to their reproduction". In this paper, we explicitly omit the term 'community low-carbon energy'—a term commonly used in the literature to describe LLCEIs – since 'community' used in this sense tends to 'conflate the project (that is the 'community' low-carbon energy project) itself with the community it is embedded in'. The sole concept 'community' leaves indistinct the scalar and spatial configurations and politics involved and implies that community low-carbon energy as such involves, to a significant degree, a collective and inclusive endeavor cf. [45]. In contrast to Becker and Kunze's [46] suggestion to abandon the 'local' in conceptualizing LLCEIs to include non-local and participatory public projects, we reiterate the local character of LLCEIs in order to account for (non-) politically motivated LLCEIs that resemble 'simple' niches [47] that do not seek to transcend the local scale.

2.2. The Role of LLCEIs in Governing Low-Carbon Energy Transitions

In light of climate change mitigation and carbon reduction goals, LLCEIs are potential vehicles to implement distributed generation [48]. Distributed generation holds the promise of a lower need for investments in expensive transportation and distribution infrastructures [49–52]. Motives for distributed generation achieved specifically through LLCEIs include environmental (e.g., carbon reduction, energy saving); economic (lower energy bill, local economic regeneration, job creation); and social drivers (community cohesion, social and civic gratification) [4,16,18,48,53–56]. Furthermore, LLCEIs enable the involvement of the local public in the development process and the impact of low-carbon energy installations, which have been suggested to positively affect the acceptance of such projects [57–64]. In order to conceptualize the role of LLCEIs in the development, ownership and operation of the energy system, we refer to Watson's [65] 'co-provision'. This

means "the provision (including generation, treatment, distribution and consumption) of utility services by a range of new intermediaries (e.g., consumers themselves, other organizations or sub-networks), alongside or intermingled with centrally provided services (e.g., public networks or grid-provision)" [65] (p. 1983) [66]. We interpret co-provision as ensuing through the self-organizing processes of LLCEIs. Such processes are the cornerstone of social innovation because LLCEIs develop new strategies and practices that meet social goals and in the long term have the potential to change the organizational arrangements and socio-technical structure of the energy system in favor of extended end-user involvement [19,47,67–70]. That being said, we use the term co-provision since "local innovations—that is LLCEIs—are likely to remain a niche in the dominant central station electricity system" [48] (p. 10).

2.3. The Role of Government in Harnessing the Potential of LLCEIs

However, realizing a socially innovative distributed energy system through a so-called 'Thousand Flowers Blooming' pathway [56,71], or 'civic energy sector' [72], implies a clash with existing energy regimes and policy domains. Traditional actors—often called 'incumbents'—typically dominate the existing playing field, which favors corporate ownership and centralized, large-scale energy generation, supply and distribution over decentralized pathways and impedes the development of LLCEIs [3,10,48,71,73–76]. This leads to 'carbon lock-in' [77] in the domestic energy system in which incumbent actors only seek to optimize current systems through incremental change. At the same time, they develop defense and cooptation mechanisms to protect the system (and hence, their own interests) against potential marker intruders (e.g., [78–80]). As a consequence, they create persistent market and policy failures that block system/market entry by newcomers such as LLCEIs [81]. This institutional lock-in inhibits system innovation that allows for the diffusion of low-carbon energy and distributed generation [8,17,82–84]. To LLCEIs this results in problems related to uncertainties regarding policy developments, grid connection, market access and contracting, and financing [83,85,86].

These barriers predominantly relate to socio-political acceptance by key stakeholders and policy makers of institutional changes and policies needed for distributed generation [84]. Various authors suggested that it is, in particular, subnational governments that have a key role in addressing these issues and preventing that LLCEIs remain at the niche level—operating at the margins of the energy system [13,14,55,71,76,87,88]. In other words, the future perspective of LLCEIs and their role in the energy system depend on the extent to which self-organizing processes of social innovation and co-provision are facilitated and guided by governments rather than through the exercise of governance (i.e., by non-governmental actors) alone [9,20,68,89–92]. State institutions and traditional forms of political authority persist and are still central in governance [5,93–96]. Bell et al. [96] hold that within this context, governments are experimenting with new ways of governing that require the involvement of non-state actors. In this regard, governments are extensively involved in the self-organization of governance networks and selecting a balance between direct imperative coordination and indirect orchestration; this is known as a process of 'meta-governance' [97–101]. In this sense, meta-governance refers to the strategic activities of government in relation to governance [99]. It is important to emphasize that we apply an approach (originating in the public administration discipline) having a government-oriented perspective (i.e., role played by government in governing governance), as opposed to a society-centered perspective (i.e., on roles played by non-state actors in governance mechanisms; e.g., self-governance by citizen-led organizations) to study the innovations that occur in governing arrangements in response to LLCEIs evolving.

Accordingly, we differentiate between two modes of governing that can be employed by governments as a response to LLCEIs: (i) governing through enabling and (ii) governing by authority [37]. These two modes of governing represent the balancing process involved in meta- governance; governing by authority involves directive and regulative activities; governing through enabling entails coordinative and facilitative activities. The two modes of governing will be discussed below.

2.4. Enabling and Authoritative Modes of Governing

Confronting "wicked" problems such as climate change mitigation in an age of austerity and against the backdrop of a reinterpretation of the government–citizen relationship generates complex challenges and institutional ambivalence for local governments that endeavor to create the capacity to govern amidst these developments [13,20,37,102–104]. Several authors have developed theories and conceptual models to substantiate governance arrangements that harness bottom-up civic action and facilitate action on climate change mitigation in collaboration with a range of stakeholders [37,90–92]. In this sense, Hoppe et al. [105] (p. 13) state that, "the future outlook of local governments involves a retrenchment to a 'supportive role' vis-à-vis public service delivery in general and climate change mitigation policy in particular".

Bulkeley and Kern's [37] 'governing through enabling' mode characterizes such a supportive role as an approach for local governments to engage in climate change mitigation (see also [8,13,106]. This particular mode of governing refers to the ability of local government to govern through various forms of partnerships and community engagement by means of employing 'soft' promotional, facilitative, coordinative and encouraging governing activities to spur climate change action by other actors. Mey et al., [7] (p. 40) further substantiated the different ways local governments can engage with the local public under an enabling mode of governing. However, the authors limit their description of local governments that engage with LLCEIs with one type of role: catalysts and supporters. This type of engagement refers to local governments providing funding, administrative support, and physical space to LLCEIs. This enabling approach overlaps with what Sørensen [107] refers to as a 'hands-on support and facilitation' exercise of meta-governance—or network management [100].

An enabling mode of governing may provide local governments with a means to surpass the formal boundaries of their authority and allows them to put to use new forms of resources and collaborate with relevant actors [108–110]. However, several authors have argued for the continued importance of an authoritative and leadership role of governments in effectuating climate change action even in the context of developing innovative forms of governing [37,87,90,111–113]. In contrast to the 'softer' instruments used through enabling, an authoritative mode of governing ensues by means of regulations, rules, permitting, planning requirements, and compulsory economic instruments [37,113]. In particular, this approach is important to guard against coordination and distribution failures [72,114]. This governing by controlling mode overlaps with Sørensen and Torfings [100] network design (or structuration), in which government decides on the rules of the game, and thus can be termed 'network governance in the shadow of hierarchy' [115]. These rules of the game may involve inter alia the access of actors, decision-making rules, power and rights of the actors, and institutional procedures of the networks e.g., [15,100,116].

2.5. The Need for Experimental Meta-Governance

However, striking a balance between the two modes of governing appears to be insufficient in coping with bottom-up civic action and climate change mitigation. In this regard, a vast body of literature has suggested that innovation in governance is necessary to allow for extended civic/end-user involvement in the administrative environment, in energy systems, and to spur socially innovative and self-organizing initiatives e.g., [20,40,71,72,89,102,117–119]. Furthermore, in light of the challenge to escape carbon lock-in [25], scholars increasingly argue for a governing approach that fosters innovation and experimentation in governing activities for climate change mitigation at different levels and scales [27–30,109,120–123]. According to Bulkeley and Castán Broto, 'climate change experiments' signify "purposive interventions in which there is a more or less explicit attempt to innovate, learn or gain experience" [29] (p. 363) "in order to reconfigure one or more socio-technical system for specific ends and where the purpose is to reduce greenhouse gases or adapt to climate change" [29] (p. 368).

Instead of experiments taking place at the margins of the system, experiments are central in coordinating and engaging in climate change action. This can be read as a form of meta-governance

mode that emerges from the governing activities that proactively enable and steer LLCEIs via experimental methods such as policy innovations and institutional adaptations. We therefore argue that this meta-governance approach should be regarded in light of balancing the two modes of governing as described above. As such, the types of policy innovations and institutional adaptions that occur are characterized by this process as well. That being said, this approach can be worthwhile to analyze the 'certain degree of unease' [68] (p. 101) that exists between LLCEIs and subnational governments especially since the latter have a key role in enabling the development of LLCEIs [6–16]. Therefore, in this paper, we focus on two capacities that subnational governments can use to enhance their governing capacity vis-à-vis LLCEIs and which substantiate the experimental meta-governance mode: (i) institutional adaptation and (ii) policy innovation. This will help in analyzing the institutional dynamics and policies that occur in determining the socio-political acceptance of co-provision through LLCEIs. Such acceptance is crucial in low-carbon energy deployment [84,124].

2.6. The Role of Institutional Adaptation

There is a vast body of academic literature that recognizes the importance of the institutional dimension in investigating patterns of change and stability within local governance [89,102,125–127]. Accordingly, studies have shown that the institutional dimension is very important when addressing (local) governance of low-carbon energy transitions [128–133]. The relevance of including the institutional dimension in the analysis is further confirmed by the sheer fact that LLCEIs represent a new type of actor that engenders co-provision and enters the policy domains of energy and climate change mitigation in a way ('bottom-up') that challenges conventional institutional arrangements and questions the early modern liberal-democratic separation between civil-society, market, and state. In other words, LLCEIs promote institutional change. Here, institutions are understood as "the rules of the game in a society, or, more formally, are the humanly devised constraints that shape human interaction" [134] (p. 3). Hence, when analyzing institutions, one focuses on the interaction between the structuring dynamics of institutions and the micro-politics of interactions between political actors (i.e., governments, LLCEIs, intermediary actors). That being said, the analysis seeks to assess how institutions adapt, as a specific model of institutional change [135] through the innovative activities employed by governments vis-à-vis LLCEIs. In this regard, policy instruments or policy innovations employed by governments may act as 'game changers' effectuating a change in the institutional landscape and action arenas at the local level [136,137].

The transformation of institutions tends to be a 'sticky' and 'overwhelmingly incremental' process [134] (p.89). In her influential book *How Institutions Evolve*, Thelen [35] argues that students of institutional change ought to focus on endogenous mechanisms and incremental patterns of change, instead of critical junctures in which exogenous shocks bring about path-dependent transformations (i.e., 'punctuated equilibrium'). Taking into consideration the general trend towards state retrenchment and powerful sources of institutional inertia involving vexing uncertainties about institutional alternatives; sunk costs related to existing institutions; and political conflict arising from proponents of the status quo that oppose new institutions [34], it is expected that institutional change will be limited to ad hoc or episodic adaptations. We argue that such ad hoc and reactive adaptations should be seen in light of the influence of an authoritative mode of governing and therefore remain at the level of specific episodes of interaction [102]. This entails that 'rules of the game' are adapted incidentally in a specific project or situation [137].

A case study conducted by Lowndes and McCaughie [138] showed that local governments reinvent their institutional forms by "re-using and recombining available organizational and institutional components" to serve new purposes; a process also known as institutional 'bricolage' [34] (p. 27). Thelen [35] uses the term 'conversion'. It can be viewed as a way of innovating and dealing with complexity in order to respond to new challenges. Additionally, 'patching up', or 'layering' [35,36] involve leaving intact the basic set up of institutional arrangements and remedially supplementing it with new structures and relieving specific bottlenecks and deficiencies [33] (p. 53). Therefore, patching

up and institutional bricolage seem to be acceptable mechanisms for institutional adaptation since they are less prone to political conflict, uncertainty and high initial set-up costs [33,139]. This explains the 'surprising' absence of radical new ideas and overt political conflict observed by Lowndes and McCaughie [138] (p. 533) in governments redesigning institutions by means of such adaptive mechanisms. Therefore, institutional bricolage and patching up existing institutions resemble a combination of authoritative (i.e., leaving intact the basic institutional set up, using existing institutions) and enabling (serving new purposes, relieving bottlenecks) modes of governing and are therefore expected to occur.

Lastly, given the time-span involved concerning the emergence of LLCEIs (e.g., in the Netherlands) and thereby the sticky process of institutional change, we expect to observe, at most, that institutional adaptation ensues via governing at arm's length when 'governing through enabling' modes are applied. This entails that governments pro-actively transfer agency, competences and responsibility to other (non-state) actors such as LLCEIs or so-called 'intermediaries'. Meadowcroft suggests that governments may create new (semi-) autonomous actors who can promote change, or transfer functions from the core of government to such actors operating at arm's length [5] (p. 311). With respect to governance of low-carbon energy transitions in general and LLCEIs in particular, this refers to the creation of intermediaries, which are actors that function as boundary organizations and spur niche development e.g., [140–145]. Figure 1 displays the continuum of governing modes juxtaposed with analytical touchstone variations in institutional adaptation and heralds three hypotheses concerning institutional adaptation vis-à-vis LLCEIs. Firstly, institutional adaptation characterized by governing by authority is expected to take shape by means of ad hoc and incremental responses. Secondly, institutional adaptation characterized by both governing through enabling and governing by authority is expected to take shape by means of bricolage and patching up existing institutions. Lastly, we expect that institutional adaptation characterized by governing through enabling will take shape by means of governing at arm's length.

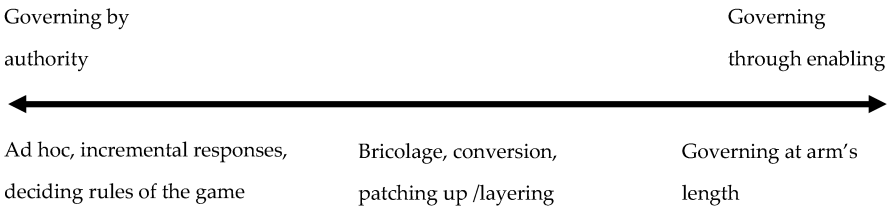

Figure 1. Continuum of governing modes juxtaposed with variations in institutional adaptation.

2.7. Policy Innovation

In addition to institutional adaptation, policy instruments prove to be useful indicators to differentiate between new modes of governance and old forms of government [146]. Jordan and Huitema's recently introduced conceptual framework on policy innovations functions as a point of departure to help in thinking systematically about what changes in policy may be considered 'innovative' [26,27,32]. In view of this, Jordan and Huitema argue that one should not overlook the capacity of nation-states to close governance gaps by means of engaging in policy innovation. The authors have compiled the conceptual debate on policy innovation and distinguish between three aspects to which innovation can refer: (i) to the novelty of emerging policies; (ii) to the extensive diffusion of such policies; (iii) and to their effects [27] (p. 389).

In this paper, when mentioning policy innovation, we mostly address policy invention. Policy invention, in our view, is the extent to which the 'new' policy (or elements therein) adds to or departs from the pre-existing policy mix brought to use in a particular policy domain, by a particular unit of government, in a specific country. Whereas Jordan and Huitema refer to this aspect (next to two other aspects) as a threshold to determine the effects of policy innovation, we contend that this definition of policy invention will assist to alleviate the overlap between the three dimensions of policy innovation.

Additionally, our definition deals with the 'acid test' for policy invention that is unlikely to be met, namely: that the policy is new to all adopting agents in the world.

Policy innovations with an authoritative character would involve inter alia planning requirements that embed civil ownership in low-carbon energy developments, strategic land-use planning and using land ownership to support LLCEIs' activities, or formulating performance criteria for LLCEIs [147]. Such authoritative mechanisms are not to be employed by threat of sanction [37], but should be interpreted in the sense that they structure the network of LLCEIs and support LLCEIs by making innovative use of conventional instruments.

Policy innovations that resemble a combination of enabling and authoritative modes of governing are ones that are characterized by conditions and criteria that have to be met before LLCEIs receive support or funding and are expected to produce tangible, proximate outcomes e.g., [72,136,148]. In this sense, governments retain a degree of control through conditional funding and economic instruments and are likely to employ reporting requirements [23,114,149].

Bulkeley and Kern's governing through enabling [37] and Mey et al. [7] local government-LLCEI engagement provide initial insight into the policy inventions expected when governments recur to an enabling mode of governing: provision of financial incentives and subsidies, providing information, shaping policy goals and the delivery of infrastructures and services in partnership with LLCEIs [37] (p. 2249). These activities refer to an overall strategy of capacity building, considered crucial in the development of LLCEIs [14,86,140]. Capacity building accepts more ambiguous and distant outcomes [136].

Figure 2 presents the continuum of governing modes juxtaposed with variations in policy innovations and heralds three hypotheses concerning policy innovation vis-à-vis LLCEIs. Firstly, policy innovations that resemble an authoritative mode of governing are expected to take shape by means of planning and land-use requirements, strategic use of landownership and the introduction of performance criteria. Secondly, policy innovations characterized by a combination of both modes of governing are expected to take shape by means of conditional funding and support. Lastly, policy innovations that are characterized by an enabling mode of governing take shape by means of capacity building measures.

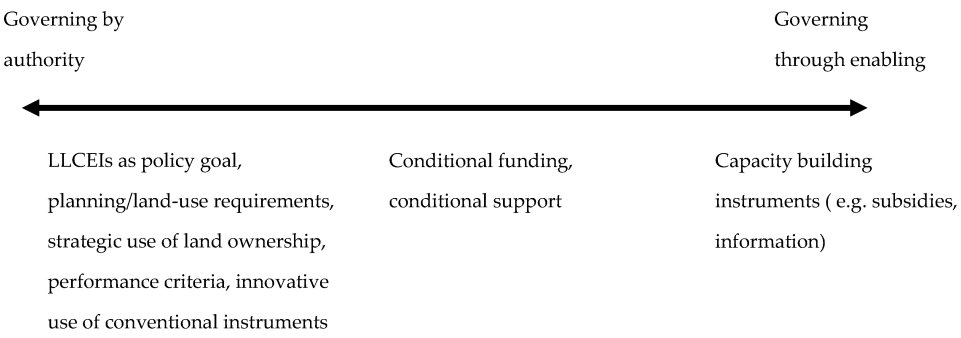

Figure 2. Continuum of governing modes juxtaposed with variations in policy innovations.

3. Methods

3.1. Research Design and Units of Analysis

The research approach concerns an embedded multiple cases study design comparing the Dutch regions of Fryslân and Overijssel (see Figure 3 for their geographical locations within the Netherlands). The case studies are used to test the descriptive hypotheses mentioned in Section 2. By testing descriptive hypotheses Yin means to use the hypotheses to direct (1) the purpose of the descriptive effort, (2) the full but realistic range of option that may be considered a "complete" description of what is to be studied, and (3) the likely topics that will be the essence of description [31] (p. 36). Within the regional case studies, local case studies (of certain municipalities) are embedded (see Figures 4

and 5). In following Dutch constitutional law, the two regions of Fryslân and Overijssel are referred to as provinces; i.e, the Province of Overijssel and the Province of Fryslân. Both are located in the periphery of the country and consist predominantly of rural areas (which differs considerably from the densely populated 'Randstad' which forms the economic center of the Netherlands). Both Fryslân and Overijssel have a provincial government of their own and consist of multiple local governments. In the Netherlands, local governments are understood as municipalities. A municipality in the Netherlands is an administrative entity governed by the Municipal Council and the Mayor and Municipal Executive, which are in turn supported by the administrative apparatus. Municipalities in the Netherlands are the third layer of government (national and provincial government respectively being the first and second layers).

Figure 3. Map of the Netherlands.

Figure 4. Map of embedded cases in Overijssel showing the municipalities and the LLCEIs in question.

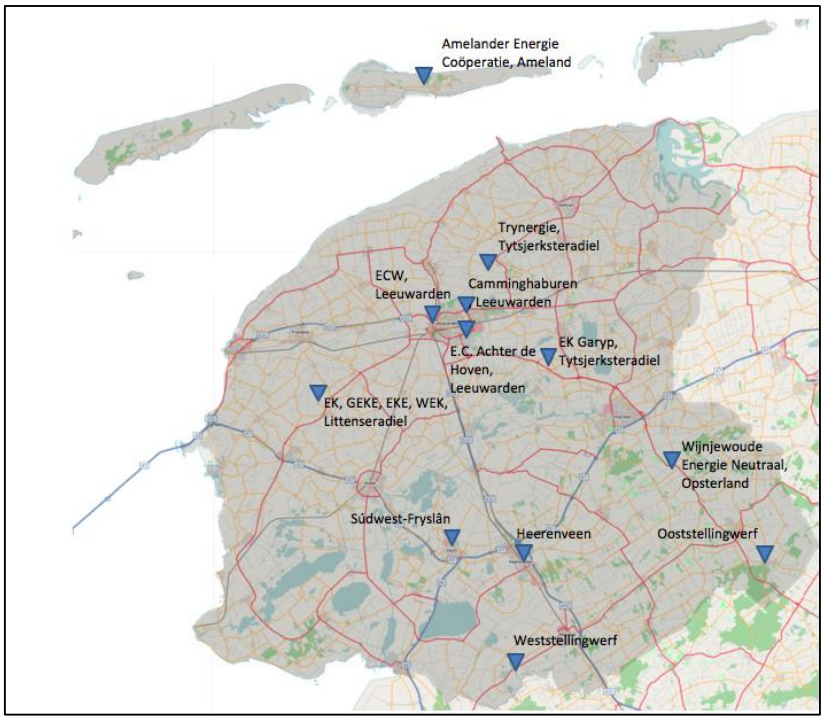

Figure 5. Map of embedded cases in Fryslân showing the municipalities and the LLCEIs in question.

3.2. Case Selection

Both regions are considered rural and show resemblance in terms of their regional economy and problems that arise from regional demographic shrinkage. Furthermore, both cases employ a relatively ambitious and progressive low-carbon climate policy (targeting energy efficiency and low-carbon energy), which also applies to having policies that target LLCEIs [150,151]. To a certain degree, this is related to both provincial governments having had a budgetary impetus following them selling their shares in (former regional) energy suppliers (such as Nuon and Essent), and next having decided to reinvest the accumulated capital to achieve 'clean energy' policy goals (which is however not unique among Dutch provincial governments). Furthermore, given that national government LLCEI policies and regulations do not differentiate between the twelve provinces, this puts provinces (and indirectly municipalities) in the Netherlands in principle in similar positions vis- à-vis LLCEIs to decide to develop policies in support of them (non-mandatory). When compared to other Dutch provinces, both Overijsel and Fryslân can be considered 'early-majority adopters' or even 'frontrunners' when it comes to having policies in place targeting LLCEIs (although peers such as North-Brabant and Gelderland may also classify; no late adopters were selected though). Hence the cases can be considered extreme cases, and important lessons might be retrieved from analyzing them that could potentially be of interest in terms of being best practices and for generating new hypotheses [152].

3.3. Data Collection

Data collection involved 12 semi-structured interviews for the Frisian case, and 20 interviews for the Overijssel case. Interviewees involved LLCEI members, municipal civil servants, provincial civil servants, but also experts from other stakeholders such as distribution system operators. Interview data were bolstered with secondary data (i.e., policy documents, minutes of council meetings, minutes of LLCEI meetings, communications, online articles, site visits, project workshops, and ongoing personal contacts with field experts and LLCEI members) and participant observation (during meetings). Interviews were conducted face-to-face and in addition follow-up questions were raised and addressed by respondents via e-mail. Data were collected in multiple projects, including EU-Horizon 2020

projects, a national research agency project (NWO), regional research projects, PhD projects, four MSc thesis projects, commissioned research by national government, commissioned research by regional government, workshops (by the province, the university), and two Master's courses in which students worked on projects collecting data and giving advice to LLCEIs (i.e., conducting case study research and presenting business cases to them).

3.4. Data Analysis

Data analysis concerned analyzing the collected primary and secondary data, and constructing (embedded) case study narratives of both the Fryslân and Overijssel regions. This process was conducted by the two authors of this paper, who have been following developments on LLCEIs and relevant policies in the two regions for four years, and have actively engaged with key stakeholders and experts ever since.

Once ready, an analytical reflection of the two case study narratives was conducted using the conceptual notions discussed in Section 2 (in particular, those mentioned in Figures 1 and 2). In doing so, we will look into which policy innovations and institutional adaptations arise in practice and how these resonate with the balancing of the two patterns of governing. Additionally, we determine the similarities and differences between the two cases by using the analytical concepts found in Figures 1 and 2 (Section 2). Subsequently, we will address the implications that follow from the analysis in terms of governing sustainability transitions; thus, furthering understanding of the role and impact of LLCEIs in energy transitions, and governmental responses to them.

3.5. Limitations

Despite the careful selection of the case studies, the reader should notice that the results of this study cannot easily be generalized to other regions for the two cases can be considered frontrunners or early majority adopters of policies targeting LLCEIs. Nonetheless, emerging patterns and best practices might allow for conceptual elaboration and theoretical generalization.

4. Results

This section addresses experiences and practices with government policies directed at LLCEIs. First, however, the roles and functions of provinces and municipalities in the Dutch context are presented. Second, the two case studies are presented. Per case—Fryslân and Overijssel—attention is paid to both the provincial government and municipalities responding to the emergence of LLCEIs.

4.1. Provincial Governments and Municipalities in the Netherlands

In the Netherlands, provincial governments are primarily responsible for spatial planning, regional economy, agriculture, infrastructure and transport. Apart from national obligations for siting large-scale wind energy developments, provincial governments' ambitions regarding energy policy and climate change mitigation are voluntary. Municipalities are responsible for housing, land-use plans and regulations, local infrastructure. Furthermore, both provincial governments and municipalities have the statutory obligation to enact specific tasks under the Law on Environmental Management (LEM), specifically having to renew their environmental policy every four years. Both municipalities and provincial governments have varying responsibilities for inter alia air, water and ground quality, environmental permits, environmental quality and impact. Municipalities have the task of municipal waste management. Although both provincial governments and municipalities run environmental policy, this typically concerns traditional command and control, regulatory policy e.g., [153,154]. Similar to provincial government, municipalities have significant discretion in determining their goals regarding energy and climate change mitigation [155]. That being said, provincial governments and municipalities have legal and administrative leeway in determining how and to what extent they respond to LLCEIs by means of innovation in governing.

4.2. The Case of Overijssel

4.2.1. The Provincial Government

As per 2009, the Province of Overijssel has been active in supporting LLCEIs. The strategy deployed by the Province of Overijssel focused on: (i) providing incentives to support LLCEIS; and (ii) support of LLCEIs by communicative means. Incentives are foremost subsidy schemes. First, in 2009 and 2010, the Province initiated a competition—'Sustainable Village'—in which villages that wanted to set up LLCEIs could prepare proposals in order to get funding for their respective plans (for realization in the 2011–2015 period; with project proposal requests ranging between 25,000 and 1,000,000 Euro) [156]. The province installed a jury of experts who were tasked to determine which bottom-up initiative would be the winner of the competition and would thus qualify for a provincial subsidy [157] (p. 5). The idea came from a civil servant who was inspired by similar examples in Germany, Denmark and Austria. There were two rounds, in which the first round emphasized the goal of carbon reduction in villages, whereas the second approach took an approach emphasizing the "triple bottom line" (i.e., social cohesion component, less and cleaner energy, and the assumed financial viability of the project). The competition scheme had a significant budget, and allowed for allocation of serious budgets to the participating villages (subsidies issued by Dutch government can only be granted to a legal entity. Thus, the budgets were commonly allocated to local organizational bodies such as village associations or foundations). For instance, the competition winner (the village Hoonhorst) was awarded (not less than) 1.5 M euro to start its local low-carbon energy (the funds were transferred to Hoonhorst's "Local Interest"—Plaatselijk Belang; authors' own translation—which is a common organizational body in Dutch villages. These organizations have a board and commonly get small amounts of government budget to use for public purposes for their town. It is not an official administrative level of government). Other winning villages were awarded much less: 50,000 euros. The financial prizes were used in different ways. For example, one LLCEI—Energiek Vasse—used the funding to hire a quartermaster to prepare its organization and business model, whereas another one—Energieneutraal Noord-Deurningen—used the budget to have energy audits conducted and to pay for installment of thermal insulation material in local dwellings. Hence, ways of spending of the budgets was the responsibility of the villages (but of course, within certain limits). A semi-governmental organization, 'Stimuland', assisted the respective LLCEIs with organizational affairs and issues concerning project development. All in all, the Sustainable Village scheme contributed to establishment and support in capacity building of 23 LLCEIs according to the Province of Overijssel's website [158]. The Province of Overijssel deemed the scheme successful, and in 2015, a follow-up scheme on supporting villages to initiate and run local projects on bio-energy issues was launched (hence, a more specific topical approach than its predecessor).

Learning from the experiences, the Province of Overijssel by 2011 embedded support of LLCEIs formally in its policy program on low-carbon energy (entitled 'New energy') [159]. By 2014, the program was revised, adding more attention to support of LLCEIs. Specific attention to LLCEIs in the formal revision of the policy framework arose from a resolution adopted in the provincial council [160]. The energy program still needs to be redesigned and adopted, but the provincial council adopted the theme 'space for local initiatives' and mentioned support for local initiators and entrepreneurs as one of the main policy lines. Provincial government focused actions on financial support and adaptation of spatial legislation. A specific example is the suggestion to negate the requirement to cluster wind turbines when a local initiative wants to realize a solitaire wind turbine in which more than 50% of the wind turbine is financed by local stakeholders [150]. When preparing the revised energy program, the province decided to involve external stakeholders, much like the neo-corporate structure of the Netherlands which emphasizes bargaining, collaboration and consensus-building with societal stakeholders and interest groups [154,161], also known as the Dutch governance school [93]. Although drawing on the province's recently adopted 'participation code' (a code demonstrating that the province underscores and seeks to enhance civic participation in policy-

and decision-making) [162], the role of LLCEIs to participate in the revision of the energy program was limited to that of a 'spectator' [163]. Traditional parties of the energy regime, e.g., the grid-operator active in Overijssel, the Social Economic Council, the association of Nature and Environment in Overijssel, the Association of Dutch Municipalities, looked to represent their interests.

Similar to the Sustainable Village scheme, the Province, Nature and Environment Overijssel and Stimuland annually organize the "Energy Pitch Overijssel" (the first was held in 2013). A commission selects four initiatives out of all applicants and invites them to pitch their plans to a jury of experts. Applications have to meet four selection criteria: societal contribution of the initiative, involvement (in terms of stakeholder involvement, marketing and communication strategies), feasibility, and roadmap (ambition and vision, sub-projects to achieve goal). The selected initiatives receive professional support to further develop their plans. Unlike the Sustainable Village scheme, the Energy Pitch Overijssel does not provide grants or subsidies.

Additionally, there was a lot of policy attention to households adopting energy efficient and low-carbon energy applications. Moreover, the provincial program was part of a larger strategy of Dutch provinces aligning provincial energy policy strategies following the signing of the national energy agreement in September 2013.

Another incentive offered by the Province of Overijssel to support LLCEIs was the so-called 'Investment Fund' [157], which is a fund used to provide for upfront investment in local low-carbon energy projects, typically targeting those entrepreneurs who often do not have access to funding (in particular, LLCEIs). The procedure for allocating an investment budget was that entrepreneurs could prepare project plans, pitch their business case for the Province (supported by professional assessors—an independent bank managed the Investment Fund), on which the Province would decide who would benefit from the Funds and who would not. In the end, multiple LLCEIs projects were funded. Notably, solar PV project (e.g., Borne), a wind park (Deventer) and a biogas project (Noord-Deurningen). Whereas, to some, the fund was considered a revelation (e.g., projects funded 1 Mi Euro to carry through), others were disappointed that their project proposal was rejected and local operations came to a halt. However, and perhaps due to its novel character, the Investment Fund was under-utilized because budget allocation guide rules were considered as "too strict".

Furthermore, the province installed a subsidy mechanism for local low-carbon energy initiatives not limited to citizen-initiated projects with a total budget of € 1.25 million [164]. The instrument subsidized projects in different developmental phases, of which each phase will be discussed below. In the first phase, activities in the design and concept-phase of a project are subsidized. In the second phase, the actual realization of the project is subsidized. Phase one and two have a combined maximum of € 50,000 per project, with the first phase having a ceiling of € 20,000 a project. Before projects become eligible for phase two, they require a feasible business case. The third phase involves subsidizing measures to professionalize the project so that it becomes an enterprise with future perspective (the maximum amount of subsidy in this phase is € 50,000). An initiative is eligible for a phase three subsidy if it is able to show that its enterprise is based on a feasible business model with future perspective. An initiative may not apply solely for phase 1 or for a subsidy to design a business model, and each phase is concluded with go/no go moments to monitor the progress made.

In addition to incentives directly targeting LLCEIs, the Province also implemented subsidies to cover upfront investments that households and firms make when adopting solar PV panels. Indirectly, this scheme also supported solar farm projects by LLCEIs. The Province incentivized innovative low-carbon energy projects in which (among others) LLCEIs participated (e.g., on smart grids) by providing "in cash' and 'in kind' contributions.

Furthermore, the Province of Overijssel implemented the subsidy scheme 'Energy Landscapes' to help initiatives in developing a plan for low-carbon energy generation by means of a workshop, or to subsidize additional measures taken by initiators to integrate the low-carbon energy installation in the environment. One of the criteria of the workshop was that residents, firms, municipality and water board in the area in question were to be involved in the workshop [165].

Other policy instruments the Province of Overijssel used had a more communicative character. For instance, a communication platform (called the "New Energy Overijssel platform) was set up to facilitate sharing of knowledge on barriers, best practices and lessons between localities. In addition, the Province facilitated the operation of local energy front offices at municipalities ('energieloketten').

The Province also supported LLCEIs by gathering information on regulatory barriers local low-carbon energy initiatives experienced, and used them for lobbying at higher government levels (nationally and at the EU level) to provoke mitigation or termination of these regulatory barriers. The Province also tried to spur inter-sectoral policy alignment vis-à-vis local energy projects (e.g., by introducing energy as a policy issue on its urban agenda). Additionally, the Province made efforts to support local low-carbon energy projects by adapting spatial zoning schemes [87]. By doing this, however, it did mean that the Province intervened with spatial policy of municipalities.

As of 2015, the province of Overijssel appointed nine 'initiative-brokers' on the basis of the experience they gained by setting up local initiatives themselves. LLCEIs may contact these experts; the experts can in turn provide start-up LLCEIs with knowledge, knowhow, or relevant contacts. The province implemented this policy instrument for LLCEIs to have one central point where they can resort to when in need of support.

4.2.2. Municipalities

Municipalities in Overijssel have provided support to LLCEIs in multiple ways. In some cases, they had an active role in initiating LLCEIs (Deventer, Hof van Twente, Wierden) and provided financial means to allow LLCEIs to build capacities and explore organizational and business development. Part of the larger provincial policy was the establishment of local 'energy front offices' ('energieloketten') in all of the province's municipalities.

Experiences by LLCEIs on the satisfaction of services provided by these offices were mixed, though. In some cases, (Tubbergen), the municipal offices were deemed very inadequate and of little use to LLCEIs [166]. However, the municipalities of Deventer, Wierden and Hof van Twente delegated the task of managing these energy front offices to their LLCEIs.

Like the Province of Overijssel, municipalities were engaged frequently by LLCEIs when deals had to made regarding establishment of solar or wind parks. In some cases, such as Deventer, the municipality supported the LLCEI by supporting the permit granting procedure to get access to a site on which wind turbines could be constructed, financed a feasibility study for the cooperative, and granted a € 50,000 start-up subsidy. In this case, a wind park along the highway A2 was realized in 2015. The politically responsible public official had a crucial incentivizing role to push through the realization, of the windmills since a white paper concerning the possibilities of wind turbines in Deventer was already adopted in 2004 but remained unimplemented ever since. Furthermore, the municipality granted the LLCEI another € 50,000 for managing the energy front office and reserved 25% worth of participation in the wind park. Furthermore, the municipality actively involves Deventer Energie in low-carbon energy projects in the municipality.

Another instance in which a LLCEI evoked a response of the local government is in the Municipality of Raalte. The Municipal Council of Raalte adopted the solar farm (of around 7000 solar PV panels) initiative of the LLCEI 'Escozon' as a pilot and formally assumed a positive attitude vis-à-vis the initiative [167]. The attitude was literally described in a proposal by the municipal executive as one that: 'guides the necessary procedures related to spatial planning and offer input for the initiators in elaborating the plans' [168]. Similarly, the Municipal Council of Almelo agreed to exempt solar farms from the procedure in which the council has to file a so-called 'declaration of no objection' when projects that are in conflict with existing zoning plans come before the council to apply for an adaptation of the zoning plan. Additionally, the municipalities of Wierden adapted their construction fee regulations for land-based solar PV panel projects in order to assist an LLCEI ('Stichting Duurzame Energie Wierden-Enter' (SDEWE)) that sought to realize a solar farm in the municipality. Instead of having to pay the fees in advance of actual realization of the project, the fees can be paid

after the initiators successfully applied for the national feed-in tariff 'Stimuleringsregeling Duurzame Energie' (SDE+) ('Stimulation Measure Sustainable Energy', authors' translation). Furthermore, the construction fees are solely levied on the load-bearing construction, and not on the solar PV panels and transformers significantly reducing the construction fees The Municipality of Wierden copied this condition from the Municipality of Hof van Twente. The Municipality of Voorst allowed its LLCEI to use the roof of the city hall building for a collective solar PV project of 400 panels. The Municipality of Borne also made available its roof, but it appeared to be not suitable for solar PV panels.

Whereas these cases are examples of relative supportive municipalities, this cannot be said for most of the many municipalities in the rural areas in Overijssel. For instance, LLCEIs in rural Twente report poor responses by municipalities to their plans (cf. to construct biogas infrastructures, solar or wind parks). This appears to be not only related to lack of administrative capacities but also to a lack of political prioritization to low-carbon energy and empowerment of local communities by public officials [169]. Moreover, there are also cases in which the public officials are committed to supporting LLCEIs but 'their' civil servants are not—they even perceive LLCEIs as a potential threat to take over public tasks—and pose a significant barrier towards supporting LLCEIs in local low-carbon energy projects (cf. the Lochem case, albeit just outside geographical domain of Overijssel but most probably not a unique case [14]). For instance, whereas on the one hand the Municipal Council of Raalte decided in favor of the LLCEI's idea of a solar farm, civil servants of the rural municipality mentioned that collaboration with the LLCEI was hampered by the entrepreneurial disposition of the initiative (the LLCEI originally consisted of two entrepreneurs). As a consequence, the negotiation process about the price of the leasehold for the parcel for the future solar farm that is owned by the municipality ensued strenuously. This is also influenced by the fact that the civil servants solely spoke to the two initiators, and not to a representative part of the village Heeten. The civil servants in question necessitated a sign of public support for the initiators' plans before they would continue collaboration. However, the interaction between LLCEIs and municipalities that predominantly ensues with the initiators of LLCEIs (e.g., Deventer, Raalte, Ommen, Vasse, Noord-Deurningen) has another implication as well. Governments may be skeptical to engage in collaboration with initiators if the project's continuation is directly dependent upon the involvement of the initiator(s). This became apparent in case of a public official ('alderman') of the municipality Ommen, in which a community center of the hamlet 'Ommerkanaal' was to be made energy-neutral by a group of initiators. The aldermen on the one hand necessitated public support for project approval, but ventilated his concerns regarding the continuation of an initiative in the case that an initiator would drop out.

Furthermore, although the Municipality Hof van Twente co-founded a cooperative together with a LLCEI ('Energie Coöperatie Hof van Twente' (ECHT)) with the goal of making the municipality energy neutral by 2035 (and which is responsible for the operation of the energy front office), the Municipal Council of Hof van Twente decided against the realization of a wind turbine in which the LLCEI participated. One of the arguments of the opposition was that the LLCEI did not adequately involve the residents of the municipality about their initiative. As of writing, the municipality of Hof van Twente contracted an external project developer to realize a solar PV farm (of 37,000 solar PV panels), without involvement of ECHT.

What appears to be missing is inter-municipal collaboration in supporting LLCEIs (despite the fact that there is a 'local climate officers' pool' in the Twente region [166] (Twente covers a large part of Overijssel in geographical and administrative terms). Therefore, it is not surprising that support by municipalities tends be situational if not fragmented. Municipalities appear to lack alignment in vision and in coordination of activities towards supporting LLCEIs [166].

In Overijssel, LLCEIs are more active in rural areas than in urban conglomerations. Notwithstanding potential administrative support by municipalities, LLCEIs are keen to explore ways to continue their project activities and engage with other (semi- and non-governmental) actors. An example is the LLCEI of 'Energiek Vasse', which tried (but rather struggled) to engage with both

the provincial government and municipality, but managed to install a solar park on top of the local community center building. The latter was funded by the local citizenry association.

The cities in which LLCEIs are active, and to some degree supported by municipalities, are known to have long histories in actively supporting bottom-up initiatives (e.g., the Deventer municipality in supporting citizens' waste management/litter reduction projects). In cities in which such a history, culture and mechanism is missing, citizens were found less favorable about the role of municipalities (e.g., Hengelo and Enschede) [166]. Furthermore, the city of Zwolle, capital of Overijssel (but is also a municipality), intensively collaborated with an LLCEI to develop a business model to retrofit a district in the city. The LLCEI received € 100,000 to develop and start up the initiative named Wijbedrijf Dieze. The municipality of Zwolle granted a subsidy of € 500,000 to the "district firm" Dieze. This neighborhood firm is owned and operated by Dieze residents and professionals, and renovates houses in the district of Dieze with the goal of providing 500 households with solar PV panels.

4.3. The Case of Fryslân

4.3.1. The Provincial Government

In 2009, the province of Fryslân issued an agenda-setting vision document that focused on processes of sustainable development. The province holds that the traditional Frisian desire for self-sufficiency and small-scale solutions are qualities to further embark on as one of the ways to arrive at sustainable innovations [170]. In doing so, the province seeks to support developments emerging from society. However, in the actual 2009-policy program for low-carbon energy, these approaches were not explicitly mentioned [171]. The focus was rather on large-scale projects and firms as partners.

This being the case, the first observable instance of political attention to LLCEIs materialized in a resolution of the Provincial Council in 2011. The Council asked the Provincial executive to clarify what kind of bottom-up projects pursuing the local generation of low-carbon energy where active in Fryslân, and what the role of the province could be vis-à-vis these initiatives. In outlining the role of the province, the executive stated that whereas LLCEIs would not contribute significantly in a quantitative sense to the provincial goals, they are 'very important for the awareness of and public support for low-carbon energy and energy saving' [172]. The province defined its role by emphasizing its support for "Network Sustainable Villages" (a knowledge platform that engages with sustainability themes for villages initiated by a semi-governmental agency 'Doarpswurk') and the Frisian Environmental Agency (FMF) that both had specific programs on local initiatives. Furthermore, the province commenced negotiations with the initiators of a provincial energy cooperative.

A year later, another resolution of the Council stressed that LLCEIs require upfront financial support in the short term [173]. The resolution was a response to the emergence of LLCEIs in the province and the threat of this movement stalling because of difficulties for the initiatives to get their projects financed. The resolution was adopted, providing a € 1 million budget (flowing from the Free Applicable Budget Reserve) that was earmarked for supporting LLCEIs in the shape of upfront investment capital. However, after the province determined that local initiatives struggle to make the step from initial idea to a feasible project, the upfront investment capital and the to-be erected provincial energy fund with € 90 million worth of investment capital ("Fûns Skjinne Fryske Enerzjy" (FSFE; Fund Clean Frisian Energy; authors' translation), were deemed inappropriate instruments to address the problem at hand. The FSFE is a revolving fund that invests in innovative low-carbon energy projects. LLCEIs are typically not eligible for this fund since they do not meet the requirements (e.g., having a feasible business-case). Consequently, the province did not opt for direct financial support, but for an approach that would build the capacity and strengthen the organizational competences of the initiatives. In other words: "an approach with a broad spin off", to effectuate an acceleration in Fryslân (. . .) since the initiatives can contribute to the targets for low-carbon energy, and strengthen the local economy by developing self-reliance in the process [151] (p. 2).

The 2014–2020 provincial implementation program on low-carbon energy devoted a separate section to LLCEIs. This marked the first time LLCEIs were explicitly mentioned in a provincial policy program. The term 'facilitation', which is mentioned in the document in relation to concrete activities and projects, materializes in the so-called Energy Workshop, the establishment of a provincial cooperative "Ús Koöperaasje", the Open Community Fund, and ad hoc support provided by the province based on incidental requests. We will discuss each of these aspects below.

As mentioned above, the province's approach crystallized in different instruments and institutions. The responsibility for the majority of the support for LLCEIs was placed outside of the provincial government's direct realm and was taken up by a newly established actor and two semi-governmental agencies, which will be discussed below. The provincial cooperative, Ús Koöperaasje ('our cooperative', authors' translation) was formally established in 2014 with financial (i.e., loan) and political backing of the Frisian province and municipality of Leeuwarden (for instance, the initiators of Ús Koöperaasje were invited to have their meetings in Leeuwarden City Hall). Ús Koöperaasje provided various supportive instruments and expertise that assisted LLCEIs, such as standardized statutes, promotional materials, and financial-technical advised on local low-carbon energy installations and business-models. This 'umbrella cooperative' would be the first step in enabling the energy transition on a Frisian level. Individual LLCEIs can become a member of this regional cooperative to enable them to resell locally generated low-carbon energy to their customers and members. The possibility to actually resell locally generated low-carbon energy was enabled by the partial ownership of the provincial cooperative of a trans-provincial energy supplier "Noordelijk Lokaal Duurzaam" (North Local Sustainable, authors' translation, NLD). NLD was established with financial and political help of Fryslân and the two other Dutch northern provinces: Groningen and Drenthe (which both have provincial cooperatives, and which are partial owners of NLD as well). The Province of Fryslân issued a loan of € 150,000 to NLD (Drenthe issued a loan of € 150,000 as well, Groningen gave a subsidy of € 100,000). NLD, a profit-for-purpose firm, is the second step in enabling a Frisian energy transition since it allows for the supply of regionally generated low-carbon energy. Furthermore, this process is strengthened by the principle that for each household that becomes a client of NLD through the LLCEI in its village or neighborhood, NLD gives that LLCEI around € 75 for each client, every year. LLCEIs can decide how to reinvest that money in their localities. The umbrella cooperative Ús Koöperaasje provided both a decentralized low-carbon energy infrastructure (in conjunction with NLD) and an infrastructure that allows for a single identity for the LLCEIs (by means of membership). The cooperative explicitly stated that it refrains from any political activities.

The second dimension of the province's response to LLCEIs was to financially support the so-called "Energy Workshop". Originally a work-package of Network Sustainable Villages, the Energy workshop received such attention that Doarpswurk (a foundation that maintains and enhances the livability on the Frisian countryside by processes of social innovation, initiator of the Network Sustainable Villages) sought collaboration with the Frisian Environmental Agency to meet the demand for support of LLCEIs. The actual collaboration between the two semi-governmental institutions started in 2014 with, as basis, a formal subsidy relationship with the province. De facto, Ús Koöperaasje and the Energy Workshop collaborated from 2014 on, but this collaboration will be formalized in the upcoming subsidy program (submitted by Energy Workshop and the provincial cooperative), which proposes a new program for the Energy Workshop for the coming years.

The Energy Workshop follows the various developmental stages of LLCEIs, and ultimately functions as some sort of 'incubator', according to one of the advisors involved in the Energy Workshop. The two semi-governmental institutions combine their knowledge and expertise to give LLCEIs social-organizational support. Doarpswurk was experienced with social processes, and FMF had considerable expertise with communication and marketing. This was complemented by Ús Koöperaasje's knowledge and expertise on low-carbon energy and the institutional infrastructure that has been developed.

The Energy Workshop settled pressing problems of LLCEIs and does so with a hands-on approach. Issues and problems were often addressed by means of organizing workshops, communities of practice, or inspiration sessions. The Energy Workshop dealt with substantive and organizational issues, performed feasibility studies, spurred collaboration with other stakeholders, assisted with drafting of project- and business plans, searched for financial sources, supported in social and organizational processes, and provided guidance in making sense of the array of policies, information and experiences that were present. By staying close to LLCEIs, the Energy Workshop allowed for a high responsiveness and was able to offer tailored support. However, whereas the Energy Workshop was responsive in attempting to solve issues for LLCEIs, it had to cope with provincial policies and regulations as well. Spatial development regulation was, for instance, a factor impeding on the development of LLCEIs, or political preferences with concern to the type of low-carbon energy.

Although the 2014–2015 Energy Workshop focused on broad support and helping out as many LLCEIs as possible, the next Energy Workshop policy (2016 and onwards) directed attention to frontrunners and pioneers in order to truly be impactful. The reason for this change of focus is because after the end of the first subsidy-program, little tangible impact can be measured in terms of low-carbon energy generated on a local scale or in terms of the energy installations constructed.

Besides all of the above mentioned, in 2014, the province of Fryslân has provided a subsidy scheme that involved a € 2500 start-up capital enough for 40 LLCEIs. This start-up fund could be used for notary costs for setting up a cooperative, website costs, costs for printing flyers, and so on. Half of the subsidy's budget was allocated to twenty LLCEIs that had applied for the subsidy. The residual € 25,000 was transferred to a fund created to support bottom-up civil-society initiatives not limited to LLCEIs; the "Iepen Mienskips Fûns" (IMF) (Open Community Fund; authors translation). The IMF was started in 2015 and boasts a total budget of € 2.5 million. Various provincial departments pitched in to provide budget for this subsidy scheme. Theoretically, the annual budget of this fund could be used for the sole support of LLCEIs, whereas the funds themselves flow from different provincial departments. The start-up subsidies do not require strict reporting as to how the subsidy was spent. Similarly, pictures or video footage of projects that utilized subsidies from the IMF-fund suffice as reporting requirement. In turn, these pictures and videos are posted on the province's website.

An example that showcases the province's willingness to incidentally alleviate administrative barriers materialized in the "Energie Coöperatie Westeinde" (ECW). The ECW wanted to construct solar farm of 3.6 acres on a strip of land owned by the provincial government. While the ECW was still searching for a party to invest in their project and waiting for the next SDE+ subsidy round, the province assured that the strip of land remained available and negated (jointly with the municipality of Leeuwarden) € 100,000 of fees that were due when a building was constructed on that property (via the so-called 'Crisis and Recovery procedure', see explanation below). Furthermore, provincial government commenced the permit application procedure, whereas this was normally the (financial) responsibility for the applicant, which thereby safeguards the solar farm's admission in legal terms. Although this presents an example of 'hands-on' support by the province, the level of provincial involvement is mainly restricted to a strategic level and deals with issues related to spatial planning and quality. Furthermore, the province's support for this specific LLCEI ought to be viewed in its very context. The position of the solar farm is in an area that the province designated as a low-carbon energy infrastructural project-zone. The solar farm nicely fitted into this area development plan.

Another instance of ad hoc support was a focus group meeting organized by provincial government. The latter invited five local initiatives (not limited to energy initiatives) in order to understand what it actually means to be a sustainable village, since the province aimed for having 100 of them in 2020. The outcome of the meeting was for the initiators to have one-to-one conversations with civil servants and provincial executives to discuss the specific barriers that need to be alleviated. Whereas a provincial executive proposed to organize an event at which different bottom-up initiatives could inspire one another, the initiatives present at the meeting stressed that the support they needed was in the shape of alleviating bottlenecks.

Additionally, the province, in collaboration with a municipality, organized a meeting to discuss the potential for adapting budgetary practices to activities of LLCEIs.

Still, whereas a great deal of support is given to LLCEIs, when it comes to wind energy development, the Province is solely willing to meet its national obligations. In effect, this means that the Province participates in the development of a large-scale wind farm, in which it does integrate a clause for a required share of civic participation in the project.

4.3.2. Municipalities

Whereas support for LLCEIs on the provincial level is placed at arm's length in a relative planned and thought-out fashion, support policies by municipalities to a certain degree incline towards impromptu practices.

The role municipalities have in supporting LLCEIs varies in each project. However, choosing what role to assume is often not done consciously by municipalities [174]. An example of how different roles materialize can be found in the Leeuwarden district "Achter de Hoven". The municipality of Leeuwarden has financially supported this district to establish an energy cooperative and health care cooperative. However, difficulties arose since the district representatives made a call for structural financial support to maintain their activities. As a consequence, the municipality contemplated whether they could not simply give out their subsidy instruments in different ways. Furthermore, contradicting policies, the importance of a single enthusiastic civil servant for the feasibility of a project, and a lack of creative thinking on the part of the municipality impeded the interactions between the municipality and LLCEIs [175].

Related to indistinctness in what roles municipalities play is the opaqueness involved in the criteria used by municipalities to decide whether to support an initiative. Various interviewees (predominantly civil servants) noted that gut feeling plays a significant role in these processes. A key aspect, though, is trust, and indirectly the authenticity of the initiators. Interviewees mentioned that the experience of the civil servant in question plays an important role in this process. These experiences and procedural knowhow were, however, not shared between civil servants. It needs to be stressed that interviewees mentioned that initiators that come to them are often familiar persons (i.e., the 'usual suspects' or former colleagues). Additionally, the initiators of LLCEIs predominantly interacted with municipalities, and various interviewees ventilated their worries regarding project continuation in case initiators would pull back from the initiative. Furthermore, although 'public support' was widely noted as one of the crucial prerequisites for public officials to support a LLCEI, it was not clear how the degree of public support was measured as this was not explicit mentioned. However, one important criterion for the decision to support an initiative noted by the interviewees was the requirement of the initiative to align with the agenda and adjacent policy action plan of the municipality.

In pursuit of supporting LLCEIs, the municipality of Leeuwarden acknowledged to not to avoid risks. That being said, another district in Leeuwarden ("Camminghaburen") was granted € 17,500 to realize its ambitions in energy savings and generation, but it failed to follow through. A more successful case involved a handful of initiators from another Leeuwarden district ("Westeinde"), who organized themselves in a cooperative (ECW). This group of volunteers was making significant progress towards realizing a solar farm of 3.6 acres (12,000 solar PV panels) on a strip of land that previously functioned as a provincial highway. Here, the municipality of Leeuwarden granted € 15,000 to the LLCEI to develop a roadmap for the district to become energy neutral. The primary mechanism used by the Leeuwarden sustainability department was to give out start-up funds to incentivize LLCEIs. The municipality of Littenseradiel gave out a € 2000 start-up subsidy to four LLCEIs (EnergieKûbaard (EK), Griene Enerzjy Koöperaasje Easterein (GEKE), Enerzjy Koöperaasje Easterwierrum (EKE), and Wommelser Enerzjy Koöperaasje (WEK)). The Municipality of Tytsjerksteradiel provided start-up subsidies for the LLCEIs active in its jurisdiction; Enerzjy Koöperaasje Garyp (EKGaryp) and Trynergie. Furthermore, the municipality shows its commitment to the LLCEIs by attending sessions for brainstorming and being present at events organized by the LLCEIs.

Furthermore, various municipalities have adapted spatial regulations and legislation. The Municipality of Tytsjerksteradiel lowered the construction fees for land-based solar PV panels to assist the LLCEI EKGaryp to construct a solar farm on a former waste dump site. Originally, these costs would amount to € 150,000, but the municipality lowered the construction fee to € 200. Furthermore, the municipality exempted the solar farm from property taxes. The Municipality of Opsterland also lowered its construction fees to spur the development of land-based solar PV panels. Additionally, the Municipal Council of Heerenveen agreed to exempt solar farms from the procedure in which the council has to file a so-called 'declaration of no objection' when projects that are in conflict with existing zoning plans come before the council to apply for an adaptation of the zoning plan. Moreover, Heerenveen also developed a spatial planning strategy that indicates areas for land-based solar PV project development and specifically introduced this framework to the LLCEIs active in the municipality.

In Fryslân, three municipalities (Oostellingwerf, Westellingwerf, and Leeuwarden) explored the option of utilizing the national "Crisis and Recovery Law" (CRL), which was a law exercised by central government that enabled governments to bypass regulations if this they deemed this desirable in light of an overarching societal need to short-track the construction of solar farms. Via the CRL route, the municipalities could exempt strips of land from the common spatial planning and quality requirements to enable the construction of future solar farms or other low-carbon projects. Leeuwarden—being the first in the Netherlands in doing this—is in the process of ratifying a spatial development plan that defines the available areas for land-based solar PV panels installations. This exempts the initiating party from having to apply for building permits or having to pay for construction fees.

Furthermore, there are instances in which municipalities and LLCEIs collaborate. In this sense, the Municipality of Ameland financially participates in a solar farm of 23,000 solar PV panels, together with the municipality's LLCEI the 'Amelander Energie Coöperatie', and energy supplier Eneco (each of the three actors owns 33.3% of the LLC that was established for the operation of the solar PV farm). Additionally, the Municipality of Ameland ended the lease contracts with the previous tenants of the parcels of land on which the solar farm was to be constructed to enable the realization of the project.

The municipality of Opsterland indirectly supported the activities of the "Wijnjewoude Energie Neutraal" (WEN) cooperative by issuing subsidies for individual households to implement energy efficiency measures and solar panels. This subsidy was made available for the villages of Wijnjewoude and Terwispel. Whereas Wijnjewoude—with its LLCEI—entirely consumed up the total budget amount of awarded by the subsidy, Terwispel—with no LLCEI of its own—did not. A civil servant mentioned that because of the LLCEI, they did not have to put much effort in informing the local public about the subsidy because WEN took this task over. In implementing the subsidy, the municipality decided to collaborate with WEN in order to refrain from impeding the bottom-up transition process that is manifest in the village. The municipality viewed initiatives such as WEN as a window of opportunity to determine what the public actually wants with regard to local low-carbon energy production, instead of the municipality traditionally studying the possibilities for energy generation and taking this to the citizens to see how they feel about this.

The Municipality of Súdwest-Fryslân actively searched for a set of criteria or new 'rules of the game' (such as participation and public support) for enabling local low-carbon energy production instead of archaic spatial planning legislation. Furthermore, they are exploring the possibilities for LLCEIs to have a role in the policymaking process.

The Frisian municipalities recognize the potential of this bottom-up movement in light of the limited capacity for municipalities to govern climate mitigation on a local scale. A civil servant from the Municipality of Heerenveen mentioned that whereas they are looking for opportunities to join up with LLCEIs, they want to refrain from an extent of intervention that may dislodge the bottom-up process. In doing so, the municipality wonders what the merits of engaging with LLCEIs are.

4.4. Results of the Comparative Analysis

In this section, the results of the comparative analysis are presented using concepts presented in Section 2. An overview of the key results is presented in Table 1 (institutional adaptation) and Table 2 (policy innovation).

Table 1. Results of the Overijssel and Fryslân cases on theoretical criteria for analyzing subnational government responses in relation to institutional adaptations.

Modes of Governing	Institutional Adaptation Criterion	Overijssel	Fryslân
Governing by authority ↑	Ad hoc, incremental, episodic responses, deciding rules of the game	*Local* - LLCEIs made responsible for energy front office - Criteria for LLCEI support context dependent - Civic participation requirement in low-carbon energy installation	*Provincial* - Assisting in permit application procedure - Civic participation requirement in low-carbon energy installation *Local* - Criteria for LLCEI support context dependent
	Bricolage, conversion, patching up/layering	*Provincial* - Alleviating administrative barriers	*Provincial* - The Energy Workshop - Open Community Fund - Alleviating administrative barriers
	Governing at arm's length	*Provincial* - Sustainable Village scheme - Involvement of LLCEIs in policy process - Initiative Brokers scheme *Local* - Co-provision energy front office, cooperative, district company	*Provincial* - The Energy Workshop *Local* - Involvement of LLCEIs in policy process - Co-provision low-carbon energy installation
Governing through enabling ↓			

Table 2. Results of the Overijssel and Fryslân cases on theoretical criteria for analyzing subnational government responses in relation to policy innovations.

Modes of Governing	Policy Innovation Criterion	Overijssel	Fryslân
Governing by authority ↑	LLCEIs as policy goal, planning/land-use requirements, strategic use of land ownership, performance criteria, innovative use of conventional instruments	*Provincial* - LLCEIs as policy issue *Local* - Council decision LLCEI as pilot - Civic participation requirement in low-carbon energy installation - adapting conditions of construction fees	*Provincial* - LLCEIs as policy line - Civic participation requirement in low-carbon energy installation *Local* - adapting conditions of construction fees and adapting spatial planning program - Ending lease contract
	Conditional support, conditional funding	*Provincial* - Investment Fund - Energy Pitch - Phased subsidy instrument - Energy Landscapes scheme *Local* - Criteria for public support	*Provincial* - Fund Clean Frisian Energy *Local* - Criteria for public support
	Capacity building instruments (e.g., subsidies, information)	*Provincial* - Sustainable Village scheme - Initiative Brokers scheme - New Energy Overijssel Platform *Local* - Start-up subsidies	*Provincial* - Open Community Fund - The Energy Workshop - Ús Koöperaasje, North Local Sustainable *Local* - Start-up subsidies
Governing through enabling ↓			

4.4.1. Institutional Adaptation

In both cases and on both administrative levels, we confirmed our hypothesis that institutional adaptation resembling an enabling mode of governing transpires through governing at arm's length and various forms of co-provision of energy policies and services. On the provincial level, the majority of the support for LLCEIs was placed at government arm's length in both provinces. This entails that the policy implementation activities regarding the support of LLCEIs were delegated to external, semi-independent, non-public organization (i.e., Doarpswurk, Frisian Environmental Agency, Ús Koöperaasje, Stimuland), platform (the Energy Workshop, Network Sustainable Villages), group of experts (initiative-brokers), or jury (Sustainable Village scheme, Energy Pitch Overijssel). Furthermore, the establishing of Ús Koöperaasje and North Local Sustainable in the Frisian case are examples of how LLCEIs, with help of the province and municipality of Leeuwarden, provide an energy (service) infrastructure for distributed generation through LLCEIs.

However, existing institutional settings influence the way governing at arm's length takes place on the ground. This becomes apparent in the case of the Energy Workshop. Whereas the platform allows for a great deal of expert and specialized support, the actual creation of the partnership between the two semi-governmental organizations and the province is characterized by hierarchy, formal procedures and decision-making processes [176]. As a result, there is solely a traditional subsidy relationship between the province and the two organizations. As such, organizational interests, budgetary constraints and the hierarchical nature of this relationship put pressure on the ability to collaborate on an equal footing. Hence, while the Energy Workshop allows for a great deal of responsiveness, as soon as issues touch upon the limits of the existing policy framework or regulations, or challenge existing institutional arrangements, the enabling role of the government comes into a gridlock. This becomes apparent, for example, in the case of wind energy development. In both provinces, wind energy is a very politically sensitive subject. Both provinces avoid construction and siting of solitaire wind turbines and prefer large-scale wind parks. LLCEIs therefore have little opportunity to produce wind energy, unless it is in the shape of participation in externally developed projects such as in the case of Deventer or the province of Fryslân—referring to episodic institutional adaptations. Even then, as the case of Hof van Twente shows, the council has significant influence in enabling or hindering such projects of co-provision.

On the municipal level, governing at arm's length is observed as well, specifically in the shape of co-provision. However, the embedded cases show that co-provision commonly ensues in an ad hoc fashion. For instance, the Wijnjewoude LLCEI effectuated a significant proliferation of subsidy requests and de facto co-implemented the subsidy scheme by jointly (with the municipality Opsterland) informing the local public about the subsidy. Additionally, four embedded cases in Overijssel—the Deventer Energie Coöperatie, Energie Coöperatie Hof van Twente, Stichting Duurzame Energie Wierden-Enter and Stichting WijBedrijf Dieze–, and one in Fryslân—Amelander Energie Coöperatie show that municipalities transferred considerable resources and competences to LLCEIs either in the shape of a partnership or the delegation of the management of the energy front desk. However, although each municipality in Overijssel has an energy front office desk, Deventer, Wierden and Hof van Twente are the only municipalities that (partially) transferred the responsibility for these energy services to LLCEIs. Additionally, whereas the Municipality of Ameland became a partner in the solar farm project, the municipalities of Hof van Twente, Raalte and Leeuwarden did not. Furthermore, Fryslân declined the idea to transfer the responsibility of the provincial energy front office to Ús Koöperaasje. Various local government interviewees mentioned that LLCEIs function as windows of opportunity to promote public support for the local production of low-carbon energy and assist in achieving low-carbon energy policy goals.

The hypothesis that institutional adaptation resembling a combination of enabling and authoritative modes of governing ensues by means of bricolage and patching up is confirmed in both cases. Acts of 'patching up' such as the adaptation of spatial planning in Leeuwarden effectively change the 'rules of the game' and have a strategic and permanent character. While the adapted spatial

planning facilitates land-based solar PV production, it does so with a number of traditional spatial quality criteria. Additionally, the municipalities of Tytsjerksteradiel, Heerenveen, Wierden and Hof van Twente also strategically adapted the construction fees for land-based solar PV panel projects. However, the municipalities did so in varying degrees, skewing either more to an enabling mode of governing (i.e., Tytsjerksterdiel), or leaning more to an authoritative mode of governing (i.e., Hof van Twente, Wierden, Heerenveen).

Furthermore, the Energy Workshop can be considered a product of institutional bricolage. The expertise on social-organizational processes of Doarpswurk was combined with FMF's knowledge on communication and marketing to support Frisian LLCEIs. In other words, existing institutional resources where combined to serve a new purpose. These practices confirm the interplay of enabling and authoritative modes of governing in innovative responses of subnational governments and their influence on the form of institutional adaptation that occurs.

Both cases show various ad hoc initiatives of institutional adaptation, indicating an authoritative mode of governing. For example, the Province of Fryslân and municipalities of Leeuwarden and Deventer pitched in with the specific LLCEIs in question to assist in settling the permit procedures for constructing their respective low-carbon energy installations. Another example is the Raalte municipal council that dubbed the LLCEI's solar farm as a pilot. Furthermore, the current subsidy scheme of the Province of Overijssel does not resemble a large size of discretion in terms of subsidy allocation and spending that characterized the Sustainable Village pilot scheme. These instances point to the uncertainty regarding the possibility for such pilots or ad hoc practices to become embedded in existing institutional arrangements.

Furthermore, various local government interviewees in both cases mentioned on the one hand their worries regarding the risks of relying on a small number of volunteers, and on the other hand referred to different definitions of 'public support' or used different criteria (e.g., gut-feeling, trust) upon deciding to support an LLCEI. This shows the case-by-case basis on which municipalities formulate their response to LLCEIs, as well as the significant influence of the civil servant at hand.

4.4.2. Policy Innovation

Both cases show various instances of policy innovations featuring an authoritative mode of governing. Both provincial governments integrated LLCEIs in their low-carbon energy policy programs and policy lines. However, differences can be found with regard to how both regional governments substantiate their support for LLCEIs.

In addition, various municipalities in both cases adapted their spatial planning policies and construction fees (either ad hoc or strategically) to better enable the development of land-based solar installations. The ad hoc adaptations applied to specific LLCEIs, whereas the strategic adaptations did not differentiate between land-based solar installations initiated by LLCEIs or other actors. A number of municipalities in Overijssel made innovative use of the provincial policy for establishing local energy offices (in itself a rather conventional policy instrument to provide information concerning energy production and efficiency) by transferring the responsibilities for these energy offices to LLCEIs.

The results further show instances of conditional support and funding for LLCEIs, signifying the hypothesis that the interplay of authoritative and enabling modes of governing notably shape the policy innovations that occur. Both provinces implemented an investment fund to support innovative low-carbon energy projects. However, the strict requirements of these funds prevent most LLCEIs from a successful application. Furthermore, the Overijssel Energy Landscape scheme, formally a subsidy instrument, is allocated in the shape of a workshop for spatial integration. However, unlike the previous instruments, the scheme does come with a list of requirements as to what projects are eligible for the subsidy and with a predefined format (i.e., a workshop). Typically, initiatives are not at the stage in which they can make use of the subsidy. Moreover, the Overijssel subsidy that provides funds for three different phases comes with strict performance criteria as well. In addition, various provincial instruments in both cases—such as the Energy Pitch, the Sustainable Village scheme

and the Open Community Fund require initiators to demonstrate public support for their projects. However, the exact content of such public support is unspecified. Similarly, various local government interviewees in both cases mentioned that upon deciding to support an LLCEI, public support was considered a critical condition (next to trust and gut-feeling).

In both cases, various instances of capacity building were observed. This confirms the hypothesis that policy innovations vis-à-vis LLCEIs under an enabling mode of governing take shape as capacity building measures. Specifically, we observed the use of subsidies in both cases. Both provincial governments gave significant a priori (financial) support to LLCEIs. While subsidies as such are not innovative policy instruments, the way the subsidies are allocated and evaluated are indicative of policy inventions. For instance, the Open Community Funds' budget is pooled from various provincial administrative departments; the citizens involved decide how the subsidy is spent by applying for their own project and there are no strict evaluation criteria as to how the subsidy is spent. Similarly, the Sustainable Village scheme allowed notable discretion as to how the subsidy was spent as well, whether this involved hiring professionals or financing low-carbon energy measures. In Overijssel, the Sustainable Village scheme incentivized bottom-up action on climate mitigation and directly built capacity for the involved villages and indirectly for the LLCEIs that would follow.

In addition, the province of Fryslân granted significant financial support (in the shape of a loan) to both Ús Koöperaasje and North Local Sustainable, establishing new autonomous actors and effectively building capacity for the Frisian LLCEIs.

Other instances of capacity building took shape as assistance with organizational development and project management. In this sense, the Initiative-Brokers scheme and the Energy Pitch instrument were set in place in order to help LLCEIs with relevant expertise and contacts to accelerate project development. Furthermore, both provincial governments have implemented instruments to support LLCEIS in a process-oriented way by following the different developmental phases LLCEIs go through. Yet, each of the two provincial governments assumes a different point of departure. The Energy Workshop provides social-organizational support that is appropriate for each phase, either tailor-made and on an individual basis, or via communities of practice. The Energy Workshop is therefore reminiscent of an 'incubator' approach (a term that originates from Business Administration), which entails that LLCEIs are supported in various ways to help them to become a fruitful initiative. The province of Overijssel also implemented the three-phased subsidy scheme that follows the various developmental stages LLCEIs go through, but does so by means of financial support that comes with strict criteria and progress requirements which shows the interplay of enabling and authoritative modes of governing.

On the municipal level of administration, instances of capacity building occur in the shape of governments financing feasibility studies and roadmaps (Deventer, Leeuwarden), allocating start-up capital for specific LLCEIs (Deventer, Leeuwarden, Zwolle, Littenseradiel), or facilitating LLCEIs in other ways, for instance as an intermediary party attracting funds from higher tiers of government to enable the start-up and projects of LLCEIs (Hof van Twente).

Various municipalities in both provinces gave out start-up subsidies for LLCEIs, ranging from relatively small start-up subsidies (€ 15,000 and € 17,500 in Leeuwarden, € 2000 in Littenseradiel) to significant lump sums of money (€ 100,000 in both Deventer and Zwolle; € 500,000 in Zwolle).

Still, thus far, only a handful of LLCEIs actually set off to construct low-carbon energy installations of their own. For this reason, the policy outcome is rather intangible and should be seen in light of what is achieved in terms of social processes (and thus policy throughput or output). An interviewee in the Fryslân case mentioned that the province does not monitor the share of energy generated by LLCEIs yet, and stated that the share of low-carbon energy produced by LLCEIs will probably be, at this point, negligible. Furthermore, a Leeuwarden interviewee mentioned that the government was increasingly seeking to replace exact and measurable policy evaluations with policy evaluations based on narratives. The provincial Open Community Fund already uses narrative monitoring to evaluate

subsidy spending. Abandoning tangible outcome indicators in favor of narrative-based evaluation embraces the policy 'silo' transcending nature of LLCEIs.

5. Discussion

5.1. Innovations in Governing

The results of our analysis confirm our hypotheses and suggest that the types of innovations in governing that occurred in response to the emergence of LLCEIs can be derived from the balancing process of enabling and authoritative modes of governing. This suggests the relevance of analyzing 'government by experiment' or 'climate change experiments' e.g., [29] through a lens of meta-governance. The variety of policy innovations and institutional adaptations signal the interplay and co-existence of the different modes of governing. Furthermore, the application of a government-centered perspective proved to be useful for illuminating the role of subnational governments in the evolvement of LLCEIs. In this sense, our case studies suggest theoretical frameworks on strategic niche management ought to be more sensitive towards government influence on grassroots innovations in relation to low-carbon energy transitions e.g., [177,178]. In particular, subnational governments seem to have a prominent role in using 'governing by experiment' for a "Thousand flowers blooming" approach in which citizen-based grassroots innovations are central [71,179]. Our results are in line with this view, showing a considerable degree of innovative attention that subnational governments give to LLCEIs. However, this supportive attitude by a small selection of Dutch subnational governments is probably not representative, and results from other studies also revealed unproductive interactions between LLCEIs and local governments e.g., [180–182].

Furthermore, differences between responses of local and regional governments exist, which reveals the importance of agency, contextual conditions and capacities for distributed generation [72,79]. The case studies further show that more than once have policy or institutional entrepreneurs in subnational governments made a significant difference in governing for low-carbon energy transitions by demonstrating leadership and innovative action [14,153,166,183,184]. That being said, additional research on subnational policy innovation dynamics regarding climate change action is needed—next to nation-state level policy innovation [27].

The results of the two case studies further indicate that local governments employ authoritative forms of governing to formulate innovative responses to the emergence of LLCEIs. These innovations were primarily directed at changing existing spatial planning regulations, although varying in terms of their scope (episodic versus more strategic and permanent patching-up). This implies that conventional modes of governing can be employed in innovative ways cf. [109], and stresses the importance of combining enabling modes of governing with authoritative ones cf. [7]. This reiterates the key role of local governments in low-carbon action in general, and for the support of LLCEIs in particular (e.g., [14]).

Moreover, the results reveal that both local and regional governments transferred responsibilities directly to LLCEIs—or indirectly to intermediaries—for public energy service delivery, effectuating co-provision.

Various scholars have recognized and found evidence on the important role of intermediary organizations in building robust LLCEI niches [86,140–144]. In our case studies, both of the provincial governments created intermediaries to provide support for LLCEIs. However, they did so in different ways. The Province of Fryslân gave political and financial support to establish three of such intermediaries, greatly assisting in developing the infrastructural and institutional fabric of distributed generation by LLCEIs in Fryslân. Whereas the Province of Fryslân's approach can be considered programmatic and strategic, the approach of the Province of Overijssel was considered rather fragmented and reactive. The difference lies in the Initiative-Brokers scheme functioning in practice as a front office for LLCEIs, whereas the Energy Workshop supports LLCEIs with a well-conceived program. Furthermore, the Energy Workshop consists of two semi-governmental

organizations, whereas the Initiative-Brokers scheme involves a group of experienced LLCEI-initiators. In effect, the Energy Workshop functions as an intermediary at arm's length of government, whereas the Initiative-Brokers scheme takes shape as an intermediary through co-provision.

5.2. Innovating within the Confines of Existing Structures

Although the innovations in governing that occurred in the cases can be interpreted by the balancing of enabling and authoritative modes of governing, the existing institutional legacy and path dependencies also shape the innovations that emerge vis-à-vis LLCEIs.

In this regard, the results reveal that LLCEIs exemplify shifting terrains of relationships between state and citizen, articulate more participatory forms of democracy while questioning the existing representative structures, and challenge existing sources of political legitimacy and processes of policymaking (see [185–187]).

In terms of conventional sources and principles of political legitimacy and representative democracy, the presented case studies reveal that local governments predominantly interact with individual initiators and choose to support LLCEIs on the basis of trust, gut feeling, and public support. Whereas the representative democratic principle of 'public support' is considered a key criterion for the support of LLCEIs, its meaning was understood in various ways and appeared to rest on the interpretation of the civil servant at hand, which varied considerably between civil servants. In combination with other conferrers of legitimacy such as trust, legitimacy appeared to be dependent on specific situations see [187]. That being said, local governments that interact with LLCEIs, predominantly do so with the initiators, often 'usual suspects', community 'stars' or 'professional citizens' that are familiar with the administrative environment and political participation [38,117]. Tendencies to collaborate with these project champions and simultaneously advancing a focus on 'the' community and civil society in official policy documents (in both cases) "betrays a continued focus in government policy on the individual and a one-to-one dialogue between the state and the citizen, which downplays the importance of collective action" [188] (p. 194). Even more so, this points to the co-existing representative and participative structures of democracy; upholding traditional representative values, while predominantly engaging with active citizens. When reflecting on this the results from the analysis of the two case studies presented in this paper reveal that governments are still searching for ways to bridge the gap between state and citizen in general, and perhaps more importantly between the initiator and its locality in particular (this ensues without coordination among or cooperation between, in particular, municipalities).

In a similar vein, the emergence of governing at arm's length of government, incidental changes in the rules of the game, and various forms of conditional support in subnational governments' responses to LLCEIs can be considered solutions that avoid explicit struggles with existing institutional arrangements. While these responses allow for a certain degree of flexibility, they are detached from existing institutional settings, or only update existing ones, and therefore have little opportunity to transform the latter. That being said, Healey [189] (p. 304) claims that innovations in governance that succeed in institutionalization and have transformative effects need to transcend "from the level of conscious actor invention and mobilization to that of routinization as accepted practices, and beyond to broadly accepted cultural norms and values". In view of this, the innovations observed in the Fryslân and Overijssel cases have not (yet) trickled down to this level and power inequalities between officials and citizens have not yet been subjected to (public) debate.

6. Conclusions

This paper set out with the research question of in what ways local and regional governments in the Dutch regions of Overijssel and Fryslân innovate in governing to respond to the emergence of LLCEIs.

Overall, our study confirmed our hypotheses, revealing that a balancing process of authoritative and enabling modes of governing particularly characterize the type of policy innovations that are developed and the institutional adaptations that take place.

In line with what was expected on the basis of contemporary claims in the literature on LLCEIs and institutional change, a number of institutional adaptations were revealed, viz. 'patching-up', 'bricolage', (episodic) changes in the rules of the game and governing at arm's length. Furthermore, various policy innovations were observed involving capacity building measures, conditional funding and support, and innovative uses of conventional instruments and innovative changes in spatial planning and requirements. As mentioned earlier, several of these policy innovations effectuated changes in the institutional landscape. The results show that several local governments adapted spatial planning policies and construction fees (either pro-active for all projects, or reactive in response to a call made by an LLCEI), effectuating changes in the rules of the game. Additionally, the results reveal that the majority of the provincial support for LLCEIs is organized at arm's length of government. Regional governments enable LLCEI development by establishing and financially supporting intermediaries that in turn provide specific and expert support to LLCEIs. In Fryslân, this led to a regional institutional infrastructure that enabled co-provision through LLCEIs and opened up the possibility for distributed generation. In Overijssel, co-provision occurred in both the regional and local level, but more in terms of 'co-production' of provincial; policy instruments; i.e., transferring public service delivery implementation activities in favor of LLCEIs cf. [19].

However, exceptions were two instances in which an LLCEI established an energy service company (Zwolle) and the Frisian municipality of Ameland which is co-owner of the limited Liability company operating the solar PV farm.

Additionally, both the provincial and local governments of Fryslân and Overijssel implemented policy innovations in the shape of capacity building. Capacity building took shape in the form of (start-up) subsidies characterized by an absence of reporting and performance requirements. However, this flexibility could only occur under conditions with subsidy schemes with relatively low budgets available. When it comes to large lump-sum investments, this flexibility was typically not observed (i.e., the investment funds of both provinces). Furthermore, at arm's length, intermediaries and platforms provided LLCEIs with socio-organizational support, as well as knowledge and expertise. In both cases, a variety of criteria were used to support decision-making to support LLCEIs. However, these criteria were neither standardized nor shared between municipalities, nor between civil servants (the latter even between civil servants working in the same jurisdiction).

Although LLCEIs are perceived by governments as additions to their own strategies or vehicles that can help them to achieve their climate mitigation targets, LLCEIs still find themselves in an arena that is restricted by political preferences for spatial quality, ambiguous sources of legitimacy and restrictive legislation. This points to a two-sided interpretation of the balancing process of both modes of governing. On the one hand, governments, in innovative ways, employ authoritative and enabling modes of governing in their response to the emergence of LLCEIs. On the other hand, governments integrate authoritative and conventional elements in enabling mechanisms to ensure a degree of influence over the self-organizational processes of LLCEIs. The conditional support and financing as well as the ad hoc responses found in both cases are examples of this. In line with other authors, policy innovations and traditional policy instruments coexist in the responses of subnational governments to the emergence of LLCEIs e.g., [146,190].

In these meta-governing arrangements, traditional mechanisms can be used innovatively and innovative enabling practices may come with rather traditional elements. Frictions may arise in this dynamic field as innovative instances of governing challenge conventional modes of governing. Governments appear to be still searching for ways to account for public budget that is spent without immediate results (i.e., capacity building) against the backdrop of complex, intertwined, and 'policy silo' transcending societal problems. The combination of experimental and conventional elements is therefore a reasonable response that is indicative of a multiplicity of solution paths that can be advanced.

To some extent, this resembles with Transition Management studies, in which the combination of experimental and conventional elements is present as well [191,192].

Further research is needed with respect to the effectiveness of different policy instruments and practices that governments implement to support LLCEIs. This applies to the effects of subsidies, in particular since previous research suggested that this type of policy instrument may have ambiguous effects on LLCEIs [148]. Since ad hoc and episodic responses may leave behind 'seeds' as positive or negative feedback loops for future policy initiatives or interactions [89] (p. 2066), research is required to explore the effects of such practices on existing institutional and policy arrangements for LLCEIs. Furthermore, medium to large-N quantitative research is needed among subnational governments in order to determine the factors influencing the extent and shape of innovations in governing vis-à-vis the emergence of LLCEIs.

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Abbreviations

The following abbreviations are used in this manuscript:

LLCEIs	Local Low-Carbon Energy Initiatives
NLD	Noordelijk Lokaal Duurzaam
FSFE	Fûns Skjinne Fryske Enerzjy
ECW	Energie Coöperatie Westeinde
WEN	Wijnjewoude Energie Neutraal
ECHT	Energie Coöperatie Hof van Twente
EK	EnergieKûbaard
EKE	Enerzjy Koöperaasje Easterwierrum
GEKE	Griene Enerzjy Koöperaasje Easterein
WEK	Wommelser Enerzjy Koöperaasje
CRL	Crisis and Recovery Law

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