

## Article

# Success, Failure, and Impact of Local Energy Initiatives in The Netherlands

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**Abstract:** In the last decade, the number of local energy initiatives (LEIs) has increased in western European countries. Although several success factors and barriers in the development of LEIs have been studied by other scholars, there has been limited scholarly interest in the overall impact of LEIs so far. Therefore, the aim of this study was to explore their impact by determining their achievement. Additionally, levels of engagement were used to categorise the success factors for and barriers that impede this impact. Initiatives in two provinces in the north of the Netherlands were studied. For the data collection, 84 in-depth interviews were conducted with the initiators of LEIs. In general, it can be concluded that the impact of LEIs is limited. Success factors and barriers in the development of LEIs play out at different levels of engagement: the level of the initiative itself; the community level; and the public–private level. Theoretically, this study provides empirical insights on how to measure the impact of LEIs. Furthermore, the study brings together a variety of factors that influence this impact based on the levels of engagement. Practically, this research offers indications on how to contribute to the further development of LEIs.

**Keywords:** local energy initiatives; citizen participation; local impact; local energy transition; levels of engagement



**Citation:** Germes, L.A.M.H.; Wiekens, C.J.; Horlings, L.G. Success, Failure, and Impact of Local Energy Initiatives in The Netherlands. *Sustainability* **2021**, *13*, 12482. <https://doi.org/10.3390/su132212482>

Academic Editor:  
George Kyriakarakos

Received: 24 September 2021  
Accepted: 9 November 2021  
Published: 12 November 2021

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## 1. Introduction

To combat disruptive climate change, a fundamental shift to a low-carbon energy system is needed, which is referred to as energy transition [1]. The energy transition is defined by Markard et al. (2012) as the “... long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption” [2] (p. 956). Although climate agreements are made on international and national levels, the implementation of such agreements in the context of the energy system is most often carried out at a local or regional level. This means that citizens are affected, for example, by the implementation of renewable energy sources in the local environment. Furthermore, citizens are also asked to engage in energy transition themselves, for example, by taking measures to reduce their energy demand.

Instead of waiting for the local government to design and implement a plan, some organised groups of citizens have taken matters into their own hands by setting up local energy initiatives (LEIs). LEIs not only aim to reduce energy consumption but also to produce renewable energy on the local scale. In the last two decades, an increasing number of local energy initiatives have emerged in western European countries [3,4], for example, in the UK [5–8], Germany [9–11], and also in the Netherlands [4,12–14]. The importance of these new civic energy actors is clearly stated in the current legislation of the European Union. Increasingly, LEIs are made responsible for the implementation of renewable energy sources. Additionally, the increasing body of literature on local energy initiatives, providing

overviews [15] or zooming in on specific aspects such as grassroots innovation [16,17] or citizen participation [10] indicates that LEIs are gaining momentum. However, the potential impact of these LEIs remains unclear. Additionally, an integrative review on successful as well as unsuccessful initiatives, and factors that impede or facilitate success is missing. Previous studies have included only successful initiatives, or have examined only a few cases [14,18,19], while some studies focused only on a limited number of factors [7], or on either success or barriers [20,21].

Therefore, the first aim of this article is to empirically explore the potential impact of LEIs in the northern part of the Netherlands by researching a large sample of different initiatives. The second aim of this study is to contribute to the theoretical debate on citizen initiatives by providing a comprehensive overview of the success factors and barriers affecting their impact. The main research question of this study is: What are the potential impacts of LEIs, which factors contribute to the success of LEIs, and which barriers impede the development of LEIs? This research includes both successful initiatives and less successful initiatives and explores a variety of factors (i.e., both success factors and barriers) based on an in-depth analysis of 84 initiatives in two regions of the Netherlands, thus providing a more complete view on this phenomenon. Based on the results, suggestions are made to improve the impact of LEIs, and how governments can support this.

## 2. Theoretical Background and Previous Research on Local Energy Initiatives

In the academic literature, different terms are used for describing local initiatives, such as citizen initiatives [22], local energy initiatives [15,19,23], local community initiatives [12], community energy [5,7,10,24], and renewable energy communities [25]. Following on from Warbroek et al. (2019), the term local energy initiatives (LEIs) is used in this article, which is defined 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” [20] (p. 3).

### 2.1. Impact of LEI

It is expected that LEIs will have a certain impact in terms of their contribution to local energy transition (performance) as well as on the environment and local community. Walker et al. (2007) stated that LEIs have a small impact regarding their performance, making a quantitative contribution to achieving global and national targets through generating renewable energy and emphasising the urgency with which these targets have to be achieved. However, they also suggest that an LEI should not be evaluated based solely on the amount of renewable energy generated; instead, a more holistic view should be adopted for the evaluation [8]. The potential impact and expected benefits of LEIs have only been discussed in more general terms for society as a whole so far and the empirical evidence is limited [26]. In addition to generating renewable energy, based on empirical overview studies conducted in the UK, Germany, and the US, scholars suggest that local initiatives also have other positive impacts on the local community [21,26,27]. Inspired by these scholars, the aim of this study is to analyse more broadly the economic, environmental, and social impacts on the local community.

To understand the impact of LEIs, various factors need to be considered. Below, these factors are discussed in more detail, resulting in a visualized conceptual model, which will serve as a theoretical lens for the empirical analysis.

### 2.2. Motives and Objectives

In order to have an impact on the local energy transition, local community, and environment, LEIs implement renewable energy projects [5,20,28]. These projects can have different forms of impact, which are related to the various motives and objectives initiators have regarding starting an initiative [13,21,28–30]. Based on these individual and varied motives, LEIs formulate joint goals that they want to achieve. A distinction can be made between environmental, economic, and social motives and objectives [13]. Other

scholars have also referred to political and technical motivations [30], as well as political and infrastructural objectives [7].

In addition to the wish to reduce CO<sub>2</sub> emissions and generate renewable energy, LEIs often aim to save money on energy bills or generate income for the community, or desire to increase their level of local energy independence from large energy companies and become more autonomous by producing energy themselves; they also often want to increase the liveability of the community [7,15]. Seyfang et al. (2013) found that economic objectives were most dominant among these initiatives [7].

The different motives and objectives of LEIs determine the potential impact the LEIs can have on the local community. LEIs are sometimes unsuccessful in transforming their motives into community benefits [30]. Until now, the debate on the driving forces of LEIs has not been sufficiently connected to discussions about their impact by scholars nor by the initiatives themselves [28]. Therefore, to examine the potential impact of LEIs, it is also important to pay attention to the motives and objectives of citizens engaged in such initiatives, in order to analyse initiatives “from the inside-out” [29]. In other words, one must consider what kind of impact the LEIs themselves want to have on the local community and to what extent LEIs accomplish these objectives.

### 2.3. Success Factors and Barriers Based on the Levels of Engagement

When the impact of LEIs can be defined according to the contribution they make to the local energy transition or the extent to which they have met their own objectives, factors that positively influence the actual impact can be examined. Some factors that have an influence on the development of LEIs, such as their motives and joint goals, have already been identified. However, a broader view is needed, which takes into account the complexity of the implementation of projects and the relevance of contextual factors, such as local policies, technical issues, social factors (i.e., communication with and participation of local citizens) [23], and organisational factors of LEIs [14,20]. Furthermore, LEIs are active on different geographical scales and institutional levels of engagement, such as the local organisational level; the community level; and the public–private level of the municipality, province, and private companies. The levels of engagement were used to categorise the success factors and barriers.

On the first level of the initiative itself, the characteristics of the group of local citizens who voluntarily steer the LEI [7] and the roles of the members of the steering group in the growth and continuation of the LEI are key [20]. LEIs are often led by more than one person [3,7] and require determined, enthusiastic, and active steering group members who are willing to invest a great deal of energy and voluntary time into the LEI [6,31,32]. The multiple skills and competences of the group are important factors in the implementation of the projects [3,7,31,32].

On the second level, the engagement by citizens, other than the steering group, is an important success factor in realising the projects initiated by the LEI [3,7,30]. The acceptance and involvement of citizens is crucial for the transition to a low-carbon society [10]. Citizens can be involved in LEIs in different ways. They can participate in joint activities, such as installing solar panels or implementing energy-saving measures, or become a shareholder in a community-owned wind or solar park. A project can be considered successful when it fulfils the needs of the community [7,20].

On the third level, the existence and use of social networks by LEIs is seen as an important factor of success [3,7,32]. Through building and participating in networks, new collaborations can emerge and information and knowledge can be shared, thus contributing to joint learning. The social network of a LEI can include different actors, such as local governments, intermediaries, umbrella organisations, and other LEIs [6,13]. Local governments can influence the development of LEIs through their legislation and can enhance the development by providing funding [7,19,31]. Furthermore, intermediary organisations (e.g., NGOs, consultancy agencies, and research institutions) can accelerate the development of LEIs [31,33,34]. Moreover, LEIs can also mutually support each other

via the exchange of information, ideas, and experiences [7,27,31]. Therefore, LEIs benefit from building bridges and links with social capital and from using their social network.

Considering the recent emergence of LEIs, there are also some barriers that limit the development of LEIs. The removal of these barriers can encourage the progress of LEIs. According to Seyfang et al. (2013), most barriers faced “are an absence of the success factors” [7] (p. 980). First, a lack of essential skills on the part of the initiators will hinder the growth of an LEI [21,31]. Initiators need to have interdisciplinary knowledge when implementing renewable energy projects, such as in technology, finance, government, or communication. Some initiators do not have these skills due to their inexperience with implementing renewable energy projects; a possible option is to outsource these skills. Another barrier could be the disinterest of local citizens in renewable energy projects [7,15,21]. Lastly, although local governments can play a supportive role for LEIs, they can also hinder the development of LEIs through poor legislation, inconsistency, and regularly changing their policies [7,21,31].

#### 2.4. Conceptual Model

The different factors influencing the impact of LEIs are shown in a conceptual model, see Figure 1. To summarize, LEIs can have different kinds of impacts on the local community. The impact of LEIs is determined by the extent to which motives and objectives of the initiators have been reached. To have an impact, LEIs start with the implementation of projects. LEIs are active on three levels of engagement, which influences their performance. Main success factors and barriers are identified on these levels, such as the steering of the organisation, the involvement of citizens, and the use of networks, which were used to analyse the interviews. While there might be more factors which are relevant, these were identified as most important in the literature. During our research, other potentially relevant factors could also be identified.

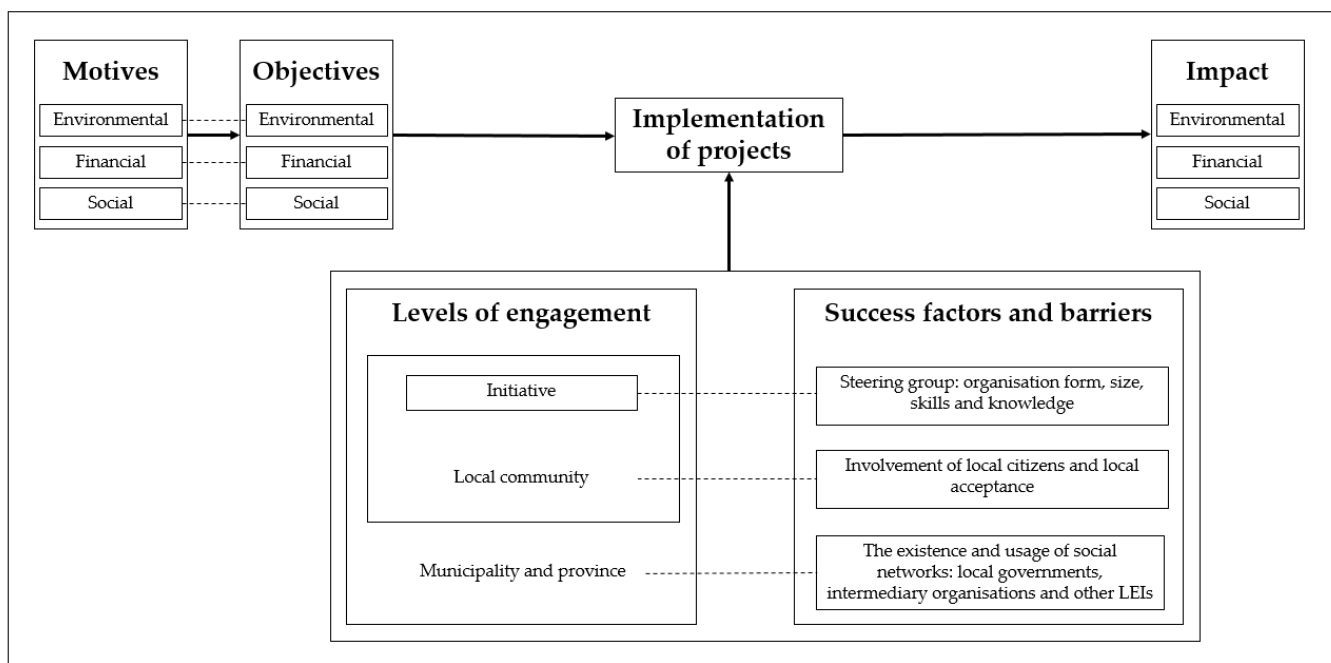


Figure 1. Conceptual model.

### 3. Materials and Methods

This study took place in the northern part of the Netherlands, following the progress of LEIs over time from 2015 to 2020. To answer the main research question, a qualitative research design was used. Specifically, semi-structured interviews were conducted. This

made it possible to explore the different subjects of this research in greater depth. Through the use of this method, in addition to the success factors found in the literature, other factors could also be identified. Additionally, three initiatives were examined in greater depth.

### 3.1. Research Context and Case Selection

A total of two northern provinces of the Netherlands were selected for this research, namely, the province of Drenthe and the province of Groningen. Both provinces commissioned the study in their province to identify the various LEIs in the province and the success factors and barriers involved. The province of Groningen has supported bottom-up initiatives relating to energy transition and sustainability (see, for example, [35]) and broader societally relevant topics (see, for example, [36]). As part of the program *Drenthe in Transitie* (Drenthe in Transition), the province of Drenthe wanted to cooperate with LEIs to become more sustainable as a province. In the last ten years, the number of LEIs has increased. At the time of the research in the province of Drenthe (i.e., from 2015 until 2017), the initiatives were in an early phase of their development (see also [13]). During the research period in the province of Groningen (from 2019 until 2020), the LEIs in this province had been in existence for a longer period of time.

The first step of the case selection was to create an overview of all the initiatives in both provinces. For this purpose, different methods were used. Firstly, we created an inventory based on our existing knowledge of the supporting organisations, such as “*Natuur en Milieufederatie Drenthe*” (Nature and Environment Federation Drenthe) and “*Groninger Energiekoepel*” (umbrella organisation for energy cooperatives in the province of Groningen). However, this assumes that initiatives have and use a social network. Starting initiatives tend to be less in touch with supporting organisations. Therefore, additional research was conducted to complete an overview of all the LEIs. A Google search was carried out with the key words “energy initiative”, “local initiative”, “sustainable initiative”, and “sustainable town” in combination with “Drenthe” or “Groningen”, or, to be more specific, one of the municipalities of the provinces. Furthermore, during the interviews, the initiators were asked if they had had contact with other LEIs. When new initiatives were mentioned, they were asked if the researchers could contact these initiatives. All these methods resulted in an overview of the initiatives in both provinces. In the province of Drenthe, 85 initiatives were found, while in the province of Groningen, 71 initiatives were found.

All of the initiatives were contacted to ask for an interview with a member of the steering group via contact details found during our search or obtained by the supporting organisations. In total, 84 members of various steering groups were interviewed; 44 members were from the province of Drenthe and 40 members were from the province of Groningen. The initiatives were organised in different ways, for example, as energy cooperatives, working groups, and community groups. Some of the initiatives were created by churches or sport clubs. All of the respondents were members of the steering group and, in most cases, they were also the person who had started the initiative.

### 3.2. Conducting and Analysing Interviews

The topics of the in-depth interviews were chosen based on the factors which are visualised in the conceptual model in Figure 1. Questions were asked about the following topics: the start of the initiative, the members’ motives for starting an initiative, the characteristics of the initiators and steering group, the group’s objectives, the difficult moments and hindering factors in the process, the successful moments and supporting factors in the process, the recruitment and mobilisation of participants, the group’s social network (i.e., contact with municipality, intermediary organisations, or other LEIs), the group’s opinions with regard to the future of the LEI, and the group’s needs regarding expertise. See Table A1 (Appendix A) for an overview of all the questions asked during the interviews. The interviews were conducted face-to-face or via telephone and lasted approximately 85 min. They were recorded using a voice recorder with the approval of the



respondent and then transcribed. The interviews were analysed following both a deductive coding process based on the interview scheme and the elements described in Figure 1, and inductive codes were also generated based on the interviews. In addition, all the activities of the initiatives were placed on a timeline to examine when important events had happened and the consequences of these events, thus providing more insight into their development over time.

### 3.3. Additional Case-Study Research

The overall assessment of the impact of LEI was difficult, see Results 4.2. Therefore, this complementary research was conducted, which made it possible to explore the impact by examining the relevant factors in more detail, such as the involvement of local citizens and the amount of renewable energy generated by the LEIs, as these LEIs aimed to become energy neutral as a community. The three largest initiatives in terms of members involved in the province of Groningen were selected. Additionally, these initiatives were mentioned most often by other initiatives during the interviews as successful LEIs. For these three cases, additional research was conducted. First, the total households in the area where the LEIs were located was identified. The total number of households was compared with the number of citizens involved in the LEI. Second, the amount of renewable energy generated in kWh within the projects implemented was calculated. As the actual electricity consumption of the regions was not available, the amount of renewable energy generated in kWh was compared with the expected total electricity consumption of this area. To determine the total electricity consumption in the area, the number of households was multiplied with the average electricity consumption of 2.730 kWh per household in the Netherlands [37].

## 4. Results

Based on the main aspects of the conceptual model, in the next section the motives and objectives will be discussed first, because they determine the potential impact of the LEIs. Second, the impact of the initiatives in both provinces is examined. Lastly, the factors influencing this impact are discussed.

### 4.1. Motives to Start and Objectives

Citizens started an LEI for various reasons, which can be divided in the three categories mentioned earlier—environmental, economic, and social motives—as shown in Table 1. Because in most cases the motives were comparable with the objectives, they are described together in the next section.

Most often, environmental motives and objectives were mentioned by the initiators. Citizens involved in LEIs are concerned about climate change and want to preserve the environment for future generations by realising a carbon-neutral town or village. They want to achieve this by reducing their use of fossil energy and producing renewable energy, such as solar or wind energy. The LEIs differed in terms of to what extent they wanted to become more sustainable and on what scale (e.g., whether they wanted to create a more sustainable world or a more sustainable village). The LEIs used different interpretations of the term sustainable or sustainability; some initiatives only focused on energy, whereas other initiatives used a broader definition of sustainability (e.g., growing your own vegetables). Additionally, the ambitions differed for each initiative, from becoming carbon neutral within five years to organising a collective solar panel project in which households could buy solar panels for a reduced price.

**Table 1.** Motives to start a local energy initiative divided into three categories: environmental motives, economic motives, and social motives.

Category	Motives
Environmental motives	<ul style="list-style-type: none"> <li>• Be more sustainable</li> <li>• Concerns about the future planet</li> <li>• Preserve environment for future generations</li> <li>• Conserve and produce energy</li> <li>• Become independent of natural gas</li> </ul>
Economic motives	<ul style="list-style-type: none"> <li>• Save money</li> <li>• Strengthen local economy</li> <li>• Benefit from energy production</li> <li>• Generate income for the local community</li> <li>• Increase the liveability of the community</li> </ul>
Social motives	<ul style="list-style-type: none"> <li>• Increase social cohesion</li> <li>• Take collective action</li> <li>• Increase awareness in the local community</li> </ul>

Environmental motives and objectives were never solely mentioned by the initiators but were always complemented by other motives. Saving money was, in addition to preserving the environment, one of the other main reasons to initiate an LEI. Producing and distributing renewable energy can possibly generate more income for the local community, and, therefore, strengthen the local economy. The LEIs had strong aspirations to increase local citizens' awareness of the consequences of climate change and the need for energy transition. They also believed that collective action has more impact and power than individual efforts and that it may result in increased social cohesion within the community. In general, they wanted to contribute to the liveability of the community, especially in rural areas, for example, by maintaining facilities such as a primary school or local supermarket. Additionally, the community could benefit from the income provided by generating and distributing energy.

In Groningen, alongside the motives mentioned above, some motives were “place-based”, relating to the specifics of the environment. This was related to the characteristics of this province as an area which has suffered from earthquakes caused by gas extraction:

*“I’ve been always interested in energy related subjects. ( . . . ) Especially, close to my own environment. ( . . . ) We live in an area where earthquakes occur, that was a motive. The environment was also important. We live in a rural depopulated area, the schools are closed. We have to keep this area attractive. That is what you have to do with energy; ensure the local economy.”*

Although most of the initiatives formulated joint objectives for the initiatives based on the motives to start an initiative, not all of the initiatives set goals at the start, either because they preferred working in an informal way or because they considered formulating objectives to be too time consuming (e.g., they wanted to use their limited time for organising projects instead). The likeliness of formulating objectives is dependent on the form of the organisation. Energy cooperatives are more likely to set goals at the start as they aim to develop a business case, whereas working groups generally want to start in a practical way, such as by organising projects and then gradually scaling up their activities.

To summarize, most of the initiatives have formulated various objectives they want to achieve in the field of energy (i.e., environmental, social, economic, or a combination thereof) or ambitions, which should be taken into account to understand and assess their impact.

#### 4.2. Impact of LEI

Although most of the LEIs analysed had objectives, these were often not formulated in specific terms and did not have measurable outcomes. Furthermore, the LEIs largely did not monitor their progress themselves. Therefore, the LEIs could not provide clear and

underpinned indications of whether they were on track to achieve their objectives. This makes it difficult to assess how much overall progress, and therefore impact, had been made regarding the realisation of objectives since the start.

According to the LEIs themselves, initiatives are successful when they are able to realise projects and when local citizens are involved. They thus considered the participation of local citizens as a prerequisite for the implementation and success of their projects.

*“That we were able to motivate a large number of citizens to isolate their houses and to install solar panels.”*

The initiators mentioned that they encountered several difficulties when implementing projects, which had an influence on the impact of the LEI. In 2015, most of the LEIs in the province of Drenthe were in the initial phase and had not started any projects yet, which explains their lack of impact. Additionally, the majority of the analysed LEIs in Drenthe were paused for an indefinite time or stopped entirely; as a result, no projects were implemented during that time. Although the majority of the LEIs were not yet successful, some LEIs were able to finish their projects and continue with the initiative. In the province of Groningen, the LEIs were somewhat more successful in implementing projects. However, a lot of setbacks in the process of implementing projects were mentioned (see Section 4.3). An obstacle which was mentioned highly frequently was the involvement of local citizens (see Section 4.3.2). Initiators were more likely to stop with the initiative after the occurrence of a setback, as initiators invest a lot of voluntary time and energy into the initiative.

The in-depth analyses of the three largest initiatives in the province of Groningen are shown in Table 2. Compared to the total number of households in the region where the initiatives were located, the percentage of citizens involved in each of the three initiatives was relatively low, especially considering that these were the largest initiatives in the province. Additionally, considering the objective of becoming an energy neutral village or town, the contribution of the amount of renewable energy generated by the LEI to the overall energy consumption in the area was relatively small.

**Table 2.** Examination of the three largest initiatives in Groningen. The number of citizens involved compared to the number of households in the area where the initiative is located and the amount of renewable energy generated compared to the total estimated electricity consumption (\* sum = total households \* average electricity consumption in the Netherlands (2730 kWh) [37]).

LEI	Number of Households	Citizens Involved (% of Households)	Electricity Consumption of the Households in the Region (kWh) *	Renewable Energy Generated (% of Total Electricity Consumption in the Region)
1	137,459	1400 (1.0%)	375,263,070	2,150,000 kWh (0.6%)
2	1232	150 (12.2%)	3,363,360	77,100 kWh (2.3%)
3	1025	87 (8.5%)	2,798,250	353,000 kWh (12.6%)

Although it can be concluded that the LEIs in Groningen were more successful than those in Drenthe, the impact of the initiatives in both provinces in terms of realising their energy and participation objectives was still limited. Both the number of local citizens involved and the amount of renewable energy generated by the LEI in comparison to the number of households were low. Assessing other impacts turned out to be difficult, as most often non-measurable objectives were formulated by the initiative, while they also did not monitor results themselves. Many obstacles and setbacks were mentioned, which negatively influenced the impact. Even the initiators who were capable of realising projects experienced disappointments in these projects that delayed their implementation.

#### 4.3. Success Factors and Barriers Influencing the Development of LEI

Although the specific impact of the LEIs could not be determined, different success factors and barriers that influenced the development of the LEI in a positive or a negative



way have been identified (see Table 3 for an overview). These factors were also seen as a challenge that should be dealt with in order to develop a successful LEI. The success factors and barriers will be discussed on different levels of engagement: the initiative, the local community, and the municipality and province.

**Table 3.** An overview of the success factors and barriers influencing the development of LEIs.

Level of Engagement	Success Factors	Barriers
Initiative	<ul style="list-style-type: none"> <li>• Motivation of steering group members</li> <li>• Skills: collaboration with local citizens and local organisations</li> </ul>	<ul style="list-style-type: none"> <li>• Failure of the first activity</li> <li>• Limited time of the members</li> <li>• Limited size</li> <li>• Recruiting new members for the steering group</li> <li>• Lack of expertise</li> </ul>
Community	<ul style="list-style-type: none"> <li>• Engagement of local citizens</li> <li>• Personal recruitment</li> <li>• Success of the first project</li> </ul>	<ul style="list-style-type: none"> <li>• High and unrealistic expectations concerning the number of participants</li> <li>• Lack of time for recruiting local citizens</li> <li>• Disinterest of local citizens in the subject</li> <li>• No clear view of the target groups</li> </ul>
Municipality and province	<ul style="list-style-type: none"> <li>• Having and using a social network</li> <li>• Support from local government</li> <li>• Support and guidance from intermediary organisations</li> <li>• Contact with other LEI</li> </ul>	<ul style="list-style-type: none"> <li>• Attending events is time consuming</li> <li>• Lack of support from local government</li> <li>• Lack of finance</li> <li>• Dependence on external funding</li> </ul>

#### 4.3.1. Characteristics of the Initiative as Local Organisation

In both provinces, the steering group members invested a great deal of their time and energy into the initiative. The average group size of the steering group in the province of Drenthe was four members, while the average in Groningen was five members. These initiatives were often steered by people with specific characteristics, i.e., a large majority of the steering members were elderly men who were often retired, meaning that they had time to complete voluntary work.

The first project was often a hurdle and an important potential barrier in the development of an LEI. When the first project failed, LEIs often considered not continuing with the initiative. However, the attitude of the steering group could be a decisive factor in keeping the project going, which shows that pleasure in collaboration also plays an important role. Although the effort invested by the initiators in the LEI was high, quite a lot of barriers regarding the size and capacity of the steering group were mentioned by the respondents.

*“We want to start a new project, but therefore we need citizens who will join the project. We don’t have the capacity to recruit the citizens. Nobody wants to join the steering group. ( . . . ) I’ve been asked to join the steer group for a year, after 4 years I’m still in the steering group. One of our project is a project has a span of 20 years. For this project you do not need a 77 year old man, but you need younger people.”*

A barrier faced was the limited amount of time the members of the steering group were able to spend on organisational work. Additionally, it was hard to keep the same members in the steering group because of their lack of time or decline in health. Retired members were often not replaced with new members, possibly due to the lack of involvement of citizens in general. Due to the limited size of the steering group, tasks often remained undone or finishing a project would take longer than expected. Additionally, through members leaving the steering group, knowledge, capacities, and driving forces were lost. The respondents mentioned that they preferably wanted to expand the steering group, especially with younger people.

Additionally, the respondents mentioned a lack of knowledge and skills within the group, e.g., when implementing a renewable energy project, developing a successful business case, or developing a marketing campaign. Expertise can be outsourced, but this costs money, and the LEIs often suffered from a lack of financial resources. Additionally, the steering group members had to be able to engage successfully on the other two levels

of engagement (the involvement of citizens and a social network), which will be discussed in the next two sections.

#### 4.3.2. Local Community: Engagement of Local Citizens

As mentioned before, the mobilisation and involvement of citizens in an LEI were seen as success factors and as important conditions for implementing projects. The number of participants was one of the evaluation points used by LEIs in their decision to continue. In the case of high expectations with regard to both the ambitions for the impact achieved and the willingness of citizens, a lack of involvement and unrealistic expectations could cause disappointments. Some initiatives were happy with the participants who were already engaged in the initiative. However, most of the initiatives considered their number of participants to be lower than they would have liked and expected.

*“On the one hand, with 150 citizens involved we are one of the largest initiatives in the province of Groningen. We can be proud of that. On the other hand, when we look at the number of households in this area, the 150 citizens involved it is not that big of a deal. ( . . . ) The initiative should be representative for this town. Especially, with the larger renewable energy projects in the future, it is important that a larger group of citizens is participating and not only the frontrunners.”*

Most of the initiatives were attempting to recruit members to participate in the initiative and they achieved this in different ways: via local media, personal contact via their own social network, and based on participation in former projects. When LEIs used their own social network to recruit members, citizens were more likely to participate in the projects organised by the initiative. However, personal recruitment is very time consuming and only a limited number of citizens can be reached.

The involvement of local citizens in the initiative is seen as the biggest challenge for LEIs to continue their development. The barriers for recruiting local citizens mentioned were a lack of time on the part of the steering group and the disinterest of local citizens in the project. Additionally, the initiatives did not have a clear picture of the target groups reached and which citizens had not yet been targeted by the initiative. As a result, the recruitment of local citizens was not tailored towards all the potential target groups, which may be an explanation for the relatively low number of participants mentioned by the LEI.

#### 4.3.3. Municipality and Province: Social Network, Collaboration with Local Government and Funding

Another important factor in the development of an LEI is having and using a social network, including organisations that can support the LEI. Via their network, they can receive guidance, support (including financial support), and gain knowledge from the municipality, intermediary organisations, and other LEIs.

However, in the province of Drenthe, most of the initiatives did not use their network intensively because they were still in the initial phase at the time of data collection and were not ready to consult other organisations. In the province of Groningen, the LEIs were using their social network extensively. However, the initiators in this province mentioned that visiting events organised by organisations in their network was very time consuming and that this was time the initiatives would prefer to spend on the implementation of their own projects.

*“There were even more events organised by supporting organizations, but I can’t name them all. There are a lot of events. Sometimes I can’t see the forest for its trees. There are a lot organisations involved in the energy transition. ( . . . ) It’s a full-time job to maintain an overview.”*

Almost all the LEIs were in contact with representatives of their municipality. The involvement and support of the municipality are important for the development of LEIs that depend on a municipality, since they organise projects that are under the responsibility of the municipality. As the project becomes larger, collaboration with the municipality becomes more important. For the implementation of renewable energy projects, LEIs have to deal with local laws and municipal regulations, which are the responsibility of the municipality. A lack of support by the municipality impedes the development of LEIs. The employee sent by the municipality can be a decisive factor in the success of the LEI.

*“The success of projects depends on the people working for the municipality. If someone supports the idea, then the project will succeed. If you do not have this person to support the initiative, it will not work.”*

A lack of finance is also an important factor impeding the development of LEIs. Especially in the initial phase, LEIs need “seed” money for building their organisation and starting projects. The assumption is that after the initial phase and after implementing some renewable energy projects, the LEI should be able to earn their own money via a viable business case and become independent of external funding. However, at this moment, the LEIs are too small to take financial risks by applying for a bank loan. As a result, LEIs are hindered in implementing larger projects and becoming more professional and independent.

Moreover, collaboration with intermediary organisations (i.e., umbrella organisations such as *Groninger Energiakoepel*) is also a factor in LEIs’ success. They guide an LEI in their initial phase and provide knowledge on how to start an initiative. Additionally, they support initiatives with the implementation of larger projects (i.e., implementing solar fields). Due to their position, they can gather knowledge and experience from all the initiatives. Via intermediary organisations, most of the LEIs in Groningen were able to contact other initiatives.

## 5. Discussion and Conclusions

In recent years, the number of LEIs has increased in western Europe, including in the Netherlands. These initiatives are expected to have a positive impact on the environment and the local community. The main research question of this study was: What are the potential impacts of LEIs, which factors contribute to the success of LEIs, and which barriers impede the development of LEIs? The two aims of this study were to provide an empirical contribution to the debate by analysing a large sample of initiatives, while theoretically providing a comprehensive overview of the factors influencing their impact.

The results show that the motives and objectives were mostly related to the environment, followed by financial and social motives and objectives. Initiatives in different contexts can have other motivations and objectives (see also [8,30]). Motives were often not specified into concrete, realistic, and measurable objectives. As the objectives were not explicit and specific enough, the progress of the LEI could not be monitored. While initiators of LEIs had high expectations at the start, they experienced many disappointments and barriers along the way. As the objectives and the progress were not evaluated by the LEIs themselves, it is difficult to assess how much impact the LEIs had regarding these various objectives. According to the initiators themselves, an LEI is successful when it is able to realise projects (i.e., to generate renewable energy) and when local citizens are involved. Considering this, this study shows that the impact of LEIs in terms of energy production and the number of local citizens involved is relatively small.

Several factors were studied that influence the development of LEIs on the three levels of engagement. When they carry out successful projects, this enhances the motivation of

the steering group, the involvement of local citizens in future projects, and the support of the local government; however, these factors are also conditional for the realisation of the project itself.

On the level of the initiative itself, this research confirms the results of earlier research that the characteristics of the steering group influence the development of an LEI positively [7,20]. The analysed initiatives were vulnerable in this sense, because of the small size of the steering group, the advanced age of the steering group members, and the voluntary nature of participation in the LEIs. The aforementioned aspects are reasons for initiators to stop the initiative, such as when the LEI takes up too much time and energy. The initiatives experienced difficulties in retaining members in the steering group and finding new members for this group. This study also analysed the different levels on which an LEI operates, the organisational and community level and the level of collaboration with public and private actors. Steering group members are engaged on different levels and need varied skills and knowledge about various topics, such as the skill to successfully collaborate on the other levels of engagement.

The involvement of citizens in general turned out to be a challenge for LEIs on the level of the community. Although every citizen can potentially be involved in the initiative, a large majority of the local citizens will not participate in one of the projects of the initiative. An explanation based on this research is that LEIs do not have a clear view of which groups of people are participating and what the needs of the community are (see also [7]). This is important, as it indicates a lack of inclusivity and representation of citizens within the community.

On the level of the municipality and province, an important success factor is maintaining a social network consisting of municipalities, intermediary organisations, and other LEIs. The use of this social network expands over time, as the need for specific knowledge increases over time. Though the municipality plays a role in providing financial support and knowledge, the LEIs perceive a lack of financial support and knowledge. A success factor is the collaboration with intermediary organisations, such as umbrella organisations for energy cooperatives, who provide guidance and share knowledge based on their experience with other initiatives.

Based on the findings of the study, a few recommendations can be provided. Due to the complexity of the energy system, it is essential for the further development of LEIs to acknowledge the relationship between the various factors which influence their success. Improving just one of these factors will not automatically lead to success.

Additionally, based on the results and previous research, it is assumed that the way that LEIs frame the issue of energy transition does not fit the perspectives of all local citizens [38]. Whereas LEIs focus mostly on the technical aspects of the energy transition and concerns about the future, local citizens might be more interested in social aspects or a desirable future. Follow-up research therefore could analyse the potential match or mismatch in the communication between LEIs and local citizens.

Since the success of the first implemented project is very important for an LEI's development, it is important when starting initiatives to gather information about the needs of the local community first. The upscaling of initiatives (i.e., merging the steering group of the initiatives of connecting regions) will increase efficiency but creates the risk of a decrease in place attachment or social cohesion (see also [18]). To support their autonomy, it is important for LEIs to generate their own income, because they often remain dependent on loans and external funding [6,31].

To our knowledge, this the first qualitative study that used a large sample of LEIs and also investigated less successful LEIs. This study provides a comprehensive overview of the factors influencing the impact of an LEI. The current study has also some limitations: the generalizability of this research is limited, as only initiatives in one part of the Netherlands were studied, since the institutional context is important for the development of LEIs; thus, it is recommended to carry out research in other parts of the country and other institutional

contexts in Europe. Second, it would also be beneficial to follow LEIs over a longer time span via longitudinal research, especially as this is a dynamic field (see also [7]).

This study represents a first attempt to explore the impact of LEIs by analysing the factors in their success and failure. Following on from Berka and Creamer (2018) [26], it is recommended to develop a better measurement of the impact of LEIs, as until now this has not been monitored properly, because initiators prefer to work on their projects instead [26]. It would be helpful if LEIs could turn their general goals into SMART (specific, measurable, attainable, realistic, and timely) objectives, which can be monitored over time. Further research could investigate how the different objectives of LEIs could be turned into measurable indicators. Since the duration of the realisation of projects is long, it is recommended to not only measure the impact in the short term, but also in the long term.

**Author Contributions:** Conceptualization, L.A.M.H.G., C.J.W. and L.G.H.; methodology, L.A.M.H.G. and C.J.W.; investigation, L.A.M.H.G.; formal analysis, L.A.M.H.G.; writing—original draft preparation, L.A.M.H.G., C.J.W. and L.G.H.; writing—review and editing, L.A.M.H.G., C.J.W. and L.G.H.; supervision, C.J.W. and L.G.H.; funding acquisition, C.J.W. All authors have read and agreed to the published version of the manuscript.

**Funding:** The research in the province of Drenthe was funded by the province of Drenthe. The research in the province of Groningen was funded by the province of Groningen.

**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki. With regard to the Institutional Review Board Statement, the study was conducted according to the ethical guidelines of Hanze University of Applied Sciences.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to restriction regarding privacy.

**Acknowledgments:** The authors would like to thank Hanna Rots and Jelmer Steenbeek for their valued contribution to this project. The authors also like to thank the province of Groningen and the province of Drenthe.

**Conflicts of Interest:** The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

## Appendix A

**Table A1.** The topic and interview questions used during the semi-structured interviews.

Topic	Interview Questions
Start of the initiative	<ul style="list-style-type: none"> <li>• Who started the initiative?</li> <li>• When was the initiative initiated?</li> <li>• Who was involved from the beginning?</li> </ul>
Motives for starting an initiative	<ul style="list-style-type: none"> <li>• How did you think of the idea of starting an LEI?</li> <li>• What was your vision regarding starting an LEI?</li> <li>• Why did you want to become involved with sustainability?</li> </ul>
The characteristics of the initiators and steering group	<ul style="list-style-type: none"> <li>• How many members does the steering group have?</li> <li>• What is the average age of the steering group?</li> <li>• How often do you see each other?</li> </ul>
The group's objectives	<ul style="list-style-type: none"> <li>• Which objectives does the LEI has?</li> <li>• How do you want to achieve these objectives?</li> <li>• Did the objectives change from the beginning?</li> </ul>

Table A1. Cont.

Topic	Interview Questions
The difficult moments and hindering factors in the process	<ul style="list-style-type: none"> <li>• Were there any difficult moments from the beginning until now?</li> <li>○ When did this happen?</li> <li>○ Why do you think this happened?</li> <li>○ What were the consequences?</li> </ul>
The successful moments and supporting factors in the process	<ul style="list-style-type: none"> <li>• What were the successes of the LEI?</li> <li>○ When did this happen?</li> <li>○ Why do you think this happened?</li> <li>○ What were the consequences?</li> </ul>
The recruitment and mobilisation of participants	<ul style="list-style-type: none"> <li>• Did you recruit participants?</li> <li>• How did you recruit participants?</li> <li>• How many participants were recruited?</li> <li>• What do you think about the number of participants?</li> <li>• What is the target group of the initiative?</li> <li>• Which target groups are not reached by the initiative?</li> </ul>
The group's social network	<ul style="list-style-type: none"> <li>• Is there any contact with the following organisations: municipality, province, intermediary organisations or other LEIs?</li> </ul> Per organisation: <ul style="list-style-type: none"> <li>• How is the contact with the organisation?</li> <li>• Why did you contact the organisation?</li> <li>• What do you expect from the organisation?</li> <li>• How can the organisation help the initiative in their development?</li> </ul>
The group's opinions with regard to the future of the LEI	<ul style="list-style-type: none"> <li>• How do you see the future of the LEI?</li> <li>• What do you want to achieve in the next year?</li> </ul>
The group's needs regarding expertise	<ul style="list-style-type: none"> <li>• What kind of expertise are you lacking in the steering group?</li> </ul>

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