Identifying important barriers and success factors of self-organizing local renewable energy initiatives

21-08-2015

By Wendy Kalmeijer (s 1534580)
MSc. Environment & Infrastructure Planning
Supervisors: Jessica de Boer and Christian Zuidema
University of Groningen, Faculty of Spatial Sciences

Abstract

In the context of growing energy demand, in particular sustainable energy; ever increasing costs of fossil fuels; new emerging technologies and alarming messages regarding climate change, self-organization of local renewable energy initiatives is increasingly portrayed as a valuable contribution in realizing the transition to a more sustainable society. Local renewable energy initiatives make it possible to experiment with new structures and patterns, which, if successful, might become accepted in society, and in the end might even become the norm. Existing literature shows that there is no clear understanding of what a successful local renewable energy initiative precisely entails. However, it does provide various conditions and factors which are argued to be critical to their success. This research has identified the most important barriers and success factors in six case studies in the North of the Netherlands.

The holographic principles of self-organization, and the literature on success factors of local renewable energy initiatives were used in order to build a framework that was then applied to analyse the data. The resulting analysis provides a useful perspective on the conditions which facilitate self-organization of local renewable energy initiatives, and the factors which contribute to their success. It also sheds light on the potential barriers they could encounter. The findings show that some of the success factors, as identified in literature, turned out to be more important than others. Following are the most important success factors: diversity of disciplinary backgrounds; local founders; active recruitment; limited internal structure; local/regional collaborations; networking; resources; proper management of external communications; and embeddedness in a favourable context.

Further, it was found that the initiatives do not seem to meet with barriers too high to overcome. The three most frequently mentioned barriers are related to securing funding; reaching/convincing actors in order to gain support; and maintaining the initiatives.

Keywords: self-organization, local renewable energy initiative, barriers, success factors, transition.

Contents

List of tables and figures

1. Introduction

The way we currently produce and consume our energy is under tremendous pressure to change. This need for change is caused by several factors, such as a growing demand for energy, in particular sustainable energy, ever increasing costs of fossil fuels due to falling reserves, new emerging technologies and alarming messages regarding climate change (Adhikari, Aste, & Manfren, 2012; Ramchurn, Vytelingum, Rogers, & Jennings, 2012; Rutter & Keirstead, 2012). In response to a somewhat passive attitude of governments and businesses to act on this, citizens are starting off their own local energy cooperatives through which they produce, consume and sell energy (Messing, 2012). An 'energy revolution' is taking place (Tegenlicht, 2012). Smart energy grids, power to the people, sustainability and self-organization are relatively new concepts, which are becoming increasingly important in our changing energy landscape. More often, consumers also become self-organized producers and are therefore less dependent on the major energy companies. It is assumed that small scale decentralized initiatives can contribute significantly to a more sustainable society. Self-organization is often portrayed as one of the ideal modes of energy production and consumption (Ornetzeder & Rohracher, 2013) but it is also important to take a critical and objective stance (Uitermark, 2012). Are self-organized local initiatives really successful in contributing to a more sustainable society? It is definitely not the only way forward, and in many cases it might perhaps not even be a realistic option, for example due to contextual circumstances or a lack of social or financial capital (Uitermark, 2012). In order for local energy initiatives to become successful, certain barriers also have to be overcome first. These barriers, for example, include issues such as costs, network access, and the capacity to act (Hoggett, 2010). It is important to be aware of potential or existing barriers in order to address and remove them. In addition, understanding which factors contribute to the success of such initiatives is useful because it facilitates the growth and success of renewable energy initiatives.

This research, therefore, aims to identify and gain a deeper understanding of the barriers and success factors of self-organization of local renewable energy initiatives. The main research problem is stated as follows:

Identifying important barriers and success factors of self-organization of local renewable energy initiatives

In order to address this research problem, the following two sub questions were drafted:

1) How is self-organization of local renewable energy initiatives established?
2) Which barriers do local renewable energy initiatives meet, and which factors significantly contribute to their success?

Six case studies in the North of the Netherlands were explored in order to learn how the initiatives were formed, which elements contribute to their success, and which barriers they experience(d). All of the cases are either local cooperatives or foundations who aim to promote and resell renewable energy. Most of them primarily focus on solar power as a means of renewable energy. The initiatives started off in recent years and were founded by small groups of citizens. Each of the initiatives has participated in in-depth interviews.
Further, literature review has been conducted, and combined with the data from the case studies, this provides a valuable knowledge base from which new conclusions can be drawn.
In particular, research conducted by Feola & Nunes, regarding failure and success of transition initiatives; and the holographic principles which enable self-organization (Morgan & Ramirez, 1984) have been used to build the theoretical framework and structure the analysis.

Though previous research has been conducted on success factors and barriers of renewable energy initiatives (Feola & Nunes, 2013; Ornetzeder & Rohracher, 2013; Adamson, 2010), much of this research seems to have been conducted abroad. Further, since they are local

initiatives, each of them is unique which means that a successful initiative cannot easily be replicated elsewhere (Devine-Wright & Wiersma, 2013). Literature even suggests that success or failure of an initiative largely depends on contextual factors (Feola & Nunes, 2013). Therefore, it is important to explore which factors generally contribute to success, and whether they are context-dependent or whether they can be observed in most initiatives. Hence, learning from various specific cases contributes to the overall understanding of the way local renewable energy initiatives can successfully contribute to the energy transition.

The research is structured as follows. The theoretical framework (chapter 2) contains relevant literature review, regarding the energy transition and the setting in which this is embedded. Further, it explores the concepts of self-organization and emergence, and it provides a framework to address the various success factors of energy initiatives. Chapter 3, the methodology section, explains which methods have been adopted in order to conduct this research. This is followed by chapter 4 which presents the data that was collected based on the six case studies. The discussion (chapter 5) builds on the data and the theoretical framework, in order to address the research problem. In short, this section consists of two parts. The first part focuses on the way self-organized initiatives are formed and how they build on, and contribute to the growth of networks. The second part looks into the success factors and barriers which are identified in the case studies, and does so from the perspective of literature. Chapter 6 then presents the conclusions and limitations of the research. Finally, chapter 6 critically reflects on the research and the outcomes.

2. Theoretical framework

This chapter explores literature related to the energy transition, reflexive modernization, self-organization, holographic design, and literature on factors contributing to the success of local renewable energy initiatives. Subsequently, based on this literature review, a conceptual model is presented in section 2.6.

2.1 Energy transition

The traditional energy sector is being confronted with serious problems related to fossil fuel depletion, reliability, safety, dependency on oil-producing countries, and environmental pollution. A transition to a new and largely renewable energy system seems to be the solution. Transitions can be considered processes of radical changes regarding governance, policy, needs, institutions, practice and cultures (Huitema & Meijerink, 2010; Kemp, Loorbach & Rotmans, 2007). The so called 'energy transition' can be described as "*the change in the composition (structure) of primary energy supply"* (Smil, 2010, p. 7). It entails a gradual shift from a particular pattern of energy supply to a new energy system, in this case characterized by renewables as the primary source of energy (Smil, 2010).
Though the Dutch government, as well as academics, interest groups and citizens keep emphasizing the importance of this transition, actual large scale implementation of renewable energy still seems far away (Verbong & Geels, 2007). However, a transition has been unfolding and especially on a more local scale changes can be observed. The number of decentralised renewable energy cooperatives in the Netherlands is steadily increasing (Messing, 2012). The growth of these so called grassroots initiatives can partially be explained by slow implementation of renewable technologies on the side of the government and the incumbent energy industry. Also the growing awareness in recent decades of the importance of sustainability has contributed to this. Though the popular concept of sustainability, defined as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987), is by many considered to be a vague label, societal discourse on this subject has definitely resulted in a more critical reflection on where our current society is headed. A growing awareness of the interconnectedness of problems, and the uncertainty of cause and effect relations has led to a more urgent call for new forms of problem handling, and new, robust modes of development. Growing doubts are rising with regards to the foundations, structures, patterns and mechanisms of modern society and governance (Voβ & Kemp, 2006). The theory of 'reflexive modernisation', which will be elaborated on in the following section, further explains this growing social reflexivity in light of economic and environmental crises.

Grassroots initiatives play an important role in the energy transition. In order to explain the concept of grassroots innovations and initiatives, the following definition of Seyfang & Smith (2007) is adopted. They define grassroots innovations as: "*innovative networks of activists and organisations that lead bottom-up solutions for sustainable development; solutions that respond to the local situation and the interests and values of the communities involved. (..) Grassroots innovations tend to operate in civil society arenas and involve committed activists who experiment with social innovations as well as using greener technologies and techniques*" (Seyfang & Smith, 2007, p. 585). Though it is on a small scale, they provide room for creating and developing new ideas and practices, and offer space for experimenting with new systems, guided by changing values (Seyfang & Longhurst, 2013). Therefore, grassroots initiatives can be considered as "niches of innovative practice" (Seyfang & Smith, 2007, in Middlemiss & Parrish, 2009). In short, they are groups of people who aim to improve the quality of life in their local community. It is a form of community action which benefits from a local, contextual knowledge regarding the way things work in a specific place, the capacities of the community, and the relevant issues that matter to the local people (Seyfang & Smith, 2007). Local renewable energy initiatives are one such type of grassroots initiatives, which have, in recent years, become a growing 'sector' of renewable energy. Local renewable energy

initiatives make it possible to experiment with new structures and patterns, which, if successful, might become accepted in society, and in the end might even become the norm. Progressing from a niche to more general acceptance is however not easy, and success will largely depend on the available community capacity (Middlemiss & Parrish, 2009), as well as the conditions under which such processes occur. Regarding community capacity, the following definition is proposed.
"Community capacity is the interaction of human capital, organizational resources, and social capital existing within a given community that can be leveraged to solve collective problems and improve or maintain the well-being of a given community. It may operate through informal social processes and/or organized effort" (Chaskin, 2001).

In the context of this research, community capacity initially operates through informal social processes, but gradually it becomes a more organized commitment.

Though local energy initiatives are of various backgrounds and sizes, and have different ambitions and goals, they are all aiming at sustainable solutions and approaches. Examples of their goals and activities include becoming an energy neutral or low-carbon community, promoting solar or wind power, advising on energy issues, supporting local community projects, strengthening community capacity, producing and selling (local) renewable energy, and encouraging energy reducing.

2.2 Reflexive modernisation

The energy transition as described in the previous section, can be considered part of a wider societal transition. This transition is characterized by exploring and aiming at a different mode of development; a more sustainable mode of development. It is driven by dissatisfaction and concerns regarding errors of the 'traditional' mode of development (Kemp & Loorbach, 2006). This can be explained, based on the idea of reflexive modernisation, which is discussed below.

According to Ulrich Beck, who introduced the notion of 'reflexive modernisation', modernity has been characterized by rationalist problem solving. Typical of this kind of problem solving and development is the aim to eliminate uncertainty and interference of uncontrolled influences, the precise definition of goals, the prediction of effects, and the strong confidence in the central role of sophisticated control systems. Following this approach, complexity should be reduced as much as possible. This 'mode of progress' has in the past enabled societies to achieve amazing technical innovations, refined patterns of social regulation, and increasing economic efficiency (Voβ & Kemp, 2006). It has resulted in bureaucratic organisation, project management, a wide range of policy making, and also a differentiation within society of functional subsystems, such as economics, politics, law, science etc. As a consequence, a multitude of specialisms have developed, which further reinforce more precision, concentration of capacities, and control over processes (Schimank, 1988, in Voβ & Kemp, 2006). Simultaneously, modernity has also resulted in unintended consequences or side-effects. Modernity has not merely produced solutions, but also new problems and risks, which now threaten our society (Hajer & Schwarz, 1997). This can be explained as follows. Rationalist problem solving has to a large extent become separated and disentangled from the complex reality of this world, and therefore many existing interdependencies and dimensions of embeddedness have been ignored in developing and implementing modern solutions. In this way, though seemingly higher effectiveness and precision within specified system boundaries might be achieved, the impact of unintended consequences only becomes stronger (Voβ & Kemp, 2006). Examples of such side-effects and risks are accidents in nuclear power plants and other chemical industries, traffic congestion, acid rain, and ozone depletion. Such risks and incidents are all related to the modern industrial and technological society we have created. Besides numerous other technological risks and environmental problems, we are also facing ongoing social problems (for example related to individualisation) and economic crises (Hajer & Schwarz, 1997). These unintended consequences, in turn, cause new, possibly more severe problems, which are hard to solve as long as society tries to hold on to similar modes of

development and problem solving, since these are the 'solutions' which caused the problems in the first place (Voβ & Kemp, 2006). In short, modernist societies have been growing in cycles of producing problems and solutions to these problems, which then produce new problems etc. They are, in that regard, societies shaped by their own side-effects.
Ulrich Beck observes however, that the modernist societies are increasingly becoming aware of their systematic failures. It is no longer simply assumed that our industrial, technological society, characterized by her economic growth and constantly rising consumption levels, will continue to persist. Somewhere along the way doubts have started to creep in, as to whether there really is an automatic link between further industrial and technological (rational) development on the one hand, and overall social progress on the other hand. On the one hand, this can be explained by an increase in risks, and on the other hand by changing perceptions of the public towards quality of life, and the acceptability of risks of certain industrial and technological developments.
According to Beck, the modernist society has slowly given way to a so called 'risk society', with a growing emphasis on the distribution of risks and responsibilities, rather than the distribution of wealth. This risk society embodies the inevitable consequences of the modernisation practices and institutions, which did not consider its dangerous side-effects. The current social institutions seem unable to sufficiently control the undesired developments and risks, and are typically not able to provide solutions to pressing issues. Beck argues that, too often, we still attempt to solve problems based on the 'traditional' modernist conceptual frameworks, which got us into trouble in the first place. Solving environmental issues and future scarcity problems requires a lot more than a 'command and control' approach (Hajer & Schwarz, 1997).

Reflexive modernisation refers to this growing awareness of the inability to master and overcome existing problems. It is considered to be a distinct, second phase of modernisation. When modern societies reach this stage they begin to transform themselves, not just by transforming their institutions, but also the basic principles underlying their society (Beck, Bonss & Lau, 2003). Since the 'first modernity' has become increasingly problematic, this reflexive 'second modernity' is questioning its own basic premises, and slowly "seems to be producing a new kind of capitalism, a new kind of labour, a new kind of global order, a new kind of society, a new kind of nature, a new kind of subjectivity, a new kind of everyday life, and a new kind of state" (Beck, Bonss & Lau, 2003, p. 2,3).
The transformation of traditional energy production and supply, towards a more sustainable and decentralized system, should also be seen in this light. The energy system is one of the societal sectors which is facing major changes, because it is increasingly considered unacceptable that it is built on 'old solutions' which are not sustainable. As a result of complex errors, problems and undesired effects of this old system, a growing awareness can be observed of the need to develop a (more) sustainable energy system (Kemp & Loorbach, 2006).

First modernity
In order to gain a better understanding of this wider transformation that is taking place, and to get a clearer picture of the second modernity, it is useful to, first, gain insight into the foundations of the first modernity.

1) First modern societies are generally nation-states (Beck, Bonss & Lau, 2003), which is a form of state organization in which both the state as an autonomous political community, and the nation as a cultural/ethnic entity geographically coincide. In short, the political community and the civic, cultural community overlap. It is therefore also a political ideal, because it holds the promise of cultural cohesion and political unity (Heywood, 2007).
2) Secondly, first modernity is characterized by a kind of programmatic individualization, freedom and equality, which is however restricted by patterns of collective life, and the social structures and institutions of which individuals are a part.

3) Further, first modern societies are typically so called 'gainful employment societies'. This means that unemployment is generally very low, and mainly consists of frictional and temporary unemployment, meaning when a worker is in between jobs. Participation in the economy is of importance with regards to status, consumption and social security.
4) The concept of nature is perceived in light of the possibilities of exploitation. It is mainly considered to be a resource, which should be made available in order to enable endless economic growth and prosperity. Possible negative consequences of this are frequently displaced elsewhere.
5) Rationality plays a central role during the first modernity. There is an emphasis on instrumental control and science in order to dominate nature.
6) Finally, first modern societies are characterized by a continuous process of differentiation and specialization in response to the growing complexity of societies (Beck, Bonss & Lau, 2003).

Second modernity
Many modern societies are currently undergoing processes of change, which challenge the above mentioned foundations of modernity as we know it. New social and political forms are developing, though Beck & Lau (2005) argue that "there has been no clear break with the basic principles of modernity, but rather a transformation of basic institutions of modernity" (Beck & Lau, 2005, p. 526). Therefore, they talk about a second modernity, which is characterized by the following interlinked processes:

1) Globalization challenges the traditional economic principles, and the ideal of a nation-state, and impacts political, cultural and environmental dimensions.
2) The welfare state, a product of the first modernity, has resulted in an intensification of individualization, consequently undermining collective patterns of life. Further, familiar forms which were once central to modernity, such as the nuclear family, are giving way to new social forms.
3) Transformation of gender roles, which affects both internal relations within families, as well as the labour market.
4) Alternative models of work, like flexible employment practices, can be observed. Other changes might be the growing emphasis on a 'knowledge society', an increase in insecure employment, unemployment, and a society where work is no longer at the heart of society, and where leisure time becomes more meaningful.
5) The acknowledgement that resources are limited, results in a different perception of nature. Nature is no longer perceived solely as a provider of resources, which we can infinitely control and adapt to our needs, but it is increasingly seen as part of society.
6) Increase in global risks, such as the ecological crisis, financial crisis, threat of terrorist attacks etc.
(Beck, Bonss & Lau, 2003; Beck & Lau, 2005)

The distinction between first and second modernity, however, only applies to the particular path of development which is typical for European countries, and therefore it is a Eurocentric perspective (Beck, Bonss & Lau, 2003).

Reflexive modernization and processes of self-organisation
This transition towards a second modernity and these above mentioned interlinked processes constitute the background or setting in which processes of self-organisation are currently taking place. Employing possibilities for self-organization in society contributes to realizing long-term societal change that enables sustainable benefits, from the local to the global level. This way, local concerns and knowledge can be maximally utilized, in order to shape society from below (Kemp, Rotmans & Loorbach, 2007). An example of this self-organization can increasingly be seen in the field of renewable energy.

Self-organization of local renewable energy initiatives is often considered a promising approach to respond to global (environmental) problems. Brown et al. (2012, in Feola & Nunes, 2013) even suggest that transitions do not take place without (local) places since people tend to get attached to places, and these places provide the environment through which common senses of responsibility, resilience and relatedness are imagined and held together. Perceiving reflexive modernization as the setting in which the processes of self-organization of local renewable energy initiatives are embedded, therefore, helps understand the conditions under which they take place.

In order to gain a deeper understanding of the concept of self-organization, it is further discussed in the following section.

2.3 Self-organization

Human behaviour is determined by human characteristics, interactions and relations, but also to a large extent by the institutionalised context in which this is embedded. In order to avoid chaos, human behaviour is often embedded within certain structures. A healthy, functioning society is therefore generally characterized by a balance between individual freedom and institutions (Zoethout, Jager & Molleman, 2004). So, on the one hand human behaviour can be explained by top-down processes, related to the way our behaviour is enforced by the institutionalised context, and on the other hand it can be understood by bottom-up processes, which show how we organize ourselves, apart from existing structures. In situations which differ from everyday life, or where there is no organized structure, people create new structures by organizing their own behaviour. This process, which we call self-organization, refers to "*the process in a system leading to the emergence of (global) order within this system, without the presence of another system dictating this order*" (Dalenoort, 1989; 1995; Heylighen, 1997 in Zoethout, 2006, p. 2). Self-organizing processes have been studied among many different disciplines, such as chemistry, biology and psychology. Also, there are several different perspectives on the concept of self-organization. For example, Anderson & McMillan (2003), in their study argue that the underlying principles and issues concerned with self-organizing teams are similar for human and insect organizations. They state that, like insects, humans also have the ability to self-organize, and we should attempt to draw lessons from such self-organized systems which are found in nature. Nevertheless, human beings differ from insects, partly because they are self-conscious, and capable of anticipating various possible future scenarios (Zoethout, 2006).

This research focuses on self-organization within social systems, which are typically characterized by complexity. They are self-structuring, self-maintaining, and because individuals are active, self-conscious subjects, they are self-creative. To a certain extent, people can choose in which systems they want to live, and how their systems are designed. Further, they have the ability to create new systems and structures. This freedom of conscious creation is typical for social systems, which distinguishes them from systems in the biological or physical world. Self-organization in physical and chemical systems involves a spontaneous process of self-structuring of certain matter. Their components however cannot maintain themselves, but generally decompose within a certain time. In the biological world, living systems are both self-structuring and self-maintaining, in that they maintain their form and own identity. Social systems are therefore more than that. In addition to being self-structuring and self-maintaining, they are also self-creative. Social self-organization involves the permanent (re-)creation of new structures, which have the ability to influence individual actions and thinking (Fuchs, 2000).

An important characteristic of self-organization refers to the 'organization' part of the concept, which implies an 'increase in order' of the system behaviour. This enables the system to obtain structure, in order to promote a specific function. Further, there can be input from outside the system, but in order for it to be self-organizing, the input cannot consist of control instructions from outside the system. As Zoethout (2006) states, "*Self-organization cannot be designed,*

nor externally dictated" (Zoethout, 2006, p. 2), because it is a process of emergence, and therefore self-organization cannot be a design principle. There is no central control of the whole, which means that no individual part directs the behaviour at the macro-level. Local mechanisms, however, influence the global behaviour, and therefore this can be considered decentralised control. In the other direction, the local parts are also influenced by the emergent structure.
The actual arrangement that appears, as a result of self-organization processes, cannot be predicted in advance. However, it takes on forms which are characteristic of the system and the environment in which it is embedded (Gilchrist, 2000).

According to De Wolf & Holvoet (2005), emergence and self-organization are different concepts, which emphasise different characteristics of a system. They believe that both can exist in isolation, as well as co-exist within a system. With regards to the concept of self-organization, they propose the following definition: "*Self-organization is a dynamic and adaptive process where systems acquire and maintain structure themselves, without external control*" (De Wolf & Holvoet, 2005, p. 7). Also, self-organizing systems are expected to be robust, in the sense that they should be able to cope with change, in order to maintain their organization. It should thus be able to adapt, and therefore needs to be capable of demonstrating a large variety of behaviours. Self-organization is in essence adaptable behaviour, which develops without external control, and displays an increase in order (De Wolf & Holvoet, 2005).
Emergence refers to coherent (persistent) properties, behaviour, structure, patterns ('emergents') at the global (macro) level, which arise from interactions between parts at the micro-level. The so called 'emergents' are novel with respect to the individual parts of the system. Therefore, though the collective behaviour is implicitly contained in the behaviour of the parts, they cannot be reduced to behaviour at the micro-level. In other words, the whole is greater than the sum of its parts (De Wolf & Holvoet, 2005). This also means that emergence is at least to some extent unpredictable, because the outcome of this process cannot be completely forecasted by simply looking at the individual elements or parts (Fuchs & Schlemm, 2002).

2.4 Holographic design

Now that the process of self-organization has been explained, the following section focuses on self-organization within a social-managerial context, and the conditions which enable or contribute to this process. The principles of holographic design, as formulated by Morgan (1986, in Zoethout, 2006), are used as a guideline since they indicate the conditions under which self-organization can occur.
Before turning to these principles, it is helpful to first shortly describe the opposite of a holographic design, namely a mechanical 'design' of organizations, in order to understand the relation between holographic design and self-organisation. The traditional mechanistic structures of organizations are designed in order to "*induce people to behave in predictable, accountable ways*" (Jones & Mathew 2009, p.109). Mechanistic principles involve designing organizations where all the 'parts' or jobs precisely complement each other in order to form a coherent 'whole' or 'machine' (Morgan & Ramirez, 1984). This means that tasks and roles are generally clearly defined. Each individual 'part' or person is specialized in and responsible for a particular task (Jones & Mathew, 2009). Such organizations are characterized by formal procedures (rules, controls, supervision, standardization etc.) to ensure all the parts function in accordance with the intended design. This typically results in a hierarchical structure. A fixed design like this is often considered appropriate for organizations facing stable and unchanging environments, with relative simple and clear objectives (Morgan & Ramirez, 1984; Jones & Mathew, 2009). However, when such organizations have to deal with uncertainty and complexity, they are often unable to successfully cope with such challenges. Many 'parts' do not know about existing problems; neither do they have the authority, and perhaps interest, to take action. The 'supervising parts' have to solve the problems, though they often do not

have a complete or well informed overall view of the organization. Therefore, actions taken by a certain 'part' could in turn cause problems for other 'parts' (Morgan & Ramirez, 1984).

Morgan & Ramirez (1984) introduce an alternative to mechanistic structures of organizations. In contrast to the traditional mechanical design, which is 'organized', a holographic design is 'self-organized'. The holographic metaphor offers valuable principles for organizational design, which emphasizes 'redundancy within parts'. This means that each 'part' or person of an organization performs a range of activities, whenever they are needed. This holographic design refers to a concept in physics, namely a hologram, an image where the whole is represented in all its parts. Each part contributes to the 'whole', and at the same time, each part comprises an image of the 'whole' in itself. Therefore, "*if the hologram is broken, any piece of it can be used to reconstruct the entire image*" (Morgan & Ramirez, 1984, p.2).
The principles of holographic design provide useful clues with regards to the conditions which enable self-organization. Though organizations cannot be holograms, they can have certain characteristics or properties of a hologram (Mackenzie, 1991). Morgan & Ramirez (1984) believe that if organizations are designed in a similar way, they can be much more responsive and creative, and more capable of dealing with changing circumstances. According to them, it has the potential to help build organizations who are better able to learn how to manage relationships with their environment, and to avoid creating problems which are then to be solved again.

The conditions under which self-organization can occur are:

1) Requisite variety

A system should possess a certain level of variety in its internal control mechanisms, which is at least equal to the variety it meets in its external environment. Only then it will be able to sufficiently deal with changing circumstances, and successfully respond to external threats, as well as opportunities. Therefore, the system must display redundancy, since this increases its flexibility and effectiveness. Each element of an organization should preferably be able to perform a variety of different functions. In practice, this means the people within an organization should be interchangeable and possess multiple skills (Morgan & Ramirez, 1984). Further, each part (person) should have relevant knowledge about the functioning and performing of the overall organization (Streeter, 1992). This diversity is particularly important in order to achieve adaptive behaviour in environments characterised by uncertainty and dynamics. Also, sufficient variety makes it possible to choose from different potential strategies (Andriani, 2001; Streeter, 1992). This variety should be there where direct interaction with the problem takes place, which means localised control and decentralization are favoured (Morgan & Ramirez, 1984). Further, looking at it from a more socio-economic point of view, it can be argued that variety encourages innovation and can help avoid a technological lock-in (Andriani, 2001).
Zoethout (2006) has formulated and tested hypotheses based on this condition of requisite variety. He studied the performance of specialists and generalists in case of both low and high task variety. He found that, in general, performance is better when variety is low, and in highly dynamic situations with high task variety, the behaviour of specialists and generalists grows more similar. These findings seem to contradict Morgan's condition of requisite variety in relation to self-organizing processes. According to this condition a task with high variety is best performed by a group which also displays this high variety. Nevertheless, the experiments carried out by Zoethout (2006) are not based on real life cases, but are conducted with a simulation program. Further, he himself concludes that this subject related to group processes is still not fully understood, and requires further research (Zoethout, 2006). Therefore, it might still prove to be a useful guideline in studying cases of self-organization within the field of renewable energy.

2) Double-loop learning

The system should be able to monitor and question the context in which it is embedded, and also its own conduct and mode of operation. Thus, it should possess a learning capacity which goes beyond skill improvement and simply detecting and correcting errors. It should further be able to challenge and alter rules, values, norms, policies and procedures. This requires a reflective understanding of the nature of the system, as well as the environment in which it is embedded (Morgan & Ramirez, 1984). This line of thought is also consistent with the notion of 'reflexive modernization' (Beck, Bonss & Lau, 2003), which is discussed in a previous chapter. Double-loop learning, which is also referred to as 'learning to learn', should include all members of an organisation. This way the system stimulates the use of available intelligence and initiative. Though initially this might require additional effort and perhaps investments, it will contribute to making the organization more effective in the longer term. It calls for collective, and wide-spread decision-making processes, in order to decide on the appropriate course of action (Morgan & Ramirez, 1984).

3) Minimum critical specification

The internal structure of the system should be specified as little as possible. Only thát should be specified which is really necessary for the system to be able to start operating, in order for the system to subsequently establish its own structure. These so called minimum conditions enable the system to start off and to remain existent. Pre-designing a system as little as possible encourages the use of self-organizing capacities. Thus, keep options open, take changing circumstances into account and avoid fixed patterns and institutionalised processes. This should promote inquiry, research, and critical reflection among members of an organization (Morgan & Ramirez, 1984).

Though Morgan & Ramirez (1984) consider the above mentioned principles to be guidelines in order to create and design self-organizing systems, these conditions can also serve as guidelines in understanding why certain systems have successfully self-organized while others are struggling or have failed.

2.5 Successful local renewable energy initiatives

Considering this research explores the success factors and barriers of self-organization of local renewable energy initiatives, it is important to understand when an initiative is actually successful. Only then it is possible to draw conclusions with regards to barriers impeding this success, and important factors contributing to this success.

Literature review has, to the best of the author's knowledge, shown that there is not a clear definition or understanding of what a successful local renewable energy initiative entails (Ornetzeder & Rohracher, 2013; Feola & Nunes, 2014). It seems to be open to interpretation. For example, success could relate to the size of the initiative; the viability; the extent to which it is growing or expanding its activities; or the amount of renewable energy produced. Further, success could also simply imply that an initiative is able to operate and has not been shut down or failed. Another way of interpreting success is by determining to what extent an initiative has been able to achieve their own goals, or to what extent they have contributed to the (global) energy transition. Though this is by no means a complete overview of interpretations, it shows there are many different ways of determining whether or not an organization is successful, depending on the notion of 'success'.

In the context of this research it was decided to consider 'success' based on the three conditions, as proposed by Morgan & Ramirez (1984), and on a list of success factors which are selected based on literature review and their relevance to this research.

Since the previous section has already discussed the three conditions which enable self-organization, this following section introduces the various success factors which were identified based on literature review. These factors relate to the success of local renewable energy initiatives. They, therefore, differ from the three conditions proposed by Morgan &

Ramirez (1984). Whereas the conditions refer to a certain 'state' of a system which enables social self-organization *in general*, the factors identified based on literature, relate to a specific form and also result of self-organization, namely local renewable energy initiatives.
Based on literature review, it is possible to identify quite a large number of factors which are believed to contribute to the success of renewable energy initiatives. At the same, this means that a lack of these factors could potentially result in barriers to success. The factors which are discussed below, highlight different aspects of self-organization of local renewable energy initiatives.

According to Ornetzeder & Rohracher (2013), the grassroots initiatives that participated in their research consider 'success' in the first place with regards to the impact they have. Looking at it from that point of view, success mainly means that they are contributing to the development and growth of renewable energy and sustainability.
Seeing the initiatives are part of a greater movement, namely the transition to a more sustainable society, it is evident that they are seeking to make a change and successfully impact their community, or society as a whole. The literature on niche experiments helps illustrate this. Niches can be considered as protected spaces where innovative experimental projects can develop outside of the mainstream structures and systems. When such experiments take shape, accumulate and diffuse, they could potentially contribute to radical system-wide transformations (Seyfang & Longhurst, 2013). Since "grassroots innovations are the product of local experimentation" (Feola & Nunes, 2014, p. 233), the local initiatives can be considered as niche experiments, which, if they are successful, might eventually contribute to the development of global niches, and even impact dominant practices, regimes and landscapes in which they are embedded (Ornetzeder & Rohracher, 2013). In this context, building an initiative on a pre-existing structure can, for example, be considered a factor which could contribute to success. Such structures can potentially result in access to "creative spaces of experimentation and learning". They can be an important basis on which networks and new structures can take shape (Ornetzeder & Rohrachter, 2013).
Though it is important to keep in mind that not all grassroots initiatives wish to grow, expand and diffuse (Hargreaves, Hielscher, Seyfang & Smith, 2013), from the perspective of contributing to the global energy transition it can however be considered an important aspect of success. An important factor indicating growth, is the active recruitment of new members. To ensure that the initiative becomes deeply rooted, it is important that new participants are recruited to work with the initial group of enthusiastic people (Hoffman & High-Pippert, 2010).

The self-organization of local renewable energy initiatives can be considered a form of social innovation. This concept refers to "*innovative activities and services that are motivated by the goal of meeting a social need and that are predominantly diffused through organizations whose primary purposes are social*" (Mulgan, 2006, p. 146). In order for social innovations to evolve, it is important for organizations to take part in the right kind of networks (Mulgan, 2006). According to literature, this is one of the critical success factors. It is important to form partnerships and to become part of information-sharing networks in order to learn from others and consolidate skills (Seyfang et al., 2013). Partnerships and collaborations can contribute to the effectiveness of an organization, and can prevent initiatives from becoming isolated. They could also lead to new contacts, and therefore new openings and projects (Feola & Nunes, 2013; Hopkins, 2011). In the context of the transition to a sustainable society, it is also important to use those networks to transfer these experiences and skills to other groups (Seyfang et al., 2013). As a result new information flows, connections, and relationships are established, and as a consequence, the networks grow and are reinforced.
By actively interacting with its context (other initiatives/niches/systems) the grassroots organizations can also contribute to forming and shaping the conditions for their own success or failure (Feola & Nunes, 2013). Thus, forming and maintaining networks and collaborations with other actors/organizations can be considered important success factors.

Since self-organization of renewable energy initiatives takes place in a physical environment, success factors could also be related to this spatial context. The social and institutional relations, as discussed above, are embedded in unique places. The initiatives have an impact on the spatial or physical environment, while on the other hand, the spatial environment could also have consequences for the success of initiatives. It is thus important to realize that 'place matters'. In other words, the local characteristics of a specific place could both contribute to an initiative's success or to its failure. According to Feola & Nunes (2014), there seems to be a relationship between the geographical location and the extent of success. Also, initiatives are more likely to take root in certain places, compared to others.
Certain spatial/physical aspects can either enable or impede the development of local renewable energy initiatives. Spatial feasibility, for example, is an important condition with regards to the development of renewable energy systems. Sometimes certain projects result in dilemmas with regards to, for example, possible degradation of characteristic townscapes. Further, spatial quality and environmental aspects, such as external safety and nuisance, need to be taken into consideration (Planbureau voor de Leefomgeving, 2010). In this context, the proximity of enabling or disabling infrastructure/obstacles is also an important factor. In case of wind turbines for example, power lines could be seen as an obstacle which limits the possible and suitable locations for wind turbines (Devine-Wright & Wiersma, 2013). Regarding solar power, the presence of many trees could limit the available spaces which are suited for solar panels. Also, characteristics of the specific area and population can play an important role. For people in relatively poor or deprived communities, for example, the options to make a change or contribute to sustainability are generally more limited. One of the reasons is a lack of money, and secondly, they often do not own their homes, and are therefore dependent on their landlord for their energy supply (Catney et al., 2014). Further, Feola & Nunes (2013) state that a rural setting contributes to the success of initiatives, since social networks tend to be denser and the level of social capital higher.

Literature reviews also shows that there are quite some factors that relate to organizational and internal aspects, which are also believed to make a significant contribution to the success of initiatives. Examples of these are possessing a legal status, since that makes it easier to interact and collaborate with other actors, such as local governments/agencies and more professional networks (Feola & Nunes, 2013; Mulgan, 2006); and having a large group of founders/steering members, because this could offer a significant organizational capacity (Middlemiss & Parrish, 2010). Also, a large group of people likely means more access to different (social) networks. Other such factors are installing sub groups and limiting internal conflict.

In short, the variety of factors discussed above shows that there is no specific formula of success. There are different ways of looking at it, and therefore it also is important to consider different aspects of success. Besides the factors discussed above, there are still more which also contribute to the success of local renewable energy initiatives. This is, therefore, not a complete overview of success factors. The complete list of factors, as identified based on literature, is attached in Appendix A.

2.6 Conceptual model

Combining the conditions and success factors in order to build a framework, provides a useful perspective on the conditions which facilitate self-organization of local renewable energy initiatives, and the factors which contribute to their success. Also, it sheds light on the potential barriers they could encounter. Therefore, it provides a more complete understanding, which can be used to explore the case studies.

It appeared that, many of the success factors regarding renewable energy initiatives, are related to one of the three conditions which enable self-organization. Therefore, it was decided to group the factors in one of these three categories. However, some factors did not fit in any of these groups. As it turned out, they were mainly related to networking activities and partnerships, and to the spatial and institutional context in which the initiatives are embedded. Therefore, these two categories with the corresponding factors have also been added to the framework. This has resulted in the conceptual model which is presented in Figure 1 below.

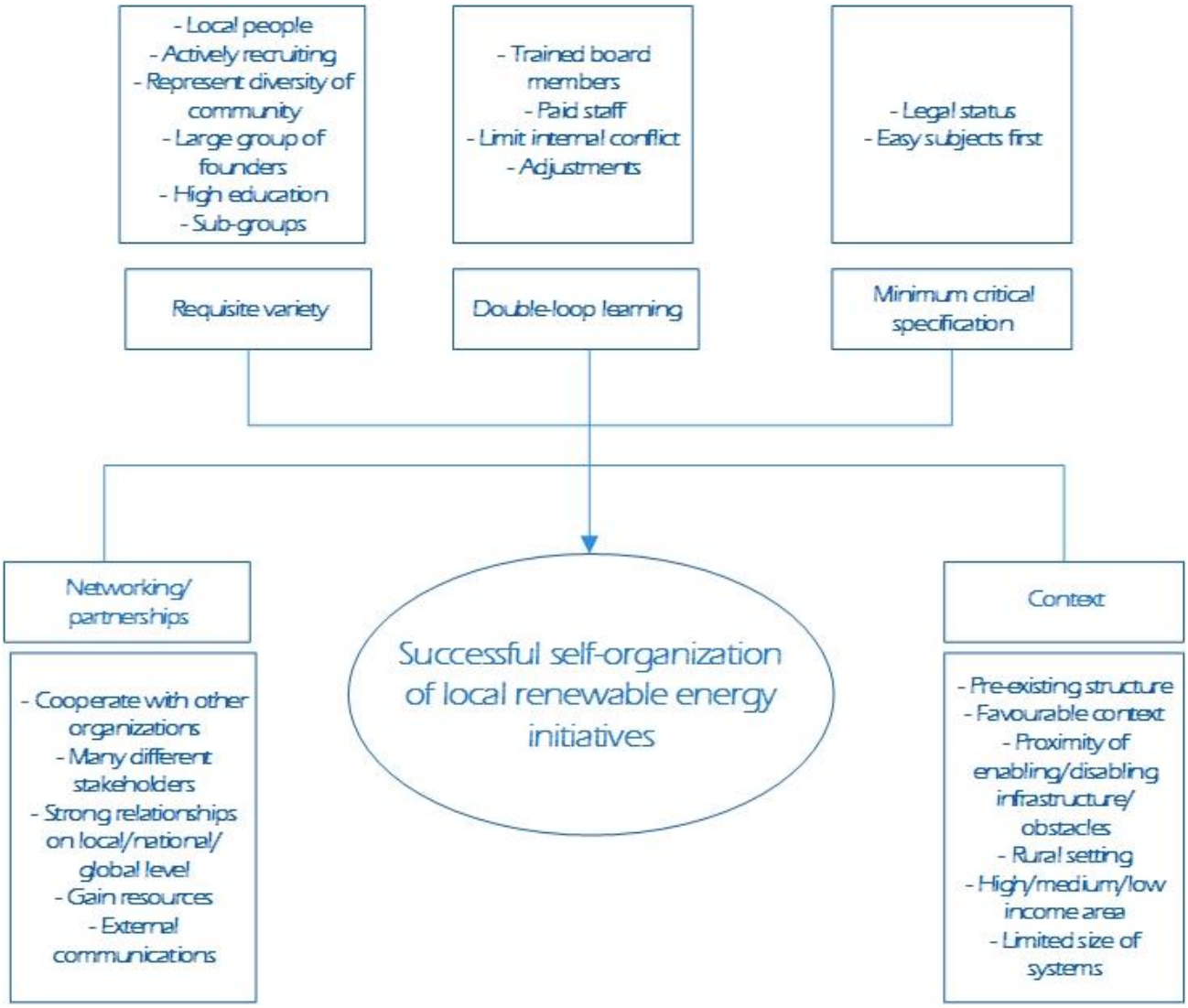


Figure 1: Conceptual model

Literature suggests that the conditions and factors as illustrated above, all facilitate and contribute to successful self-organization of local renewable energy initiatives. This conceptual model has been applied to the six case studies explored in this research, in order to examine whether the importance of these conditions and factors is indeed confirmed in practice.

3. Methodology

This chapter explains which methodological choices have been made in order to conduct this research. It talks about the ways in which primary and secondary data were collected, and explains the way this data has subsequently been analysed.
The approaches and methods are, however, selected based on certain philosophical positions. Methodological choices imply certain philosophical assumptions in doing research, and therefore, these philosophical positions are discussed first.

Human geography research focuses on landscapes and localities, spatial relationships and relationships between people and their environments and places. It is a social science and touches both upon natural sciences, as well as liberal arts/humanities. Social science is involved with the causes and/or consequences of human activity. It aims to explain human behaviour in relation to their dreams, intentions, and ambitions and believes etc. Social science, therefore, fundamentally differs from natural science, which does not include human qualities (Flowerdew & Martin, 2005). Considering this research focuses on groups of citizens who have certain reasons/motives for self-organizing a renewable energy initiative, and who can reflect on their experiences, this research calls for an anti-naturalist approach and employs a hermeneutical understanding. Adopting a hermeneutical stance means considering human activity as meaningful behaviour, which can be interpreted by the researcher.

Further, this research emphasizes the notion that people are capable of being creative and reflective, and that they are moral beings. Therefore, it is also linked to humanist ideas. Key concepts of humanist social science are the idea that human beings are characterized by consciousness and intentionality. It is assumed that people intend to do certain things (such as starting off a local renewable energy initiative) and decide to do so, based on personal reasons, beliefs and values (Flowerdew & Martin, 2005). These assumptions are also reflected in the theoretical framework which is built (among other things) on the concepts of reflexive modernization and self-organization of social structures and systems, which are characterized by a freedom of conscious creation. At the same time, this research is also based on the idea that human choices and actions cannot be completely understood without looking at the context in which they are embedded.

Semi-structured, in-depth interviews are people-oriented, because they allow for a wide-ranging conversation which differs for each interview, depending on the interests and experiences of the participants. Since local initiatives are constructed of unique social, cultural and political elements which are embedded in a unique spatial context, it important to explore their (unique) experiences. Interviews provide a valuable means of understanding processes which take place in particular social contexts (Flowerdew & Martin, 2005). Considering the research focuses primarily on people; the way they self-organize; and their personal experiences, this methodology was believed to be appropriate. Besides this, other sources of information were also employed in order to gain a deeper understanding of the cases. These sources include literature, the initiatives' websites, newsletters, websites of other organizations, documentaries, government websites, and social media.

In order to be able to compare the cases to each other, similar cases were selected through the website of 'HIER opgewekt', which keeps a database of nearly all Dutch local energy initiatives (HIER opgewekt, 2015). A total of 8 initiatives, located in the North of the Netherlands, were contacted, out of which 6 agreed to participate in the research. All of them are initiated by citizens. The researcher travelled to the participants and carried out semi-structured interviews. One in-depth interview was conducted with participants from each of the initiatives. The interviews took between 1-3 hours and were carried out over a period of three months. The number of participants per interview varied from 1-2. Further, all of the interviewees were board members of the initiatives. Table 1 below provides some information about each of the initiatives that took part in the research.

Initiatives	Year of registration	Key activities	Target area
Duurzaam Menterwolde	2013	Promote solar power; reseller of renewable energy; support other community initiatives	Municipality of Menterwolde
Eco Oostermoer	2012	Realize local fibre optic infrastructure; promote and reseller of renewable energy; improve quality of life in rural region	The municipalities of Aa en Hunze; Borger-Odoorn; Tynaarlo.
Pekela Duurzaam	2013	Promote solar power; stimulating energy saving measures; create an energy neutral village; reseller of renewable energy	Municipality of Pekela
Energie Coöperatie Noordseveld	2011	Reseller of renewable energy; promote solar power; advice regarding energy saving measures	Municipality of Noordenveld
Stichting Duurzame Energieprovincie	2012	Custom-made advice on energy saving measures; reseller of renewable energy	Primarily the provinces of Drenthe and Groningen
Hooghalen Duurzaam	2011	Energy saving measures; raise awareness/share knowledge regarding renewable energy and sustainability; support other relevant local initiatives; promote solar power	The village of Hooghalen and its vicinity

Table 1: General information initiatives

The interviewer carried out some background research on these initiatives before the actual interviews took place, by browsing their websites and exploring other sources such as newspapers and newsletters, PowerPoint presentations, social media etc. In advance, the interviewees were informed about the topics and line of questioning they could expect, so that they could prepare for the interviews. Furthermore, each interview was recorded with the permission of the interviewees.

The interviews were structured based on the conditions for self-organization, as proposed by Morgan & Ramirez (1984), in combination with the (critical) success factors for self-

organization of renewable energy initiatives, as identified based on literature review. After conducting the interviews, they were transcribed and the data was analysed and categorized, based on the conceptual model. This conceptual model is built on literature review, and combines both the theory of holographic principles and literature on success factors of local renewable energy initiatives. This way, both aspects of the research problem (self-organization and successful local renewable energy initiatives) are thoroughly addressed.

Based on this analysis, it was possible to derive the findings which are presented in chapter 5, the discussion section. Literature on the energy transition, reflexive modernisation, and self-organization were used as background knowledge regarding the setting in which self-organization of local renewable energy initiatives takes place. It served to put things in perspective. The theory of holographic design and the literature review on success factors of local renewable energy initiatives were used to structure the second part of the findings section and identify potential barriers and success factors. Further, it was used to compare the case studies and other data to the findings in literature. This way, different perspectives and sources complemented each other, which allowed for triangulation of the data.

4. Data

As explained in the methodology section, in-depth interviews have been conducted with six different local renewable energy initiatives, started off by groups of citizens. All interviewees were more or less asked similar questions, which makes it easier to compare differences among them. In addition, their websites, official documents, and publications have been studied in order to gain a better overall understanding of the initiatives and the way they organize themselves.
This section provides an overview of the data that has been collected in the course of this research. The data is primarily categorized based on the different conditions and success factors, as illustrated in the conceptual model. Further, it also includes data regarding the barriers experienced by the participants, and other related information regarding their personal experiences with organizing a local renewable energy initiative.
Each of the participants has also provided some advice/tips for other starters in this field. These are presented at the end of this chapter.
For more generic information regarding the initiatives (such as their motives behind self-organizing a local renewable energy initiative; the current phase the organization finds itself in; membership options; number of solar panels installed etc.) refer to Appendix B.

In order to obtain a better overview, tables are sometimes used to present the data. In the tables, the different initiatives are sometimes assigned a number between 1 and 6. The table below shows the numeric code for each of the initiatives. In some cases, an abbreviation of the initiative will be given, instead of a code. The abbreviations are also presented in the table below. Henceforth, these codes and abbreviations will be used to refer to the initiatives.

Numeric code	**Initiative**	**Abbreviation**
1	Duurzaam Menterwolde	DM
2	Eco Oostermoer	EO
3	Pekela Duurzaam	PD
4	Energie Coöperatie Noordseveld	ECN
5	Stichting Duurzame Energieprovincie	SDE
6	Hooghalen Duurzaam	HD

Table 2: Numeric codes

4.1 Requisite variety

Diversity and backgrounds
The condition of requisite variety refers mainly to the people in an organization. It calls for a variety of people and skills, in order to successfully deal with changing circumstances, barriers and also opportunities (Morgan & Ramirez, 1984). The case studies show that there is quite a large variety in professional backgrounds of the board members. The DM initiative, for example, is founded by a group of people, including a gardener/business owner, an accountant, a general practitioner, someone with a legal background and someone holding a government position. The other initiatives have a similar variety of professional backgrounds, with most people enjoying relatively high level employment, which is likely the result of high education. Further, most of the initiatives include at least one member who has a government position. For a complete overview of the various backgrounds of all of the board members, refer to Appendix B.
It was also found that many of the board members take part or have taken part in other extracurricular activities, and are or have been active in their local community, for example as a volunteer, on the village council or in local politics, associations or labour unions.
Though four out of six initiatives believe there is quite a diverse group of people involved in their organizations, two of them, however, mentioned that they are mainly older (50+) people. Also, one participant thought the middle class is comparatively better represented.

Considering one organization is limited in size (3 persons), this topic was not very relevant to them.
Regarding gender diversity, it was observed that all the board members taking part in the interviews were male. Further, out of the total number of 36 board members (total of the six initiatives), only seven are female whereas twenty-nine are male.

Board members and membership
The initiatives were all founded by local people, though the founders do not necessarily originate from the specific region in which the initiatives are located. In case of initiative PD, five out of six board members were not born and raised in the municipality, but have only moved there at a later stage. Further, the number of board members varies between 3 and 9.
At the time of the interviews, only 3 of the initiatives offered the option of (paid) membership. The number of members varies quite a bit, with one initiative having 100 paying members, whereas the other two initiatives 'only' had 14 and 30 members. Further, the smallest organization, started off by only 3 persons, had drafted custom-made advice for about 200-250 customers. Also, it appears quite common for other enthusiastic non-members to be involved in the organization as well. Four of the organizations have about 10-25 non-members involved in organizational activities.

The extent to which the organizations are actively recruiting members also differs. At the time the interviews were conducted, remarkably none of the organizations were actively recruiting members. Two participants mentioned they are currently not recruiting members, because they were still in the initial stages and it was not clear yet what the cooperative will offer the members. Another reason why the initiatives were not actively recruiting is related to external circumstances. At the time of the interviews, there were some ongoing developments regarding the NLD. This umbrella organization was still awaiting a licence, required for energy supply. Once they would acquire this licence, the initiatives were planning to join and become resellers. In anticipation of these developments and to await more clarity, they temporarily slowed down their recruitment activities.

Positions, tasks and sub-groups
All six organizations have a chairman and five out of six also have a secretary and a treasurer on their board. The board members usually stay on for a period of three years, after which members have an opportunity to vote for new board members. In most cases, the other remaining board members who have not been allocated any of these three positions, assist the other three board members, or focus on a variety of tasks, and can therefore be considered "jack-of-all-trades", as one interviewee described.
The majority of the initiatives have installed sub-groups or working groups. These groups focus on a specific theme, project or group of tasks. The sub-group which was most often mentioned concerns PR. The working groups are primarily manned by board members and non-members who do not have a fixed position or specific task. For a complete overview of the various working groups, refer to Appendix B.
Some organizations have not installed working groups, but have allocated similar tasks to board members.

Division of labour and involving other people
Besides the tasks of the chairman, secretary and treasurer, the remaining work is often divided depending on availability of time, personal interest and experience/expertise. In general, the board members take up quite a wide range of tasks, such as goal setting, building a website, recruiting members, promoting renewable energy, collecting data and organizing activities/events. People tend to take up the work they like doing, as and when something is required. They also take turns with regards to performing certain roles and tasks. Division of labour therefore often takes place whenever work comes along, and not always in advance. Further, the working groups generally take up whatever work is related to their theme. Especially in the early stages when an initiative is starting off, the task allocation and division

of labour are largely characterized by flexibility and based on personal interest and skills. The oldest initiatives seem to have a slightly more fixed and structured distribution of tasks and positions, compared to the younger ones.

Half of the organizations (actively) seek involvement and suggestions/help of non-board members, for example by taking part in a working group. The other organizations are merely run by the board members who conduct all the work themselves, though two of them hope that in the near future more enthusiastic people are willing to contribute ideas and help promote the initiatives' activities. The other organization is deliberately small in size, in order to remain better control and overview.

4.2 Double-loop learning

The condition of double-loop learning refers to the learning capacity of the organization. This should include more than just skill improvement and detecting errors, and therefore, it requires a certain reflectivity of the organization as well as its context (Morgan & Ramirez, 1984).

Information collection

In order to run an organization and outline its future course, certain information and knowledge is required. The participants get the necessary information and knowledge from many different sources. Their main sources are the government and the internet. Also, newsletters and universities were both mentioned more than once. Other sources include municipal and provincial regulations, experts, companies, agencies and meetings that were attended. Further, it is unknown whether the board members received any specific training. None of the participants mentioned any such thing, so therefore it seems unlikely that they did. The board members do, however, regularly attend lectures, network- or information events organized by the umbrella organizations or other institutions.

Un-paid staff and decision-making

In most cases, decision-making processes include only the board members. Regarding important issues, for example when a lot of money is involved, the other members sometimes also have a vote. Occasionally, decisions are taken based on expert advice. Though one participant mentioned that the board members have intense discussions with regards to future directions, they do not fight. He believes a conflict at times is only healthy. Three other initiatives have also come across differences in opinion, but nothing too serious. The other two participants say they have not experienced any internal conflicts. Nevertheless, in all of the cases the initiatives seem to be able to manage (possible) conflict in a positive way.

All of the initiatives are completely run by volunteers. Though some people even invest multiple days per week, they do not get paid. This can partly be explained by the fact that there is a relatively high number of retirees. The members who do have normal (full time) jobs, however, sometimes feel they lack time to dedicate to the initiative. Therefore, and also considering it is unpaid work, the participants feel it is in their personal interest to work efficiently. One interviewee also mentioned that it is not smart to exhaust the board members if you want to be in it for the long run. The work load or expected effort should remain manageable. On the other hand, always finding fast or cheap solutions is neither the goal. Sustainability and quality are definitely important. Another participant mentioned that, since they are all volunteers, they have the freedom to do things their own way, and at their own pace. There is not much pressure, but they do, however, want to do a good job. Lastly, quick solutions do make it easier, and when there is a chance to, for example, save money, this encourages people and instigates enthusiasm.

Learning and adjusting

Within the organizations there does not seem to be much attention (yet) for formal evaluation and reflection of their approach and results. It takes place in some occasions, to some extent,

but it has not become a custom yet. Evaluation mainly happens unplanned and in an unofficial manner, though two of the initiatives believe it would be good to more consciously evaluate with all the people involved. However, this is more likely to take place at a later stage, when the organizations have been running for a while.
Unofficially, reflection does seem to be part of the learning experience. As one board member explained, they are continually adjusting along the way. "*We learn as we grow*". Further, the board members keep discussing among themselves, and deciding on, their approach, and course of action.

Regarding adjustments, most of the initiatives have not implemented any significant improvements yet. Two participants, however, mentioned that their initial focus has expanded to a larger scale. Another participant explained how they have been working on professionalizing their organization, without commercializing their approach.
A more practical example of an improvement refers to the securing of funding. SDE, which drafts customized advice for people, would initially ask them to donate 10 Euros afterwards, but since people would regularly not transfer any money, he decided to charge a one-time fee in advance. All in all, the interviewees found it hard to come up with examples of any changes made.

Feedback
The initiatives do, to some extent, receive feedback from paying members, and also non-members, but not frequently. In case they do, it is mainly negative feedback (criticism). One participant even received threats from outsiders. He opposes the installation of large wind turbines, which is not always appreciated by farmers in the region who (can) receive subsidies for them. However, usually 'feedback' is not such a serious matter. One initiative had to deal with scepticism in the region, because some people felt the organization had not achieved much in two years. Lastly, one of the organizations has received criticism from the people in their working groups, who were arguing that the board members leave most of the workload up to them.

4.3 Minimum critical specification
Minimum critical specification refers to minimal design and limited structure in order to encourage self-organization processes.

Legal status
All of the initiatives participating in this research are officially registered. At the time of the interviews, four of them were registered as a cooperative, while the other two were registered as a foundation. Therefore, all of them have a legal status, which makes it indeed easier to interact and collaborate with certain actors (Feola & Nunes, 2013; Mulgan, 2006). For instance, it is required to have a legal status in order to be able to join the regional NLD and become a reseller of renewable energy. Further, without a legal status an initiative is unlikely to qualify for subsidies etc. It does leave no room for ambiguity, considering a cooperative and foundation have to draft a mission statement etc. Also, the legal structure of these organizations are designed to make it possible to represent and protect certain interests. Since the organizations are bound by certain rules, it also provides a lot of clarity towards (potential) members, customers and partners.

Easy subjects first
The initiatives participating in this research do not necessarily address easy subjects first, and move on to more complex ones at a later stage. However, it can be observed that they tend to focus on a more narrow approach in the early stages of the initiatives, whereas they sometimes expand their range of activities later on. In a few cases, the initial idea was to collectively purchase solar panels with other members of their communities. Once this turned out to be successful, they have started organizing other activities as well. Only one of the initiatives

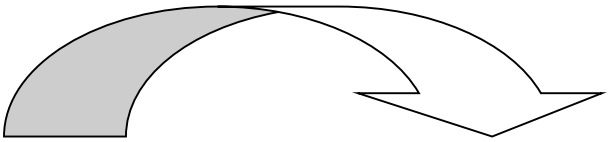
started with a fairly broad approach. This organization wants to focus on different aspects of sustainability, such as liveability and different sources of renewable energy.
Though some have drafted an initial plan and laid out a structure, these plans generally comprise relatively vague and ambiguous goals without a clear roadmap.

Internal structure
In order to be able to officially found a cooperative, it is required to have written bylaws. The bylaws describe the relevant rules and procedures, such as the appointment or resignation of board members. They also contain relevant information about the organization, such as their objectives, annual contribution, and the rights and obligations of members. At the time of the interviews, five out of six organizations had drafted such bylaws. Two of the interviewees mentioned that, since their organization was established, they do not apply or use their bylaws much, unless they are not able to solve things or work things out together. One of them further explained that only these things which are really required or necessary have been written down. They do not have the intention of becoming bureaucratic.
Another participant, on the other hand, told that his organization tends to gradually establish more rules, procedures etc. in order to become more professional.
Overall, not much seems to be specified at the beginning. In most cases, it is just a legal obligation. In general, the structure seems to grow gradually over a period of time.

Informal character
Most of the initiatives have an informal character. Work is often divided on the spot, and based on personal interest/skills. Further, meetings often take place in their own homes, and are said to be both fun, serious and informal. One participant mentioned that the role of chairman is not even really needed, since it is only a small group of people coming together.

4.4 Networking/partnerships
It is not unusual for organizations to be engaged in networking and help out other initiatives with similar objectives. In many cases, the initiatives turn to each other, and also to other agencies and organizations, for help, and/or to set up partnerships.

Cooperate
Four of the organizations have been in touch with, or (have been) advised (by) one of the other organizations which were interviewed. So, though the organizations were all selected and interviewed independently of each other, the interviews revealed there are ties between some of them. Figure 2 below shows for each of the organizations whether they currently or in the past have worked together or have been in touch with other organizations.



DM	EO	PD	ECN	SDE	HD
Regular contact with PD (role model).	Initially in touch with ECN, who encouraged them to set up their own initiative. They have also invited other organizations to give speeches etc.	DM advised them with regards to drafting bylaws.	Regularly asked to give presentations in other places	Tries to work with, and advise local governments.	Consult with other villages (village council etc.). Also people from other villages come to down for advice.

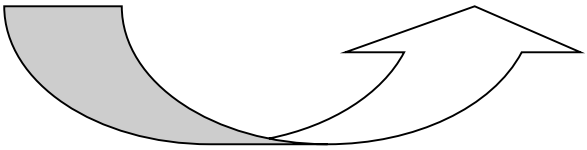


Figure 2: Networking of initiatives

Umbrella organizations

All of the six organizations taking part in this research are now connected to a relatively new umbrella organization, namely Noordelijk Lokaal Duurzaam (NLD), what stands for Northern, Local, and Sustainable. This is a renewable energy supplier targeting the north of the Netherlands. It is founded by the three umbrella organizations representing the three Northern provinces in the Netherlands (Ús Koöperaasje, Drentse Kei & GrEK). Each of the six interviewed organizations is a member of one of these three organizations, depending on the province they are situated in. The local organizations can be considered retailers of renewable energy for NLD. They receive a fixed payment from NLD for each customer they acquire. The provincial umbrella organizations help people set up and support local initiatives, and serve as a platform for the members to share their knowledge and experience. They also promote local renewable energy and inform people on public events and market places.

Some of the board members of one of the interviewed organizations also actively participate as commissioners in one of the umbrella organizations, and another organization is also looking to contribute in this way.

Figure 3 below shows the organizational structure of the umbrella and local organizations.

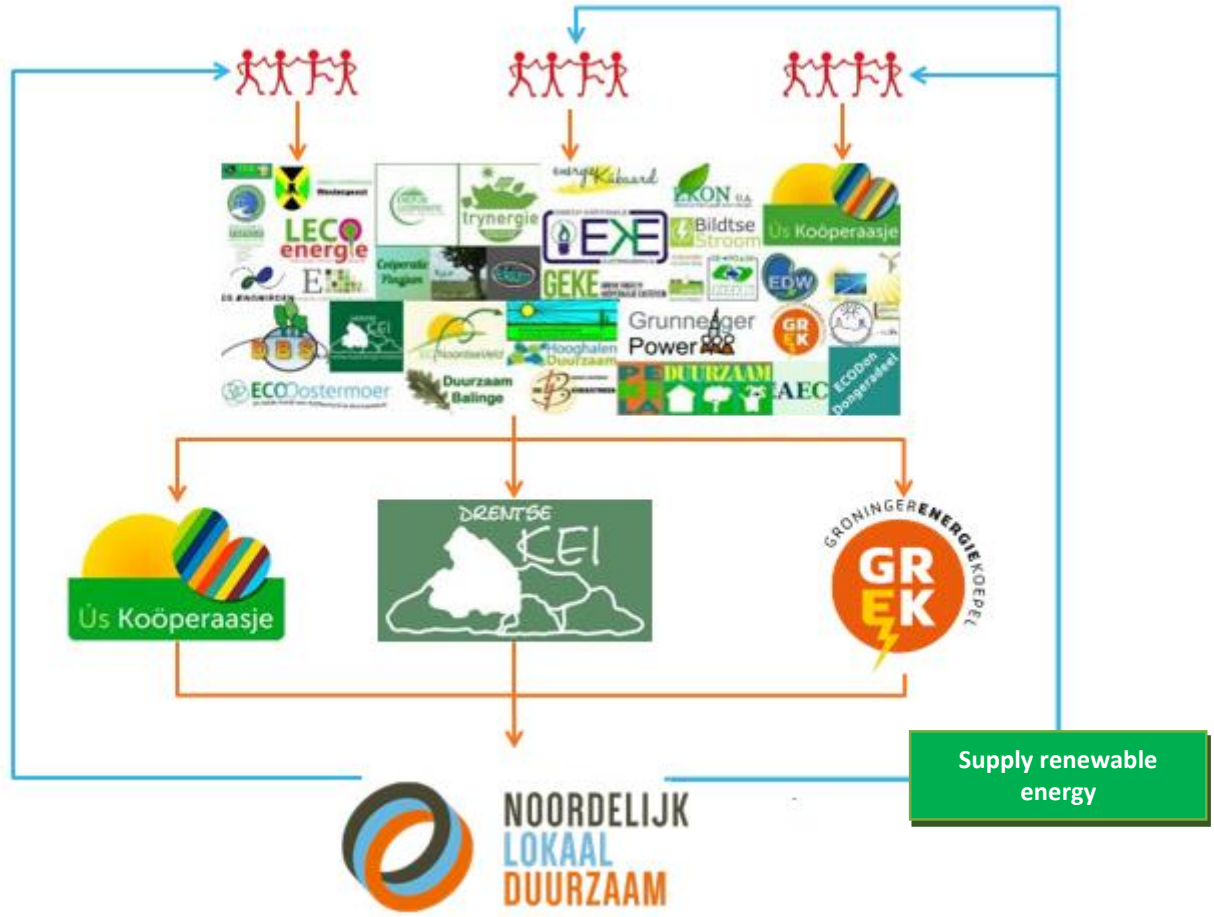


Figure 3: Organizational structure (Source: www.noordelijklokaalduurzaam.nl)

Stakeholders and relationships
Since different stakeholders have access to different resources, it is expected to be useful to maintain relationships with many different actors/stakeholders (Seyfang & Longhurst, 2013). Based on the data, the following stakeholders can be identified:

- Umbrella organizations (both provincial and regional)
- Municipalities
- Provincial government
- National government
- Village councils
- Other cooperatives
- Nature & Environment Federation
- (Local) businesses (e.g. sales/installment of solar panels)
- Housing association
- Interest groups
- Energy (related) companies
- University/schools & other research institutes
- Customers
- Other local projects (e.g. Smart Living; Community Center)
- Local organizations/associations
- (Local) organizations promoting sustainability (e.g. Stichting Samen Energie Neutraal [translation: Together Energy Neutral])
- Collaborative partnerships (e.g. Samenwerkingsverband Noord-Nederland)

Just to clarify; not each of the initiatives maintains relations with all of the above mentioned stakeholders. Further, it is likely that some are left out.

Most of the relationships with the actors/stakeholders mentioned above, are on a more local (including regional) level. They are mainly local governments, local organizations and local companies. Only one participant mentioned they work with a foreign company on a certain project. Other international/global actors never came up. The initiatives also do not really maintain many relationships on the national level. Examples of stakeholders at the national level are the national government and the knowledge platform 'HIER opgewekt', which supports the initiatives, and facilitates knowledge sharing.

Support and resources
Their primary income generally consists of membership fees and profits from energy sales. Particularly the membership fees can be considered fixed income streams, which are therefore a secure source of funding. However, at the time of the interviews, only three of the initiatives had a paid membership option.
Further, some initiatives receive a municipal subsidy to fund (part of) their activities. Most of the initiatives also inform people/citizens about the different options to apply for subsidies themselves, for example, in order to purchase solar panels. For most of the initiatives it is necessary to raise funds, in order to be able to carry out their work. They use it to cover the expenses of the initiative, such as advertising and organizing events and campaigns.

Besides financial resources, they also receive support from the umbrella organizations, other local initiatives and organizations in the form of advice and knowledge. Further, some of the initiatives have worked or are working with knowledge institutes, such as universities and other schools and research institutes. They conduct research, for example based on a community perception survey, and provide the initiatives with the outcomes of their research.

External communications
External communication refers to the transmission of information between the initiatives and other people or entities in the organizations' external environment. They could be (potential) customers, suppliers, donors, governments, other stakeholders and society at large. The data shows that most of the initiatives use a range of different communication tools. In general, they employ both online and offline tools, such as local newspapers, flyers, digital newsletters, brochures, Facebook, Twitter, websites and blogs. There are, however, differences with regards to the degree of professionalism, and the amount of time and effort invested.

4.5 Context
The situational context in which an organization is embedded, can influence processes of self-organization. At the same time, the initiative is also likely to impact the context.

Pre-existing structures
The idea to self-organize a renewable energy initiative often arises in a group setting. This could be in an informal setting, such as a neighbourhood barbecue or a night out at the local pub, but it is (perhaps more often) during an organized event or meeting, such as a village council meeting or an energy market organized by the municipality. With regards to the case studies conducted for this research, the data shows that in at least four cases the idea originated in a more organized group setting. Whereas a village council can be considered a pre-existing structure, this is not really the case with an energy market or information event. The small group of founders do, however, tend to tap into their pool of neighbours, friends, acquaintances etc. in order to complement the group and construct the necessary community capital.

A favourable context
The data shows that an important element of the initiatives' work is to convince other actors to support them and contribute to their organization and their goals. Not all of the initiatives are situated in a completely favourable context. One of the initiatives has even experienced hostility among people in the community, because the initiative strongly opposes the installation of large wind turbines as a means of renewable energy. Another participant told that certain people in their community expressed scepticism with regards to the achievements of the initiative. They felt the organization had not achieved much in the past two years of preparation.

Proximity of enabling/disabling infrastructure and size of the energy system
Since the initiatives focus primarily on solar power, there are not as many disabling infrastructures as you would expect in case of large wind turbines. Houses with a thatch roof are not suitable for solar panels. One of the participants lives in a village where a relatively large number of houses has such roofs. In their case, wind turbines are also not really an option because the village is located near forests. Therefore, they are exploring different options of renewable energy. One of the other initiatives also met with quite some cases in which solar panels could not be installed on roofs, because of a lack of sunlight exposure. Further, in one of the Northern provinces (namely Drenthe), there are many protected townscapes and historic buildings, where the instalment of solar panels is often not allowed on roofs which are visible from the streets. The initiative discussed this with a local municipality and eventually it was decided that solar panels could also be installed on the ground, for example in a garden or at the edge of an agricultural plot.

Considering the initiatives participating in this research primarily focus on solar power, and other smaller energy saving measures, it can be concluded that the size of the energy systems is generally limited. This would become a different story in case they start promoting and constructing solar farms, but as of now that is not the case.

Rural setting and population decline
All of the initiatives participating in this research are located in villages in the countryside. Most of the regions are characterized by agricultural land use.
Two of the initiatives are located in a region where the population is shrinking. It is characterized by relatively low incomes, and a relatively high percentage of low-skilled employees, low-literacy and unemployment (Bureau PAU/Bureau Louter, 2010; CMO Groningen, 2011).

4.6 Personal experiences
Most of the participants do not consider it to be very difficult to set up a local renewable energy initiative. However, the interview data shows that they all encounter some barriers. Further, they were also asked about their needs, their own personal experience with self-organizing an initiative, and finally, they were asked to give some tips/advice for other potential start-ups.

Degree of difficulty
All of the interviewees were asked to assign a 'degree of difficulty' with regards to the process of setting up a local renewable energy initiative. They could select one of the following scores and were further asked to explain their choice.

1) Very easy
2) Easy
3) Fairly easy
4) Somewhat difficult
5) Difficult
6) Very difficult

Table 3 below contains the scores and their explanation for each of the initiatives. Some of the interviewees assigned two different scores, which correspond to the difficulty level of two different phases of the organizational development.

Initiative	Score	Explanation
DM	2 (fairly easy)	Previous experience with other organizations help.
EO	5 (difficult)	- It can be easy if you just focus on solar panels, but our focus is really broad; - Each of the working groups might eventually start a private company, which results in a complicated structure; - We need a lot of time to prepare. We need to think of all the legal aspects, ownership etc.
PD	2 (fairly easy) 4 (somewhat difficult)	- Starting off a formal cooperative is the first step, and it is not hard; - Organizing concrete activities and deciding on the future course is pretty difficult, though after that it should again become easier.
ECN	1 (very easy) 5 (difficult)	- Starting of a formal cooperative is simple; - Keeping it running and maintaining the cooperative is more difficult. At some point enthusiasm fades.
SDE	1 (very easy)	- It is simple. Only acquiring finance is problematic.
HD	2 (fairly easy)	- Setting up a foundation is not difficult, but organizing and maintaining it is a little harder, just like working on achieving your goals.

Table 3: Degree of difficulty

Barriers

The main barriers that the participants experience with regards to setting up and running a renewable energy initiative differ to some extent. Their answers to this open question are displayed in table 4 below.

Initiative	Barriers
DM	- Not many problems. Initially: how to finance our plans? But did not turn out to be very difficult. Renewable energy is a relevant topic and access to money is not that hard to find.
EO	- Lack of time. It requires a lot of preparation time. - Dependency on other parties/stakeholders. They were about to sign a contract with an energy supplier, which then went bankrupt. - How to finance plans? (e.g. Local fiber optic infrastructure)

PD	- Making the transition from a loose-knit initiative to a cooperative. Takes time. - Concretizing plans ('saving energy' is quite a vague concept). The ideas need to be more specific to actually work on them. - Who do we target? Which area? Time schedule?
ECN	- Legislation: opportunities are limited. - Convincing people (marketing/communication strategy is required). People also tend to forget who we are and what we do. Necessary to keep repeating the same message in the media etc. - Sustainability is not a hot topic/priority among a certain generation (age 25-45). They are too busy with their families and careers. - Municipalities can be an obstacle. They are all different. Some are easy to work with but with others it is hard to convince them to help out: it is a constant struggle. - Keeping it up / maintaining the cooperative.
SDE	- Difficult to get loans for low-income households who want to invest in sustainability or save on energy costs. - Financing - It is hard to reach and convince people and governments. Especially governments do not take initiative. - It is hard to get access to the people in power; it can be quite an arduous and painful process.
HD	- Difficult to reach people and to motivate and convince them to come and join. - You need to have enough space and sunlight for solar panels. - Regulations (e.g. you cannot produce more than you need and sell it to your neighbor). - Thinking of new things (events/activities etc.) to attract new people - Keeping enthusiasm high/alive. - Sometimes lack of time because they also have normal paid jobs.

Table 4: Barriers

Needs
Besides asking about the barriers they experience, the initiatives were also asked about their needs. Many of their needs are related to better publicity and PR. Also, some feel they need more resources (time, people, funding, knowledge), in order to be able to run more different projects and organize bigger events.

Positive learning experience
When asked about their experiences, three out of six organizations explicitly mentioned they consider this process of setting up and running an initiative as a positive learning experience. However, when asked to explain this, they all came up with different reasons. One participant mentioned that it created positive energy, seeing that people showed interest in their plans. Another person explained that this experience changes the way you look at things. *"You see more opportunities and become more consciously engaged in socially relevant issues and changes"*. According to a third one *"it is something very new and different. It is different from previous board experience because nothing is laid out (specific) yet. It is also nice to meet new people and expand your social network"*.
The other organizations did not specifically say whether or not they consider this process to be a positive experience, but one of them told that "*As and when you grow, you professionalize your organization. You learn from the past and from other organizations; how to do it, and how not to do it*". An interviewee from another organization emphasized it can also be a frustrating experience sometimes. "*Many people I talk to like my ideas and say they are interested, but then I never hear from them again. And the government is lacking to take up its responsibility. But I keep on going; because once I decide to do something I fully commit myself to it*".

Tips & advice
At the end of the interviews, the participants were asked which advice or tips they would give to a group of people (or a person) who is also thinking about setting up a similar initiative. As can be observed in the table below, there are few similarities among the tips they provided, though most of them are related to the people in an organization.

Initiative	Tips & advice
DM	- Just go for it. Do not be afraid to try. - And with regards to solar panels: the payback period for solar panels is relatively short which makes investing interesting. It helps to convince people.
EO	- Come and talk to us. We know which barriers others might come across, so we might be able to help.
PD	- Gather a group of enthusiastic and motivated people around you, and figure out what everyone would like to do, and if you are all on the same page. People who lack motivation will drop out at some point. Make sure you gather a sufficient group of people around you to 'choose' from. Also for support. - Use the expertise of the people involved. You have to be able to rely on your own capabilities. That is what you have to work with.
ECN	- It is important that the board members obtain the necessary know-how (regarding technical, financial, and communication issues). - Also find someone who is good with social media (website, Face book, Twitter, LinkedIn etc.).
SDE	- Many local initiatives turn into discussion groups. Then people start dropping out, because they want to actually do something; so do not waste too much time talking. - Also do not focus too much on reaching a consensus, because this will result in compromises. - Try and give tailor-made advice to people. - It is not necessary to purchase solar panels together; I also get the maximum discount from various suppliers. - And buy now! Now you can still recover the full VAT deduction.
HD	- You need enthusiastic people to pull this off; committed people who know what they are doing and who are willing to make an effort. - You need people who are also capable of setting up a proper organization. An organization characterized by harmony and where people accept each other. - It is good to have a wide social network in your town/village; it helps if people know you. - It also helps if you are an extrovert. Being an introvert it does not appeal to people. - Do not try to be a wiseacre; do not think you know better than others.

Table 5: Tips and advice

5. Discussion

Now that chapter 4 has presented the most relevant data that was collected in the course of this research, this chapter further discusses the findings, in order to address the research questions. Chapter 5.1 addresses sub question 1: How is self-organization of local renewable energy initiatives established?
This is followed by chapter 5.2 which explores the second sub question: How is self-organization of local renewable energy initiatives established? This chapter is mainly structured based on the conceptual model and the data section.
The findings are based on literature review and the six case studies that were conducted in the context of this research.

5.1 Self-organization of local renewable energy initiatives

In the transition to renewable energy, local energy initiatives can play an important role. As is previously explained in the theoretical framework, they can be considered "niches of innovative practice" (Seyfang & Smith, 2007, in Middlemiss & Parrish, 2009). When they are successful, this could result in new, more sustainable, structures and patterns (Middlemiss & Parrish, 2009). This section expands on the way self-organization of local renewable energy initiatives takes place in the North of the Netherlands. It does not merely present a list of the various consecutive steps taken, but focuses mainly on the structure of the organizations, how they take shape, and how they are embedded within larger networks.

It all begins with an idea
The question is: what are the motives behind the idea and where does it originate?

According to literature, important motives for such initiatives are:
1) producing and promoting renewable energy;
2) increasing social cohesion;
3) investing profits in the local community (Van der Schoor & Scholtens, 2015)

Though only six initiatives participated in this research, their motives are only partly consistent with the ones identified in literature. The two most frequently mentioned motives behind starting off a renewable energy initiative are 1) an interest in, and a wish to contribute to a more sustainable society and renewable energy, and 2) a sense of support from the local people. Though, the first one matches the one mentioned above, the second one (which is mentioned just as often) is more surprising. However, this motive should probably be considered as a secondary or derivative motive, since in itself it does not seem a sufficiently strong or convincing motive. Nevertheless, it is an important condition for success, which probably explains why it is considered a motive by the participants. Some of the other motives mentioned also do not seem to be purely motives, though they apparently do play an important role. For example, encouragement/support from the local government, or successful examples of other existing initiatives contribute to the decision to start off an initiative but in itself it does not seem a sufficient motive. Considering most participants mentioned multiple motives, it appears that there is generally a set of reasons, which together form the motive for such initiatives.
Further, it was noticed that none of the initiatives participating in this research referred to financial/economic incentives, such as profit maximization or savings as a motive. This can be explained by the fact that it is about social innovation. The decision of a group of people to self-organize renewable energy is motivated by the vision of providing for a social need (Mulgan, 2006). This is considered a purpose or mission that cannot be achieved alone. That probably also explains why support of the local community is considered an important motive as well. Especially in the early stages it is essential for the initiative to be supported by a sufficient group of people, in order to successfully take-off (Mulgan, 2006). In order for the

local community to offer support, they need to be able to trust the local group (Van der Schoor & Scholtens, 2015).

With regards to the question where the idea originates, it seems that such ideas often arise in a group setting. Two of the participants in this research mentioned that the idea to start of an initiative originated during a village council meeting. In another case, the idea sprang from a local political party, whereas another participant mentioned that, in their case, the idea originated among some locals attending an energy market organized by the municipality. Feola & Nunes (2013) also found that it is quite common for grassroots initiatives to originate from and/or build on pre-existing networks. It also shows the importance of communicating ideas and the process of creating shared visions in a group setting, which is again confirmed by literature (Mulgan, 2006; Van der Schoor & Scholtens, 2015, Seyfang et al., 2013). It emphasizes the characteristic bottom-up approach of these grassroots initiatives. "Bottom-up transitions have their source in local networks of engaged citizens, who are moral agents" (Van der Schoor & Scholtens, p. 668).

Organizational development

All of the initiatives participating in this research are still relatively young. Two were officially registered in 2011, two in 2012 and two in 2013. At least half of them had already been active unofficially for about a year, before they officially registered. The process of self-organization therefore starts some time before registration. An official registration (to formally establish a cooperative or foundation) generally takes place after an initial campaign or event has been successful.

Since the initiatives have only in recent years been established, about half of them still consider themselves to be in a start-up phase or at least in an initial stage. Only one participant mentioned their initiative is quite well established by now. He based this on the fact that they are occasionally asked for advice by other starters. Apparently they are perceived to be an exemplary role model.

Based on the interviews and other sources (websites, newsletters, social media etc.) it is possible to discover a somewhat similar path of development for most of the initiatives, regarding the start-up phases. Figure 4 below shows this path in short. It has to be noted that this does not apply to all initiatives, and neither does it completely and accurately show each of the steps. The figure merely shows a simplistic overview of the start-up phases that can more or less be identified in most of the case studies in this research.

Figure 4: Path of development

The first three phases, as observed in the case studies, can also clearly be identified in social innovation literature. According to Mulgan (2006), people in all societies stumble upon great ideas, but sometimes it never progresses beyond an informal conversation in, for example, a bar. However, if it does, then the second phase involves experimenting with the idea in practice. This can be considered a reality check, of which the results are sometimes hopeful, and sometimes disappointing. Subsequently, the third phase commences when an idea proves sufficiently successful in practice and can from there on further grow, adapt or be replicated or franchised (Mulgan, 2006).

At the time of the interviews, most of the organizations were in the 'fourth phase'. Three of them had recently finished a project related to the collective purchase of solar panels. In all three cases it was considered successful and therefore two of them decided to do it once again, while the third one was yet to make a new plan. Two other organizations had already passed beyond that stage, and have reached a more stable phase in which it is more clear what they stand for, and what they have to offer. One of them is an advisor and established local energy supplier, and the other one also offers custom-made advice regarding energy saving measures and (funding of) renewable energy.
Mulgan (2006) describes the fourth phase as one of learning and evolving. At this stage, ideas could take on different shapes and forms, and change based on experience and increased understanding. The importance of learning is also emphasized by Morgan & Ramirez (1984) in their research on self-organized systems. However, according to them, the system should not only question and learn from its own approach and practice, but it should also be capable of challenging and altering the underlying rules, values, norms, policies and procedures.
The case studies in this research do, however, not show much proof (yet) of extensive learning processes. It might be possible that this is yet to take place, considering the remark of a participant: "*Probably after a year we will officially evaluate. As of now it is a little early for that, but I can see such things happen in our group in the future*". Further, though most of the initiatives have made a few small adjustments here and there, they have not implemented major changes. A participant of one of the oldest initiatives mentioned that, as a result of growth and maturity, they have become increasingly professional. Also "*nowadays we are*

more aware of our approach, size, legal issues, the way of campaigning etc.". This also seems consistent with theory. Initially ideas are only 'somewhat vague possibilities', which are not even completely understood by their creators. Then, as and when their inventors gain experience and learn how to make them work, they develop further and become more concrete and formalized (Mulgan, 2006).
Regarding the time span, it can be concluded that the start-up phases require quite some time and preparation. Table 1 below shows for each of the initiatives which year they officially registered, what sort of area they target, and how many people are involved at the time of the interviews (including (board) members/non-members and customers).

Initiative	Year of registration	Target area	People involved
DM	2013	Municipality	18
EO	2012	3 municipalities	50
PD	2013	Municipality	20
ECN	2011	Municipality	120-150
SDE	2012	2 provinces	200-250
HD	2011	Village	30-35

Table 6: Descriptive data

After this section has briefly discussed the different phases of the start-up process, the following section explains how, over a period of time, structure emerges within the organization.

Emergence of structure
As and when people are gathering, sharing their ideas and creating a shared vision, structure slowly starts to emerge. Initially the setting is mostly very informal. People gather in their living rooms and around their kitchen tables, become more acquainted and learn about each other's ideas, ambitions, capacities and networks. Different path ways are proposed and discussed, and every now and then people might have to compromise, until they agree on a somewhat specific plan and approach. In order to enable this process and make things happen, people start taking up tasks (collecting information/contacting an agency) and performing certain roles (such as chair a meeting or take notes). At least in the initial stages, the distribution of work/tasks often seems to happen based on personal interest, skills and availability of time. As one participant explains: "*People take up these tasks that they feel enthusiastic about. We help and complement each other*". Another participant says they currently divide the work on the spot, as and when something needs to happen.
In order to become officially registered as a cooperative or foundation, all six organizations have installed a chairman, and five out of six also have a secretary and a treasurer. Nevertheless, the division of (other) tasks still largely seems to depend on personal skills, interests, and time. One participant also mentioned the board members alternate or take turns regarding certain tasks. In general, the board members take up quite a wide range of tasks, such as goal setting, building a website, recruiting members, promoting renewable energy, collecting data and organizing activities/events. Though most of the work is carried out by the board members, they also tap into the pool of members and supporters/donors for help. This mostly concerns temporary, non-structural work. Therefore, work and task allocation seems to be characterized by flexibility. This corresponds with the holographic principles of self-organization, as introduced by Morgan & Ramirez (1984). According to them, traditional organizations are characterized by mechanistic structures where all the 'parts' precisely complement each other in order to form a coherent 'whole'. Tasks and roles are clearly defined and each person is specialized in and responsible for a particular task. They suggest, however, that self-organization is characterized by 'redundancy within parts', which means that every person in an organisation performs a range of activities, whenever they are needed. Such organizations will be more responsive, creative and robust.

With regards to the initiatives participating in this research it is probably too early to derive any such conclusions, since most of them are still in the start-up phases. Based on the data, it can, however, be observed that the oldest initiatives seem to have a slightly more fixed and structured distribution of tasks and positions, compared to the younger ones. The oldest two organizations have also installed so called working groups which focus on a specific theme, project or group of tasks, such as PR, vision, website etc. At first glance this seems to entail a form of specialization similar to that in mechanistic structures but on second thought this is different after all. Whereas in mechanistic systems, specialization takes place based on tasks, in the self-organized initiatives, specialization is based on themes. Though it contributes to an increase in structure, it leaves a lot of room for flexibility with regards to the specific distribution of tasks and roles. This can still be left up to the people in the working groups.

Regarding their activities, it can be observed that most of the initiatives seem to be going through a search process during their start-up stages. In a way, this can be compared to a sort of identity crisis. Though the initiatives might have a written (set of) goal(s) or a vision, this is sometimes very broad and ambiguous. Examples of this are: "We want to create a more sustainable village"; and "Creating a livable and sustainable countryside for the people: together we can do more!". Van der Schoor & Scholtens (2015) also confirm this finding. They studied a number of thirteen local renewable energy initiatives in the Netherlands and found that the initiatives communicate rather general and superficial views, while clear energy goals are often lacking.
As mentioned earlier, a clear shared vision is important, but it should also be further developed in a practical 'roadmap'. This is likely to result in a higher level of activities and member commitment (Van der Schoor & Scholtens, 2015). Also, Seyfang et al., suggest that developing more formal organizational structures might be a condition for achieving the group's goals.
At the time of the interviews, the majority of the initiatives was still working on making more concrete plans. Especially in case of the younger initiatives, there was often no clear set of activities or services that they offer. This was, however, also partly due to the fact that the initiatives were in anticipation of another development, namely the establishment of a regional umbrella organization. If this were to succeed, they were all thinking of joining this organization, in order to become resellers of renewable energy. This shows that making practical steps could sometimes depend on contextual circumstances. Though, over a period of time, you expect to see an increase in order and structure in self-organized initiatives, there can also be input from outside the system apparently. However, in order for the system to be self-organized, this input cannot take the form of external control instructions (De Wolf & Holvoet, 2005).

In conclusion, it can be stated that the internal structure of the organizations is only minimally specified in the initial phases. Because options are, to a large extent, kept open, this is likely to encourage research and critical reflection among the members (Morgan & Ramirez, 1984). At some point, however, it becomes increasingly important to have a clear set of goals and activities, in order to move on. Without practical steps it might become more difficult for board members to be committed (Van der Schoor & Scholtens, 2015). Further, it impacts the scope for membership recruitment. In the interviews, two participants mentioned they are currently not recruiting members yet, because it is not clear yet what the cooperative can and will offer the members. "*Only once it is clear what members can expect from and/or contribute to the organization, then we will actively start recruiting members*".
Once things become more concrete, most of the initiatives go through some sort of formalization process, which strengthens the organization.

Networks
Local renewable energy initiatives are built on local networks and knowledge. This is one of the strengths of local initiatives and at the same time it is also considered an important success factor (Seyfang et al., 2013). Sharing experiences and knowledge with each other, and with other organizations is especially helpful considering it is a relatively new domain. The data

suggests that the initiatives value contact and relationships with other local initiatives, as well as other umbrella organizations, platforms and agencies etc. The example of other successful initiatives is encouraging and it is not unlikely for new start-ups to contact more experienced and successful initiatives for help and advice. As shown in the data section, between four of the initiatives participating in this research, such relationships can be observed. This demonstrates the importance of networking activities to the success of local renewable energy initiatives. Seeing it in a larger picture, this consequently also contributes to the wider transition as a whole.

Based on the case studies, relationships and links at different levels can be observed. To get an understanding of the various actors which play a role at the different levels, Figure 5 below presents an overview. Though this is not complete, it shows the most important actors as identified based on the case studies and literature review.

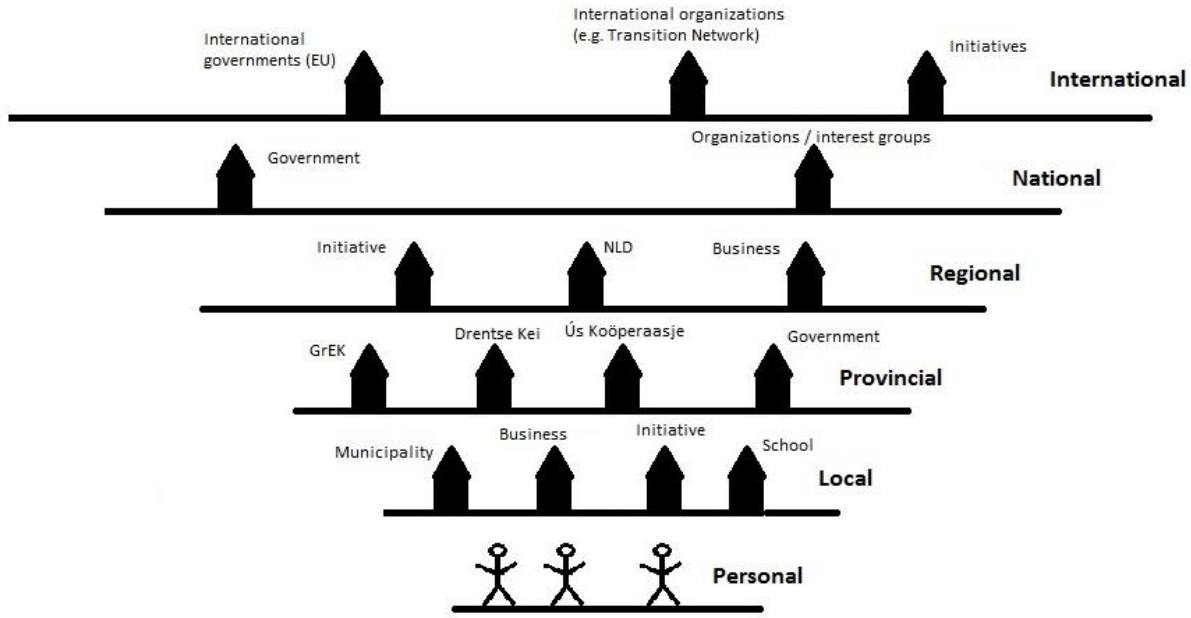


Figure 5: Network levels

As can be seen above, there are various actors at different levels, which are all somehow connected to, or have an impact on the local initiative. Some links are, however, more important than others. Also, some actors have similar objectives and ideas, and collaborate in order to achieve their goals and promote their ideas.
Networks take various forms and are of various sizes/scales. They can be formed at only one specific level (such as a local network) but they can also include actors from different levels. As is portrayed above, the bottom-up approach, characteristic for local renewable energy initiatives as studied in this research, often begins with links/relations at the personal level. It all begins there where neighbours, friends, acquaintances etc. meet and start sharing their worries, ideas and ambitions. Though this might, at the same time, be at the local level, it is illustrated separately to emphasize the fact that it all starts with a small group of enthusiastic people. Also in order to promote the initiative, it is important to be part of a wide social network within your community. According to one participant: "*It helps if people know you*". For a transition to sustainability, it is, however, necessary that transition takes places at each of the levels. Local initiatives can play an important role in contributing to this, by promoting, supporting and actively seeking sustainable solutions at the personal and local level. As a consequence, this can instigate action at the higher levels. On the other hand, developments at the higher levels can also facilitate or impede initiatives at the local level. Therefore, in light

of the transition, interaction and maintaining strong relationships are an important success factor. This was also confirmed by one of the participants who mentioned that networking, and connecting different parties is one of their core activities. Further, many board members regularly attend networking events and lectures/readings etc. to learn and exchange information.

In order to understand which links/relationships are considered important for the initiatives participating in this research, Figure 6 was drawn. The number of initiatives and their mutual links drawn, do not represent reality. They should merely be considered examples of the findings.

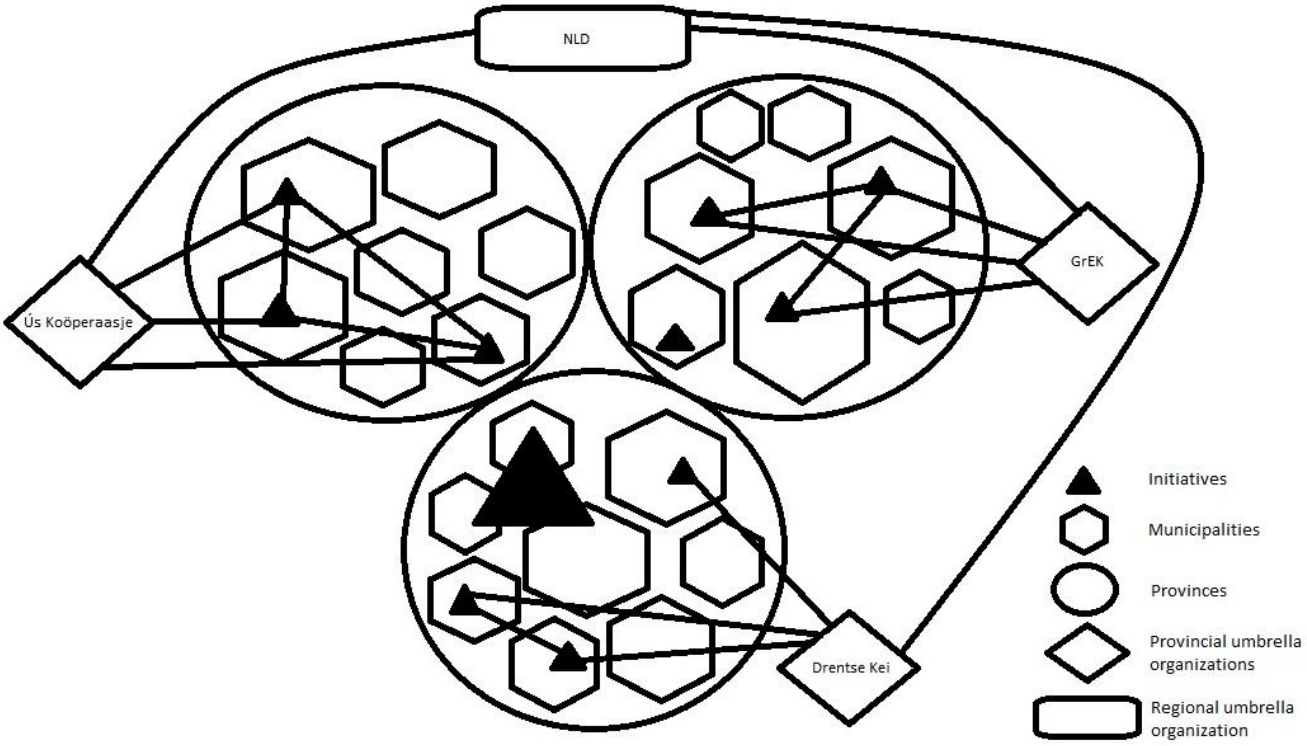


Figure 6: Network of local initiatives

At least four of the initiatives maintain relationships with other local initiatives in their region, or have helped/advised other initiatives. Sometimes they consider another initiative as a 'role model' and try to learn from them.
The provincial umbrella organizations also play an important role, because they support the local initiatives and serve as a platform for the members to share their knowledge and experience. Most of the participants were very positive about their relationship with the organizations. As one of the GrEK members said: "*The GrEK comes up with ideas and suggestions and helps us brainstorm. They are there for us when we need them. They have a positive influence*". Some of the board members of the local initiatives have also been appointed a position at the umbrella organizations. They are active both at the local as well as provincial level. One of the interviewees was even worried that they might lose two of their own board members, because they have become so busy with the provincial organization.

Reflecting back on literature regarding self-organization, this shows that people indeed create new structures, where there was no organized structure before (Zoethout, 2006). Over a period of time more and more initiatives pop up and build links to other initiatives and institutions. At some point they decided to collectively gather in associations, the so called umbrella organizations. This again results in an increase in order and structure, since the umbrella organizations to some extent coordinate the various activities of the initiatives, and

promote their common objectives. These processes emphasizes the element of active and conscious self-creation (Fuchs, 2000). Together they decide in which systems they want to live and act, and which goals and activities are important. It is not merely a spontaneous process, but built on a freedom of conscious creation. Further, the structures they create, also influence the ideas and decisions of the individual initiatives and citizens. As a result of interaction between the initiatives and the organizations, over the course of time new properties, behaviour and patterns emerge (De Wolf & Holvoet, 2005).
The findings also show that self-organization takes place at different levels. Whereas the initiatives operate mainly on the local level, the umbrella organizations operate on a provincial and regional level. There is, however, no central control of the whole system. None of the individual initiatives direct the course and behaviour of the umbrella organizations, but together they influence the overall emergent structure. Would any initiative quit, the networks and structure would continue to persist. This contributes to its robustness (De Wolf & Holvoet, 2005).

In short, the findings confirm what literature also suggests. Networks are an important element and contribute to successful niche-growth. Different actors have access to different resources from their organizations (Kemp et al., 1998; Seyfang & Longhurst, 2013). Further, being embedded in provincial, regional and national networks can provide the organization with additional support, information and inspiration (Van der Schoor & Scholtens, 2015).
The bottom-up approach seems to successfully contribute to the energy transition. The findings of this research show that the number of initiatives is growing, as well as the number of links between the initiatives and various other actors in the field. It remains to be seen, however, to what extent the initiatives will keep growing. The data suggests that the initiatives are not necessarily seeking continuous growth in scale. Most of them are established in a local community on village or municipal level, and are not planning on including other municipalities. They want to remain local, and that is also the strength of these initiatives.

5.2 Barriers and success factors of local renewable energy initiatives

After the previous chapter has explained how local renewable energy initiatives are formed, this chapter discusses sub question 2: Which barriers do local renewable energy initiatives meet, and which factors contribute to their success?
The findings are based on the case studies, as well as literature review. The chapter is mainly structured based on the conceptual model and data section.

Though literature review has revealed that there is no clear definition of a successful renewable energy initiative (Ornetzeder & Rohracher, 2013; Feola & Nunes, 2014), it was possible to come up with a selection of success factors (refer to theoretical framework). Further, the theory of holographic design suggests that the three conditions of requisite variety, double-loop learning and minimum critical specification enable processes of social self-organization. Based on the data, it is explored whether or not these conditions and factors are also present in the actual cases. The goal is to learn whether the conditions and factors, as identified in literature, can really be considered important. If they are critical to their success, then it is expected that absence of a factor could result in a barrier. The initiatives were, therefore, also asked which barriers they experience, what they consider important and if there are certain things they are missing. Comparing the data to literature will thus provide a more complete understanding of the important success factors and barriers regarding self-organizing local renewable energy initiatives.

5.2.1 Requisite variety

The condition of requisite variety refers mainly to the people in an organization. It calls for a variety of people and skills, in order to successfully deal with changing circumstances, barriers and also opportunities (Morgan & Ramirez, 1984).

Number of founders
Considering the initiatives participating in this research are still relatively young, the number of founders was, at the time of the interviews, equal to the number of board members at the time. The data shows that the number of board members varies between 3 and 9. Whereas a number of three persons seems rather small, a board of nine members seems rather large. However, there is only one initiative with such a large group of board members. A board of about six persons seems sort of average and, therefore, the initiatives do not necessarily have a large group of founders. Though some participants mentioned that it is important to gather a sufficient number of people around you when starting off a local renewable energy initiative, there is no other data that suggests this is a very important success factor. A large group of founders does, however, contribute to the variety.

Diversity and backgrounds
The case studies show that there is quite a large variety in professional backgrounds of the board members. This means they all bring in different knowledge, skills and experience, which can all be considered important resources. Most of the board members enjoy relatively high level employment, which is likely the result of high education. Many board members seem to have professional backgrounds which proof very useful for the initiative. There is a relatively high number of managerial positions, entrepreneurs and civil servants working for the government. Many are also active in their local community and are involved in other extracurricular activities. Quite some of them participate in local governments or organizations, or are members of the village council. Further, some of them have their own business in the area. So in many cases, the founders have strong ties to the local community. Being part of a community, and maintaining a strong social network at that level makes that you are more aware of the local community's characteristics, habits, needs, worries and capacities. Knowledge of this could be very important to the success of an initiative. Therefore, it can be concluded that involving local people with strong local ties definitely contributes to the success of an initiative. However, because the local context is so important, this complicates potential replication elsewhere (Devine-Wright & Wiersma, 2013).

Though there is quite a large variety in professional backgrounds, this does not necessarily mean that the initiatives also reflect the diversity of the community. There seem to be mainly older people (50+) involved in the initiatives. This finding only partly corresponds with the finding of Feola & Nunes (2013), who note that the transition initiative members in their research, predominantly belong to the age range 30–65 years old. Further, there appears to be an underrepresentation of women, considering only seven of the thirty-six board members (total of all the initiatives) were female. This overrepresentation of males was also observed by Van der Schoor & Scholtens (2015). In addition, there are not many low-skilled people involved.
This raises the question whether it is actually important for local renewable energy initiatives to fully represent the diversity of the community. According to the theory of holographic principles, it is important to reflect the diversity of the external context, in order to be able to deal with changing circumstances, and successfully respond to external threats and opportunities (Morgan & Ramirez, 1984). The need for requisite variety is based on the recognition of a complex environment and society in which the system is embedded. As a result of maximizing the internal variety, the system is expected to be better prepared to deal with any contingencies (Jessop, 2003). Though this would likely contribute to their success, it does not seem realistic to expect such major preparations from the side of the citizens in these cases. Also, some aspects of diversity may be more relevant than others. Including people with a variety of professional backgrounds might be more important and useful than including an equal number of men and women, high-skilled and lower skilled people, and religious and non-religious for example. Because initiatives are often built on pre-existing structures, it is also just more likely to happen that somewhat similar people will end up together in the initiatives.

It can, thus, be concluded that variety is, to some extent, very useful and important and definitely contributes to the success of the initiatives. Especially the diversity in professional backgrounds is highly regarded by the participants. When they were asked what advice they would offer to a group of people who are thinking to start off an initiative, many of them referred to the importance of gathering a sufficient group of people with different skills and backgrounds. However, to some extent, it is also unrealistic to expect a maximization of requisite variety from a small group of citizens. Also, it does not seem very likely that the citizens have to deal with very complex issues. Thus, the form of 'requisite variety' as proposed by Morgan & Ramirez (1984) seems very ambitious in the case of the participants in this research. Considering the initiatives seem to be doing fairly well, without this major form of variety/diversity, it does not appear to be an *enabling* condition of self-organization.

Division of labour and sub-groups
Much of the work is divided depending on availability of time, personal interest and experience/expertise. The board members take up a wide variety of tasks, ranging from goal setting and building a website to recruiting members and organizing activities/events. They also tend to take turns with regards to certain tasks/roles. This approach corresponds to the condition of requisite variety. According to Morgan & Ramirez (1984), each element of an organization should preferably be able to perform a variety of different functions. Because there is quite a lot of work to be done, and only a limited number of available people, this also happens out of necessity. Taking up different tasks also contributes to a more complete understanding of the functioning and performing of the organization as a whole (Streeter, 1992). It also increases the flexibility and adaptability if various people are suited to take up a certain task or deal with certain issues. If one of the members were to drop out for some reason, the initiative will likely be able to continue. Therefore, it also contributes to the effectiveness of the organization. Considering this approach has many advantages, it can certainly be argued that it contributes to the success of initiatives. However, there is no evidence that a more 'mechanical design' would not successfully get the work done. Especially in case of small initiatives, the exact approach might not matter a lot.

The majority of the initiatives have also installed sub-groups or working groups. Establishing working groups seems to make it easier to divide the workload among people who do not have fixed positions. It provides more flexibility, because the people manning the working group can decide how to go about it. Further, over a period of time they sort of specialize in their subject. They also serve as a way of involving non-board members in the organizational activities. In the context of the wider societal transition, this can be considered important. However, the data does not suggest that initiatives who have not installed sub-groups are less successful.

Recruiting
The extent to which the organizations are actively recruiting members differs. At the time of the interviews, none of the initiatives were actively recruiting members due to either internal or external developments. Also, at the time of the interviews, there were still two initiatives which were registered as foundations. They have a legal structure, different from the one of a cooperative, and cannot have members, apart from their founders. One of them, however, recently (June 2015) registered as a cooperative.
Though the initiatives were at the time of the interviews not actively recruiting members, this is still believed to be an important element with regards to the continuity of the initiatives. "*A deeply rooted grassroots initiative requires that participants be recruited beyond what is usually a small group of initial enthusiasts*" (Hoffman & High-Pippert, 2010, p. 7569). Recruitment also contributes to the diversity, the available pool of skills and the institutional wisdom. These are important elements on which the initiative is built.
In most cases, there seem to be different levels of involvement. Generally, there is a possibility to become a member/donor and financially support the initiative, but in most cases it is also

possible to get involved in organizational activities, both temporarily or structurally. Though enthusiastic people sometimes spontaneously join or offer their help, the data suggests that the initiatives also have trouble reaching and motivating people to support them. This is definitely one of the main barriers they are facing.

5.2.2 Double-loop learning

The condition of double-loop learning refers to the learning capacity of the organization. This should include more than just skill improvement and detecting errors, and therefore, it requires a certain reflectivity of the organization as well as its context (Morgan & Ramirez, 1984).

Untrained and unpaid staff

There is no evidence that shows that the board members have received any specific training. However, the disciplinary backgrounds of some board members are related to relevant topics, such as energy, ecology, education and governance. Their personal skills and experiences seem to be important resources. These are all part of learning processes. Further, all of the initiatives are completely run by volunteers. The fact that it is all voluntary work seems to take a certain pressure of them. It is not an obligation and they generally feel they can do it at their own pace and in their own time.

Considering it is unusual for board members to receive any training or payment, these are not believed to be a critical success factors. They could, however, definitely contribute to the success of initiatives.

Decision-making and internal conflict

The condition of double-loop learning calls for collective, and wide-spread decision-making processes, in order to decide on the appropriate course of action (Morgan & Ramirez, 1984). The case studies, however, show that most decisions are made by the board members. Only, in case of important (financial) issues, the other members are sometimes also involved in decision-making. This can partly be explained by the fact that the initiatives are still relatively young, and many of them were still in the initial phases. These start-up phases are characterized by a search for the appropriate future course. Such decisions are generally taken by the founders/initiators of an organization. In one case, board members have had intense discussions with regards to their future direction. In another case, some of the board members also have different ideas which they try to promote. However, in none of the case studies, these discussions result in serious internal conflicts or fights. Though there seems to be room for discussing different ideas, it also appears that (at least in some cases) the participants try to avoid conflict by narrowing down the number of ideas and consciously select one particular course of action or activity to begin with. This way they feel they can start off faster, and at a later stage they can always discuss other options and expand their range of activities. This behaviour is also recognized in literature. Groups tend to minimize internal conflict and focus on topics and issues that maximize consensus (Van de Ven, 1986).
Only one initiative has embraced a broad approach from the beginning. They have chosen not to limit their focus and try to work out different ideas at the same time. This particular initiative, however, has been taking quite a lot more time to from concrete plans and start off, in comparison to the other initiatives.

Evaluation and reflection

The data shows that there does not seem to be much attention (yet) for formal evaluation and reflection of the initiatives' approaches and results. However, this does not mean that learning processes do not take place. The whole process of self-organizing a local renewable energy initiative can be considered a learning experience from the very first beginning. Searching for the appropriate future direction and course of action means that they are (continually) adjusting along the way. Some ideas work out well and some approaches turn out to be less

successful. Though they might not be big things, they nevertheless contribute to the learning process.

Literature suggests that more conscious reflection and learning would benefit the organizations. Though double-loop learning already happens on a very small scale, considering some of the organizations have implemented adjustments or changed their approach, this generally happens unplanned and in an incidental manner. Further, the process of double-loop learning can be facilitated by encouraging constructive conflict and discussions regarding competing perspectives (Van de Ven, 1986). Therefore, in order to strengthen this condition, the initiatives should perhaps not aim to avoid conflict too much. Instead, it could be very useful if conflict is managed in a positive way.

5.2.3 Minimum critical specification

Literature suggests that minimal design and limited structure of organizations facilitates processes of self-organization.

Legal status

All of the initiatives are officially registered and have a legal status. Though obtaining this status requires adhering to a specific legal structure and certain rules, it also comes with important benefits. As a result, they qualify for certain subsidies and they can join other associations. Besides that, it still leaves a lot of room for arranging and shaping their own course and approach.

Keeping future options open

It can be observed that they tend to narrow their focus in the initial stages by conducting a very limited number of activities/plans. However, they like to keep their options open for the future. Depending on how things go in the near future, they will decide on the 'far' future accordingly. This approach is also reflected in their internal structures. This structure seems to grow gradually over a period of time, and is only minimally specified in the beginning.
Therefore, the organizations are of a very informal kind and are characterized by flexibility. The question is, does this really encourage self-organization? Considering the initiatives often have relatively vague and ambiguous goals without a clear roadmap, they sometimes seem to be struggling a bit as a result of this minimum critical specification. However, it can be noticed that, when something new comes along (a project/activity/collaboration), this is experienced as exiting, adventurous and motivating and therefore, it keeps the spirit alive. This is especially important considering it is unpaid, voluntary work, which should not become too much of a burden. However, if such concrete developments do not take place, it becomes hard to move on, and to stay committed.
The case studies show that progress is quite slow, but sooner or later, they seem to find their way. The condition of minimum critical specification definitely allows the participants to pitch their personal ideas and ambitions. It helps them do these things that they personally consider interesting, in the way they would like to do them. This is important if they want to be in it for the long run. Therefore, this is considered an important condition which contributes to successful self-organization.

5.2.4 Networking/partnerships

Local renewable energy initiatives are often engaged in networking activities and partnerships/collaborations with other initiatives and organizations. Though this is not specifically covered by the conditions which, according to the holographic principles, enable self-organization, it still appears to be of importance to the success of the initiatives. This is confirmed both by the literature on success factors, as well as the case studies.

Cooperating

Considering all of the initiatives, in some way or another, collaborate with other initiatives and organizations, this appears to be an important element of successful self-organization of

renewable energy initiatives. Especially since it is still a relatively new field, it is helpful to share experiences. Local renewable energy initiatives are built on local networks and knowledge. The importance of this factor has previously been explained in chapter 5.1.

Many stakeholders and strong relationships
In the data section, a list of stakeholders has been presented. Based on this list, it can be stated that the networks include quite a large number of different stakeholders, including ones with commercial, political, ideological, environmental and social interests. Stakeholders can provide useful access and resources, though dependency on stakeholders can also slow the initiatives down. But especially in those cases, it can prove useful to maintain relationships with many different stakeholders. Where one door closes, another could open.
Considering most of the initiatives maintain relationships with quite a large number of stakeholders, it can be assumed that this is at least of some importance to their success, for reasons such as redundancy.

Related to this, is the factor of maintaining strong relationships on the local, national and global level. The data suggests that the relationships with stakeholders on the local and regional level seem to be the most relevant and important. Seeing they are local initiatives, this makes sense. Since they primarily aim to contribute to sustainability in their own community/region, local ties and support are very important.
The fact that actors on the national level did not really come up in the case studies, can perhaps also be explained by the argument that local clusters often demonstrate only limited awareness of the total system in which they take part. This is likely the result of an absence of central control mechanisms (Gilchrist, 2000).

Resources
Though a lack of financial resources can be a barrier, in general the initiatives are able to secure a relatively modest amount of funding. In particular, membership fees and energy profits are important because they are generally sources of long-term funding, whereas subsidies often have a temporary character. Especially when the initiatives are expanding their activities and develop into a more professional organization, funding appears to become increasingly important.
Other non-financial resources, such as skills, knowledge, support and advice, seem to be just as important, if not more, particularly in the early start-up phases. Together, these resources form a very important part of the basis on which the initiative is built.
According to Catney et al. (2014), 'power and ability' are also key resources. In this respect, the government is an important actor. The data, however, shows that the government is sometimes experienced as a barrier in order to get things done. The initiatives are sometimes struggling to obtain this type of necessary support and resources.
Because each community is different, difficulties with resources are similar for each community. Communities in more disadvantaged and underdeveloped areas are likely to have more trouble to gain access to the necessary resources. Catney et al. (2014) believe that people in some places are unable to arrange for the required resources, and therefore, they are not able of becoming self-organizing and self-reliant, let alone becoming "*social entrepreneurs who can build their own collective, profit-making energy businesses"* (Catney et al., 2014, p. 727).
One last important resource is time. Some of the participants consider a lack of time to be a barrier, or an important need. In a way, the importance of this resource goes without saying, but it is also confirmed by literature. Research conducted by Feola & Nunes (2013) shows that the initiatives that discontinued, were characterized by small steering groups of which the members had little time to dedicate to the initiative.

All in all, the findings indicate that resources make a substantial contribution to the success of local renewable energy initiatives. Feola & Nunes (2013) even believe that less successful initiatives might underestimate the importance of contextual factors and material resources.

Though this finding has not been confirmed in this research, it has to be noted that this research did not include initiatives who discontinued. However, it could be an interesting subject for future research.

External communications
All of the initiatives seem to be aware of the importance of external communications, though some of them seem to make better use of it than others. There are differences with regards to the degree of professionalism, and the amount of time and effort invested. Most of them, however, specifically mentioned the importance of having (board) members who are good at PR, communications, social media and website building etc. Those are considered important ways and tools to reach and convince people and organizations, and gain support. As is mentioned before, this is one of the key activities of the initiatives, because without the necessary support they will not be successful. Despite the fact that most of them employ both online and offline tools, such as local newspapers, flyers, digital newsletters, brochures, Facebook, Twitter, websites and blogs, some of them still feel it is not good enough. One participant says: "*It is disappointing how few people actually remember us, even after being in the newspapers several times*". According to another participant, word of mouth marketing works best.
In short, some of the initiatives perform better with regards to their external communications, than others. There seems to be a relationship between the size/scale of the initiative, the degree of professionalism, and the extent to which they are active. Being part of umbrella organizations and knowledge platforms etc. is expected to partly eliminate this potential barrier, because it provides exposure, and makes it easier to be noticed and found.
Literature suggests that using a diverse set of communication tools, both online as well as offline, seems especially effective in order to reach a variety of actors (Feola & Nunes, 2013; Van der Schoor & Scholtens, 2015). Considering all of the participants make active use of these tools, and also confirm the importance of external communications, it is argued that this is an important success factor.

5.2.5 Context
The context in which an initiative is embedded can contribute to their success but factors related to this context, can also hamper their success.

Pre-existing structures
Group-settings and pre-existing structures seem to facilitate the process of self-organizing a local renewable energy initiative. These existing structures already provide some access to certain people and resources. Also, certain structures connect like-minded people, and therefore, it is more likely that such ideas and ambitions find room to pop up and grow there. For more on this, refer back to chapter 5.1 which has already explained the importance of networks and pre-existing structures.

Though pre-existing structures can be useful and contribute to the success of initiatives, the data does not suggest that this is a critical or important success factor. Access to resources and relationships with (relevant) actors is important but this can be attained or achieved in different ways. Pre-existing structures are not necessarily required. Processes of social self-organization are even characterized by the development and emergence of new structures and linkages (refer to chapter 2.3) (Zoethout, 2006).

A favourable context
A favourable context is one which facilitates and encourages cooperating and relationship building among various actors, such as local authorities, mass media, other organizations and initiatives and businesses. It also a context in which people/consumers are willing to offer their support. The data shows that, in order to be successful initiatives, they have to succeed at convincing other actors to support them and contribute to their organization and their goals. Many of the initiatives are, to some extent, struggling with this. Therefore, they are not all

located in a very favourable context. However, in relation to self-organization, the particular context is not a static state of being. Bottom-up processes of self-organization can result in new behaviour and new structures (Zoethout, 2006). To a certain extent, people have the freedom to choose in which systems they want to live, and how their systems are designed (Fuchs, 2000). Though it is important to acknowledge this, it is not a straightforward, simple process, and its success will largely depend on community capacity. A pre-existing favourable context offers significant benefits (in terms of cooperation and support) and can thus be considered an important success factor.

Size of the energy system and enabling/disabling infrastructure
Considering the initiatives focus primarily on installing solar panels on rooftops, the size of the energy system is generally limited. The case studies do not show any signs of issues with regards to the size of the energy systems. In case of other types of energy systems, the size is likely to be more relevant. This could, however, mean that the limited size of the energy systems (solar panels) contributes to the success of the initiatives. Precisely because the size is not an issue. None of the participants has to deal with opposition in the area, for example regarding systems that spoil the landscape. Whereas this is likely to happen in case of large wind turbines, the initiatives promoting solar power do not experience this barrier. Therefore, it seems safe to argue that the limited size of the solar power systems definitely contributes to their success.
Further, in case of solar power systems, there are not a lot of disabling infrastructures or obstacles. However, solar panels cannot be installed anywhere and everywhere. There are certain requirements that have to be met. For example, the panels cannot be installed on houses with a thatch roof, locations with a lack of sunlight exposure, or in case of protected townscapes and historic buildings. Considering almost all of the initiatives primarily focus on solar power as a means of renewable energy, this is a recurring issue they have to anticipate on and deal with. In most cases, there are, however, other ways to reduce energy use or other sources of renewable energy that are more appropriate. Therefore, in case of the participants in this research, this cannot be considered a critical success factor.

Rural setting and population decline
According to Feola & Nunes (2013), in comparison to urban areas, social networks are denser, and social capital is higher in rural settings.
It is difficult to draw any conclusions regarding this statement, based on the case studies that were conducted in this research. All of the initiatives participating in this research are located in a rural setting. For reasons of convenience, only initiatives in the North of the Netherlands were selected. Considering there are not many urban areas in this region, it was likely that most of the participants would thus be situated in rural settings. As a result of this, there is no data regarding urban initiatives. Therefore, it is not possible to make any such comparisons.
However, one point that is worth discussing, is the issue of population decline in the region where some of the cases are situated. The specific region (Oost-Groningen) is characterized by relatively low incomes, and a relatively high percentage of low-skilled employees, low-literacy and unemployment. Since this is a problem which is (at least in the Netherlands) mainly felt in rural (agricultural) regions (Raad voor het Landelijk Gebied, 2009), it could be that, as a result of this, some rural initiatives even have to struggle more. In that case, a rural setting does not necessarily contribute to the success of an initiative. On the contrary, it could be experienced as a barrier.
Though certain rural areas might, therefore, be characterized by a higher level of deprivation, low income households, lower education levels, and therefore perhaps a lower level of social capital, the participants in this research are mainly highly educated and entrepreneurial. This could mean that, to a large extent, only the wealthier and more highly educated people of the communities are involved in self-organization. This is again related to the factor of resources, which has been discussed before.

High/medium/low income area
For people in relatively poor or deprived communities the options to make a change or contribute to sustainability are generally limited. They often lack finances and do not own the homes they live in (Catney et al., 2014). Based on the data it appears that money matters. First of all, most of the interviews took place in beautiful characteristic houses, which were clearly not low-priced rental properties. Secondly, the professional backgrounds of the founders/board members indicates relatively high incomes. Thirdly, solar panels require a reasonable investment. Most of the initiatives (unintentionally) seem to target the richer people/communities, as a result of the kind of activities they perform. As mentioned above, some of the initiatives are located in a region where the population is shrinking. This area is characterized by relatively low incomes, and a relatively high percentage of low-skilled employees, low-literacy and unemployment (Bureau PAU/Bureau Louter, 2010; CMO Groningen, 2011). There are a few options to get a loan in order to invest in renewable energy or energy saving measures. One of the initiatives informs people about the options and can help them apply for it if they want. However, people without income generally do not qualify. This initiative, therefore, advocates a social sustainability loan, in order to make it possible for people at the bottom of the society, to contribute to sustainability.
The other initiative, which is also situated in that region, is talking to a local housing association about energy saving solutions for rental housing. The initiative wants to support tenants and tenants associations who are interested in such solutions. They try to mediate between the tenants and the housing association. Such cases show that it is definitely more complicated for low-income households and tenants. Further, communities or neighbourhoods which are characterized by low-income households, unemployment and degradation are also less likely to have the necessary skills, networks and expertise to self-organize and engage in environmental initiatives (Catney et al., 2014). Hence, in low-income areas it is likely to be more difficult to self-organize and maintain a local renewable energy initiative, because there are fewer people who are in a position to contribute to, and support the initiative. However, this does not necessarily mean that self-organized local renewable energy initiatives cannot start off in relatively lower income areas. Such regions have to deal with certain issues, such as population decline and the loss of certain services (schools, post office, bank, public transport, stores etc.). Those kind of problems can also unite the people, and provide them with more opportunities and reasons to 'fight' for their community. Though it might be more challenging and difficult for such communities to self-organize, the circumstances can also instigate processes of change out of necessity. Therefore, it is not essential for initiatives to be situated in higher income areas, in order to be successful, as some of the cases also prove.

5.2.6 Personal experiences
This section discusses the personal experiences of the initiatives with self-organizing a local renewable energy initiative. In short, it discusses the barriers they encounter, their needs, and their thoughts on the degree of difficulty regarding self-organization.

Barriers
During the interviews, the participants were also asked which barriers they experience, regarding self-organizing and running an initiative. For each of the initiatives, the barriers can be found in Table 7 below.

Initiative	Barriers
DM	- Not many problems. Initially: how to finance our plans? But did not turn out to be very difficult. Renewable energy is a relevant topic and access to money is not that hard to find.
EO	- Lack of time. It requires a lot of preparation time. - Dependency on other parties/stakeholders. They were about to sign a contract with an energy supplier, which then went bankrupt. - How to finance plans? (e.g. Local fiber optic infrastructure)
PD	- Making the transition from a loose-knit initiative to a cooperative. Takes time. - Concretizing plans ('saving energy' is quite a vague concept). The ideas need to be more specific to actually work on them. - Who do we target? Which area? Time schedule?
ECN	- Legislation: opportunities are limited. - Convincing people (marketing/communication strategy is required). People also tend to forget who we are and what we do. Necessary to keep repeating the same message in the media etc. - Sustainability is not a hot topic/priority among a certain generation (age 25-45). They are too busy with their families and careers. - Municipalities can be an obstacle. They are all different. Some are easy to work with but with others it is hard to convince them to help out: it is a constant struggle. - Keeping it up / maintaining the cooperative.
SDE	- Difficult to get loans for low-income households who want to invest in sustainability or save on energy costs. - Financing - It is hard to reach and convince people and governments. Especially governments do not take initiative. - It is hard to get access to the people in power; it can be quite an arduous and painful process.
HD	- Difficult to reach people and to motivate and convince them to come and join. - You need to have enough space and sunlight for solar panels. - Regulations (e.g. you cannot produce more than you need and sell it to your neighbor). - Thinking of new things (events/activities etc.) to attract new people - Keeping enthusiasm high/alive. - Sometimes lack of time because they also have normal paid jobs.

Table 7: Barriers

The two most common barriers (both mentioned in half of the cases) are related to funding and reaching/convincing actors. The latter seems more like a constant struggle, which cannot be overcome just like that, but is in a way 'part of the game'. In order to survive, the initiatives have to keep promoting their cause. According to one participant, people easily forget about them. It is important to keep reminding people and to remain visible in the community/region. Also, the process of convincing actors, such as governments, to support them, is sometimes experienced as frustrating and tiring. In comparison, it is perhaps easier to overcome the 'funding barrier'. It is a matter of getting access to funding, though this might not always be very easy. However, sooner or later, the initiatives seem to be able to succeed at this, either with government support, donor funds, paid membership or financial support of (local) companies and organizations.

A third important barrier is related to maintaining the initiative, in the sense of making concrete plans, keep organizing new events and keeping enthusiasm high. Two of the participants mentioned that after a while, when it is no longer new and exciting, they

experienced a sort of 'dip'. In such cases, working on new plans and activities and making progress, can instigate the group spirit.
The remaining barriers, such as a lack of time, and regulations are mainly mentioned in one or two individual cases.

Needs
Besides asking about their barriers, the participants were also asked about their needs. In combination with the barriers, this information provides a more complete understanding of the importance of certain factors in order to successfully run a community initiative.

As it turns out, their needs correspond to the barriers they experience, and therefore confirm their importance. The most frequently mentioned need is related to publicity and PR. In other words, people need to hear about them and be convinced to support them. In order to make that happen, the initiatives are in need of people who possess such skills. Since this is related to skills and experience, it also indicates the importance of community capacity. This also was repeatedly confirmed during the interviews.
The second most frequently mentioned need concerns funding. One participant mentioned the need for funding in order to be able to organize (bigger) events, and another participant referred to the need for a proper social sustainability loan to make it possible for low-income households to contribute to sustainability. Therefore, access to financial capital enables the initiatives' efforts to promote renewable energy.

Degree of difficulty
Finally, in order to gain understanding of the overall difficulty of self-organizing a local energy initiative, the participants were asked to estimate the degree of difficulty. Further, they were asked whether they perceive the whole process as a positive experience.

Regarding the degree of difficulty, the participants were asked to select a score between 1 and 6. The following options were given:

1) Very easy
2) Easy
3) Fairly easy
4) Somewhat difficult
5) Difficult
6) Very difficult

As is also explained in the data section, some of the interviewees assigned two different scores, which correspond to the difficulty level of two different phases of the organizational development.
In short, it can be stated that, especially the initial stages of starting off, are considered to be easy to fairly easy. The few higher scores that were given, were mainly based on later phases, where it becomes important to keep things up and running, and maintain a positive spirit. Apparently, this is by some considered to be more challenging. Only one participant gave a somewhat different score, namely a 5 (difficult). According to him, "*it can be easy if you just focus on solar panels, but our focus is really broad. (..) We need a lot of time to prepare*". This again confirms the finding that it is generally easier to address a limited number of topics first, and expand the range of activities and objectives at a later stage.
Overall, most of the organizations consider self-organization of their local renewable energy initiative as a positive (learning) experience, though it can be frustrating at times.

6. Conclusion

In the context of growing energy demand, in particular sustainable energy; ever increasing costs of fossil fuels; new emerging technologies and alarming messages regarding climate change, self-organization of local renewable energy initiatives is increasingly portrayed as a valuable contribution in realizing the transition to a more sustainable society. It is, however, important to take a critical and objective stance (Uitermark, 2012). In order for local renewable energy initiatives to become successful, they have to overcome certain barriers first. This research, conducted based on six case studies in the North of the Netherlands, has explored the various barriers that the initiatives experience. Further, literature has provided relevant knowledge regarding barriers and success factors of social self-organization, social innovations and community (energy) initiatives. Combined, this has provided a solid knowledge base, based on which the following conclusions can be drawn.

The first part of the research focused on the way local renewable energy initiatives are formed; how they gain structure; and how they are embedded within networks. The findings show that the initiatives go through a similar path of development, leading from a very informal setting to a more structured and professional organization over the course of time. Especially in the initial phase, a sense of local support and successful examples of other initiatives are considered important. Also, it is evident that pre-existing networks facilitate processes of self-organization.

The organizations are characterized by flexibility, which makes them more robust, responsive and creative, compared to traditional organizations which are characterized by a more mechanical design. Over a period of time, they do, however, become slightly more structured and professional.
Further, the initial phases are characterized by a search process, which can be compared to an 'identity crisis'. Many of the initiatives draft somewhat vague and ambiguous mission statements, and as a result have trouble working out a concrete road map. Overall, it seems to take at least a few years for initiatives to become well-established.

Important conditions and success factors
After exploring the way local renewable energy initiatives are formed, the second part of the research focused on the barriers they meet, and the conditions and factors which contribute to the success of the initiatives. Some of the success factors, as identified in literature, turn out to be more important than others.

Regarding the condition of requisite variety, the factors related to diversity, local people and recruitment appear to be especially important. The case studies display quite a large variety of professional backgrounds of the board members, which means they bring in a variety of useful knowledge, skills and experience. This variety does, however, not necessarily reflect the diversity of the community, considering the overrepresentation of older, highly skilled men with high level jobs. Considering Morgan & Ramirez (1984) believe that the organizations should reflect the diversity of the external environment, this extent of requisite variety cannot be observed in the initiatives participating in this research. Therefore, it can be argued that this extensive form of requisite variety is not required in order to enable self-organization of local renewable energy initiatives. However, the importance of a rather large variety of professional backgrounds has been clearly confirmed by the participants. Therefore, this can be considered an important success factor.

The fact that many of the founders have strong ties to their local community, is also considered an important success factor. Being an active part of a community provides you with important knowledge regarding the local characteristics, habits, needs, worries and capacities. This corresponds with the condition of requisite variety, which suggests that localised control is

important, since that is the level where direct interaction with the context takes place, in order to respond to problems and opportunities.

The third factor of actively recruiting members, is believed to be important with regards to the continuity of the initiatives. It is not merely important for the individual initiatives, but it is also critical in the context of a (national) societal transition. Further, recruiting new members could also potentially add new, valuable resources to the variety of professional backgrounds.

Though literature review refers to the importance of double-loop learning (Mulgan, 2006; Morgan & Ramirez, 1984), the case studies in this research do not show much proof (yet) of extensive learning processes. Also, none of the factors related to this condition, turned out to be of critical importance. The fact that currently there is not much evidence that points to any significant double-loop learning can at least partly be explained by the fact that the initiatives are still relatively young.

The findings further indicate that the condition of minimum critical specification contributes to successful self-organization. The initiatives keep their internal structure limited and they also keep future options open. Though they sometimes struggle to make concrete plans, this freedom encourages creativity and allows members to pitch their personal ideas and ambitions.

The theory of holographic organization has proven useful in understanding the conditions under which self-organization can occur. In particular, the importance of the conditions of requisite variety and minimum critical specification have been confirmed in the case studies. However, it has also become clear that this theory ignores two other important conditions which also influence the extent to which self-organization of local renewable energy initiatives is successful. Both literature and the case studies have demonstrated the importance of networking/partnerships, and the importance of the context in which the initiative is situated. The findings particularly emphasize the importance of local/regional networks. Networks provide the requisite conditions that contribute to the emergence of self-organized community initiatives. Relationship building is essential in order for the initiatives to survive, especially since access to resources is unpredictable and limited. Networks provide for a medium to share objectives, tasks, assets and worries, and can therefore facilitate mutual support (Gilchrist, 2000). The local/regional relationships and collaborations provide the initiatives with knowledge, support and resources, which make a substantial contribution to the success of the initiatives. With regards to gaining support, a proper management of the external communications is also considered an important factor.
Further, the findings also indicate that it is important to be embedded in a favourable context. This also offers significant benefits in terms of cooperation and support.

Barriers
During the interviews, the participants were asked to reflect upon the challenges they face, the needs they experience and factors they believe to be important for starting off a community energy initiative. Overall, they do not seem to meet with barriers too high to overcome.
Following are the three most frequently mentioned barriers are related to:

1) Access to, and securing funding
2) Reaching/convincing actors in order to gain support
3) Maintaining the initiatives

The first two barriers are also addressed in literature as important factors contributing to success. The third one came up during the interviews a few times, but existing literature largely seems to ignore this. It is related to making concrete plans, keep organizing new events and keeping enthusiasm high. In some cases, when things are no longer new and exciting, the

initiatives experienced a sort of 'dip'. This seems to be an important barrier, which is, to the author's best knowledge, not adequately discussed in literature.

In general, it was found that community capacity is very important. In the end, a lot seems to depend on the members' qualities. The group of initiators needs to possess relevant skills and also have the right contacts in order to successfully self-organize a renewable energy initiative.

Limitations of the research

The case studies have greatly contributed to an increased understanding of the way self-organization of local renewable energy initiatives takes place in the North of the Netherlands, which barriers they face, and which factors largely contribute to their success.

This research might, however, be limited by the fact that there were only six case studies conducted, which could potentially impact the quality of the findings. At the same time, the case studies show significant similarities, which seems to confirm their validity. Nevertheless, a higher number of cases, including different types of renewable energy initiatives, would provide a more complete understanding.

Further, most of the initiatives participating in this research were only recently established. This makes it somewhat more difficult to draw conclusions, considering there is still some uncertainty regarding their future course and activities. However, this research has been conducted over a period of 2 years and in those years the initiatives have not ceased to exist.

Nevertheless, it would be useful to explore how older, more well-established local renewable energy initiatives are doing, which barriers they have overcome, and which factors have contributed to their success.

Also, some findings, such as the underrepresentation of the younger generation, female and low-skilled members; and the motivation barrier call for future research. Finally, more research is needed regarding the discontinuation of initiatives, since this will likely provide new insights concerning insurmountable barriers.

7. Reflection

This research has provided useful insights regarding the success factors and barriers of self-organized local energy initiatives in the North of the Netherlands. Nevertheless, it is important to remain objective and critical about the way the research was conducted, and the results it produced. Though the interviews provided the researcher with a lot of useful data, the number of topics addressed was probably too large, which resulted in an information-overload, which required a lot of categorizing and analysing. Eventually, a relatively large part of the data was left out of the analysis, considering it was outside the scope of this research.

Overall, the theoretical framework proved to be a useful guideline and perspective in order to analyse the case studies. Especially the section regarding the success factors of energy initiatives provided helpful clues in order to identify potential barriers.
Though the holographic principles explain the important conditions which enable self-organization, this theory might be less relevant for very informal, small and non-profit organizations, such as the initiatives in this research. Further, because the initiatives are still relatively young organizations, there is not much evidence yet of learning processes, an element which is considered very important according to this theory. Therefore, this theory may prove more applicable for research into larger and well-established organizations.

The outcomes of the research are believed to be convincing, since they are not just based on a single case study. The main findings have been confirmed in most of the case studies conducted for this research, which strengthens their credibility. However, the case studies are quite similar. Therefore, it is unknown whether the findings will also be relevant in other types of renewable energy initiatives, such as the ones promoting biomass or wind power. In hindsight, it would have been interesting to include different kinds of initiatives, but in that case, it would be necessary to include a large number of cases in order to be able to draw any relevant conclusions. Hence, this would be a good direction for future research.

References

Adamson, D. (2010). Community Empowerment: Identifying the barriers to "purposeful" citizenship. *International Journal of Sociology and Social Policy*, 30(3/4), 114-126.

Adhikari, R. S., Aste, N., & Manfren, M. (2012). Multi-commodity network flow models for dynamic energy management – Smart Grid applications. *Energy Procedia*, 14(0), 1374-1379.

Andriani, P. (2001). Diversity, Knowledge and Complexity Theory: Some Introductory Issues. *International Journal of Innovation Management,* 5(2), 257-274.

Beck, U., Bonss, W. & Lau, C. (2003). The Theory of Reflexive Modernization: Problematic, Hypotheses and Research Programme. *Theory, Culture & Society,* 20(1), 1-33.

Beck, U. & Lau, C. (2005). Second Modernity as a Research Agenda: Theoretical and Empirical Explorations in the 'Meta-change' of Modern Society. *The British Journal of Sociology,* 56(4), 525-557.

Bureau PAU/Bureau Louter (2010). *Demografisch ontwikkelingen in Groningen en de gevolgen*. Report 254. Groningen: Provincie Groningen.

Catney, P., MacGregor, S., Dobson, A., Hall, S.M., Royston, S., Robinson, Z., Ormerod M. & Ross S. (2014). Big society, little justice? Community renewable energy and the politics of localism. *Local Environment*, 19(7), 715-730.

Chaskin, R.J. (2001). Building Community Capacity: A Definitional Framework and Case Studies from a Comprehensive Community Initiative. *Urban Affairs Review,* 36(3), 291-323.

CMO (2011). *Analfabetisme en laaggeletterdheid in Noord en Oost Groningen*. Groningen: Centrum voor Maatschappelijke Ontwikkeling.

Cunliffe, A.L. (2011). Crafting qualitative research: Morgan and Smircich 30 years on. *Organizational Research Methods*, 14(4), 647-673.

Devine-Wright, P. & Wiersma, B. (2013). Opening up the "local" to analysis: exploring the spatiality of UK urban decentralised energy initiatives. *Local Environment,* 18(10), 1099-1116.

Dubois, A & Gadde, L. E. (2002). Systematic combining: an abductive approach to case research. *Journal of Business Research*, 55(7), 553-560.

Feola G. & R J Nunes (2013). *Failure and Success of Transition Initiatives: a study of the international replication of the Transition Movement*. Research Note 4. United Kingdom: Department of Geography and Environmental Science, University of Reading; School of Real Estate and Planning, University of Reading; Walker Institute for Climate System Research, University of Reading.

Feola, G. & Nunes, R. (2014). Success and failure of grassroots innovations for addressing climate change: the case of the Transition Movement. *Global Environmental Change*, 24, 232-250.

Flowerdew, R. & Martin, D. (2005). *Methods in Human Geography: a guide for students doing a research project*. Second edition. Essex: Pearson Education Limited.

Fuchs, C. (2000). *Concepts of Social Self-Organisation*. Research Paper 4. Vienna: INTAS project "Human Strategies in Complexity", Vienna University of Technology.

Fuchs, C & Schlemm, A. (2002). The Self-Organisation of Society. *INTAS Project "Human Strategies in Complexity" Research Paper*. New York: Social Science Research Network.

Gilchrist, A. (2000). The well-connected community: networking to the edge of chaos. *Community Development Journal,* 35(3), 264-275.

Hajer, M. & Schwarz, M. (1997). *De Wereld als Risicomaatschappij*. Amsterdam: Uitgeverij de Balie.

Hargreaves, T., S. Hielscher, G. Seyfang & A. Smith (2013). Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change,* 23(5), 868-880.

Heywood, A. (2007). *Politics*. 3rd Edition. New York: Palgrave MacMillan.

HIER opgewekt (2015). *Overzicht*. Geraadpleegd op 15-08-2015 via www.hieropgewekt.nl. Utrecht: HIER Klimaatbureau.

Hoffman, S.M. & High-Pippert, A. (2010). From private lives to collective action: Recruitment and participation incentives for a community energy program. *Energy Policy,* 38(2010), 7567-7574.

Hoggatt, R. (2010) *Community-Owned Renewable Energy Projects: evidence for their development, funding and sustainability*. Community Energy Plus, April 2010.

Hopkins, R. (2011). *The transition companion: Making your community more resilient in uncertain times*. United States of America: Chelsea Green Publishing Company.

Huitema, D. & Meijerink, S. (2010). Realizing water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society,* 15(2), art. 26.

Jessop, R. (2003). Governance, Governance Failure, and Meta-Governance. In *Policies, Governance and Innovation for Rural Areas International Seminar, 21-23 November*.

Johansson, R (2003). *Case Study Methodology*. International Conference on Methodologies in Housing Research, Stockholm.

Jones, G.R. & Mathew, M. (2009). *Organizational Theory, Design, and Change*. Fifth edition. New Delhi: Dorling Kindersley.

Kemp, R. & Loorbach, R. (2006). Transition management: a reflexive governance approach. In J.P Voβ, D. Bauknecht & R. Kemp (Red.), *Reflexive Governance for Sustainable Development,* (pp. 103-116). Cheltenham: Edward Elgar Publishing Limited.

Kemp, R., Loorbach, R. & Rotmans, J. (2007). Transition management as a model for managing processes of co-evolution towards sustainable development. *International Journal of Sustainable Development & World Ecology,* 14(1), 78-91.

Kemp, R., Rotmans, J. & Loorbach, R. (2007). Assessing the Dutch Energy Transition Policy: How Does it Deal with Dilemmas of Managing Transitions? *Journal of Environmental Policy & Planning*, 9(3), 315-331.

Kemp, R., Schot, J. & Hoogma, R. (1998). Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technology Analysis and Strategic Management,* 10, 175-198.

Mackenzie, K.D. (1991). *The Organizational Hologram: The Effective Management of Organizational Change*. Massachusetts: Kluwer Academic Publishers.

Messing, M. (2012). *Op naar Weconomy: waarbij 'small is beautifull' een hoofdrol speelt*. Stichting Energie Transitie Nederland, 2012.

Middlemiss, L. & Parrish, B.D. (2009). Building Capacity for Low-Carbon Communities: The Role of Grassroots Initiatives. *Energy Policy,* 38, 7559-7566.

Morgan, G. & Ramirez, R. (1984). Action Learning: A Holographic Metaphor for Guiding Social Change. *Human Relations,* 37(1), 1-28.

Mulgan, G. (2006). The Process of Social Innovation. *Innovations: Technology, Governance, Globalization*, 1(2), 145-162.

Ornetzeder, M. & Rohracher, H. (2013). Of solar collectors, wind power, and car sharing: comparing and understanding successful cases of grassroots innovations. *Global Environmental Change,* 23 (5), 856-867.

PBL (2010). *Quickscan energie en ruimte. Raakvlakken tussen energiebeleid en ruimtelijke ordening*. Den Haag/Bilthoven: Planbureau voor de Leefomgeving.

Polatidis, H. & D. Haralambopoulos (2010). Local Renewable Energy Planning: A Participatory
Multi-Criteria Approach. *Energy Sources,* 26(13), 1253-1264.

Raad voor het Landelijk Gebied (2009). *Kansen voor een krimpend platteland: Advies over de gevolgen van bevolkingsdaling voor het platteland*. Publication RLG 09/07. Utrecht: Raad voor het Landelijk Gebied.

Ramchurn, S. D., Vytelingum, P., Rogers, A., & Jennings, N. R. (2012). Putting the ' Smarts' into the Smart Grid: A Grand Challenge for Artificial Intelligence. [Article]. *Communications of the ACM*, 55(4), 86-97.

Rutter, P., & Keirstead, J. (2012). A brief history and the possible future of urban energy systems. *Energy Policy*, 50, 72-80.

Schoor, van der (T) & Scholtens, B. (2015). Power to the people: Local community initiatives and the transition to sustainable energy. *Renewable and Sustainable Energy Reviews,* 43, 666-675.

Seyfang, G. & Longhurst, N. (2013). Desperately seeking niches: Grassroots innovations and niche development in the community currency field. *Global Environmental Change,* 23(5), 881-891.

Seyfang, G., Park, J.J. & Smith, A. (2013). A thousand flowers blooming? An examination of community energy in the UK. *Energy Policy*, 61 (2013), 977-989.

Seyfang, G & Smith, A. (2007). Grassroots Innovations for Sustainable Development: Towards a New Research and Policy Agenda. *Environmental Politics,* 16(4), 584-603.

Smil, V. (2010). *Energy Transitions: History, Requirements, Prospects*. Santa Barbara: ABC-CLIO, LLC.

Streeter, C.L. (1992). Redundancy in Organizational Systems. *Social Service Review,* 66(1), 97-111.

Tegenlicht (8-10-2012). [*Power to the People*]. VPRO.

Uitermark, J. (2012). De gevaarlijke belofte van burgerschap 2.0. Dossier Minder overheid, meer zelf doen? 12 october 2012.
Ven, van de, A. (1986). Central Problems in the Management of Innovation. *Management Science, 32(5), 590-607.*

Verbong, G. & Geels, F. (2007). The Ongoing Energy Transition: Lessons from a Socio-Technical, Multi-Level Analysis of the Dutch Electricity System (1960-2004). *Energy Policy,* 35(2), 1025-1037.

Voβ, J.P. & Kemp, R. (2006). Sustainability and reflexive governance: introduction. In J.P Voβ, D. Bauknecht & R. Kemp (Red.), *Reflexive Governance for Sustainable Development,* (pp. 3-28). Cheltenham: Edward Elgar Publishing Limited.

Walker, G. (2008). What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy,* 36(12), 4401-4405.

WCED (World Commission on Environment and Development) (1987). *Our common future*, Oxford: Oxford University Press.

Wolf, De, T. & Holvoet, T. (2005). Emergence Versus Self-Organisation: Different Concepts but Promising When Combined. *Lecture Notes in Computer Science,* 3464, 1-15.

Zoethout, K., W. Jager & E. Molleman (2004). Self-organising social processes of task allocation. *Cognitive Systems,* 6(2,3), 189-203.

Zoethout, K. (2006). *Self-organising processes of task allocation: A multi-agent simulation study*. Ridderkerk: Labyrinth Publications.

Appendix A

Success factors

1) Are local people involved?
   Local people are believed to have valuable local knowledge which can contribute to the success of an initiative. Further, they are likely to feel more connected to the local area, and will have its best interest at heart (Devine-Wright & Wiersma, 2013).
2) Is it able to cooperate or partner with other organizations?
   Partnerships and collaborations can contribute to the effectiveness of an organization, and can prevent initiatives from becoming isolated. They could also lead to new contacts, and therefore new openings and projects, all contributing to the global transition (Feola & Nunes, 2013; Hopkins, 2011)
3) Does the initiative build on a pre-existing group/structure?
   Pre-existing structures can potentially result in access to "creative spaces of experimentation and learning". They can be an important basis on which networks and new structures can take shape (Ornetzeder & Rohrachter, 2013).
4) Is it located in a favourable context in which the initiative is perceived positively?
   The acceleration of social innovations depends, among other things, upon help/support of "practitioner networks, political allies, strong civic organizations (from trade unions to hospitals) and the support of progressive foundations and philanthropists". Further, consumers have to be persuaded to be willing to pay for and/or support something new (Mulgan, 2006; Feola & Nunes, 2013). Also, solar panels change the appearance of buildings (Planbureau voor de Leefomgeving, 2010). If such developments are not appreciated by other residents in the area, this could affect the extent to which the initiative is successful, considering the initiative largely depend on the support of local residents.
5) Are they actively recruiting?
   To ensure that the initiative becomes deeply rooted, it is important that new participants are recruited to work with the initial group of enthusiastic people (Hoffman & High-Pippert, 2010).
6) Do their networking activities include many different stakeholders?
   According to Kemp et al. (1998), networks are an important element of successful niche-growth. Different stakeholders can draw different resources from their organizations, which can contribute to the emerging niche (Seyfang & Longhurst, 2013).
7) Do they maintain strong and ongoing relationships with actors both on the local, as well as national/global level?
   Maintaining relations with actors on the local level is important because it could potentially result in local support of the government, schools, businesses and other local organizations. Further, being embedded in regional, national and global (energy) networks can provide the local initiative with additional support, information and inspiration (Van der Schoor & Scholtens, 2015).
8) Are they able to gain support and resources from other organizations / actors? Are they able to attract and secure sources of funding?
   According to Catney et al. (2014), "power and ability should be seen as key resources alongside material wealth, and they typically go hand-in-hand". Funding can, however, be quite problematic for initiatives. It is often short-term and subject to requirements and bureaucracy (Seyfang & Longhurst, 2013; Seyfang & Smith, 2013; Van der Schoor & Scholtens, 2015; Walker, 2008, Catney et al., 2014)
9) Do they seek to promote their growth and diffusion? Do they focus on expanding their activities?
   Though not all local renewable energy initiatives seek growth and diffusion, it is increasingly regarded as important by policy makers and community activists. The

growth and diffusion of renewable energy initiatives could potentially contribute to gaining influence over wider unsustainable systems. If this were to be achieved, it would be a significant contribution to solving current energy challenges (Hargreaves, Hielscher, Seyfang & Smith, 2013).

10) Is the initiative able to manage external communications well?
Initiatives which were set up, but discontinued later on, had previously shown lower levels of external communications compared to active initiatives. Also, using a diverse set of communication tools, both online as well as offline, seems especially effective (Feola & Nunes, 2013; Van der Schoor & Scholtens, 2015).

11) Proximity of enabling or disabling infrastructure/obstacles?
In case of wind turbines for example, power lines could be seen as an obstacle which limits the possible and suitable locations for wind turbines (Devine-Wright & Wiersma, 2013). Regarding solar power, the presence of many trees could limit the available spaces which are suited for solar panels.

12) Is it a high/medium/low-income area?
Though this is in essence perhaps a more structural/economic aspect, it is still in this category since there is often also a relationship with a specific area. For people in relatively poor or deprived communities the options to make a change or contribute to sustainability are generally more limited. One of the reasons is a lack of money, and secondly, they often do not own their homes, and are therefore dependent on their landlord for their energy supply (Catney et al., 2014).

13) Is the initiative located in a more rural setting?
In rural areas social networks tend to be denser and the level of social capital higher (Feola & Nunes, 2013).

14) Is the size of the renewable energy systems limited? And does it not spoil the landscape?
People are less likely to accept a big project (such as a huge wind- or solar farm), or one which is installed in a pristine or otherwise beautiful/recreational area, or other projects/installations which result in "significant visual distraction". Residents of agricultural areas without considerable future tourism prospects, however, tend to be less opposed to such developments (Polatidis & Haralambopoulos, 2010).

15) Does the organization have a legal status?
Being an official organization with a legal status makes it possible or easier to interact and collaborate with other actors, such as local governments/agencies and more professional networks (Feola & Nunes, 2013; Mulgan, 2006).

16) Does the initiative addresses easy subjects first and moves on to more complex ones only at a later stage?
Feola & Nunes (2013) propose the hypothesis that initiatives who start off addressing easy themes first, and more complex ones later, are more likely to be successful.

17) Are (some of) the board members specifically trained with regards to sustainability, group management etc.?
Feola and Nunes (2013) conducted research with regards to the failure and success of transition initiatives. The studied transition initiatives that turned out to be very or fairly successful tended to have board members who were specifically trained in themes as Transition, permaculture etc.

18) Does the initiative represent the diversity of the local community in which it is situated?
In order for a system to be able to deal with the challenges posed by the environment in which it is embedded, it needs to possess of a variety/diversity which is equal to that of the environment (Morgan & Ramirez, 1984). Further, Feola & Nunes (2013) in their research state that the studied initiatives which turned out not to be very successful or not at all successful also did not reflect the diversity of the community very well. The same goes for initiatives which were discontinued.

19) Does the initiative have a large group of founders/steering members?
A large group of people could offer a significant organizational capacity (Middlemiss & Parrish, 2010). A large group of people also likely means more access to different (social) networks. Also, the very and fairly successful initiatives are often characterized by a larger number of founders and/or steering members (Feola & Nunes, 2013).
20) Are a significant number of board members highly educated?
If board members are highly educated it is more likely that they possess relevant and critical skills, which are important to the success of the initiative (Feola & Nunes, 2013).
21) Can the initiative rely on paid staff, in addition to the volunteers?
The initiative could be more vulnerable if it merely relies on volunteers, since they often have limited time. Seyfang et al. (2013) also identify this as one of the possible obstacles that community energy groups face. Further, "*grassroots initiatives, like many volunteer organizations, often struggle with securing and sustaining participation over time*" (Feola & Nunes, p.4).
22) Is the initiative able to limit internal conflict and/or manage it in a positive way?
Internal conflict, for example about ideologies, strategy or priorities is also considered a potential barrier to a successful initiative (Feola & Nunes, 2013).
23) Has the initiative installed/organized sub-groups?
The initiatives by Feola & Nunes (2013) identified as fairly or very successful were generally organized in sub-groups, based on, for example, a theme or project.
24) Do the members have sufficient time to dedicate to the initiative?
One of the challenges for future continuation of initiatives is time constraints. Members generally have limited time they can and are willing to spend on the initiative (Van der Schoor & Scholtens, 2015; Feola & Nunes, 2013).

Appendix B

General/additional information initiatives

Motives
When asked about their motives to start off their own organization, multiple reasons were given by all six organizations. The frequency of the various motives mentioned is displayed below.

Motive	**Number of times mentioned**
Municipal government encouraged renewable energy (initiatives)	3
Idea originated in local village meeting	2
Interested in contributing to sustainability / renewable energy	4
Collectively we can achieve more	2
Following the example of other existing initiatives	2
The local people seem interested / show up for information events	4
Out of discontent and frustration with current state of affairs (government and big energy companies). A bottom-up approach is required.	2
Setting the right example	1

Current phase
The interviews show that all of the initiatives are still relatively young (refer to table below).

Year of official registration	**Initiative**
2011	ECN, HD
2012	EO, SDE
2013	DM, PD

Three of the participants mentioned that, before they formally registered, they had already been active unofficially for a while. The two initiatives which were officially registered in 2013 originated from a campaign/initiative organized in 2012, and one of the initiatives registered in 2012, branched from a workgroup initiated in 2011. Below is an overview of the current phases they identified with at the time of the interviews. At least with four of the organizations, the phase they described, seems to correlate with their year of registration.

Current phase	**Initiative**
Initial phase of formal cooperative	DM, PD
Towards the end of the start-up phase	EO
Quite well established	ECN
Not specifically answered	SDE, HD

Area
The organizations target areas of somewhat different sizes. The table below shows the target area, size of the area, and of the population, for each of the initiatives. The demographic data is obtained from Statistics Netherlands (CBS, 2014).

Initiative #	Target area	Area size (km2) (Jan. 2014)	Population size (Jan. 2014)
1	Municipality of Menterwolde	81.62	12,258
2	The municipalities of Aa en Hunze; Borger-Odoorn; Tynaarlo.	704.47	83,477
3	Municipality of Pekela	50.20	12,706
4	Municipality of Noordenveld	205.32	31,087
5	Primarily the provinces of Drenthe and Groningen	5,640.04	1,071,716
6	The village of Hooghalen and its vicinity	Approximately 25.44*	Approximately 1400*

* Source: CBS (2014)*

In most cases the focus is on the municipal level. Though #1 also targets a municipal area, they wonder if this might already be too large in size. They think it might be better if each village established their own organization, so that there is not too much distance between the citizens and the organization. They are afraid people might quit if the target area becomes too large, since they will no longer be able to identify with it. However, they admit that in their case, the history and perceptions people have of other villages in their region also plays a role. According to them, this probably influences their way of thinking.

Number of people involved
During the interviews the initiatives were asked how many board members, (paying) members and/or non-members are involved in the organization. The numbers are displayed in the table below.

Initiative #	Number of board members	Number of (paying) members	Non-members	Customers
1	4	14		
2	9	30	+/- 10	
3	6		+/- 15	
4	5	100	15	100
5	3			200-250
6	6		+/- 25 and a few donors	

Time investment
The initiatives were asked how much time they generally invest in the organization on a weekly basis.

Time estimates (per board member)	Initiative #
Max. half a day per week	1, 6
Two days to half a week	4
Part time	2, 3
On a daily basis (but not full time)	5

Retirees work almost full time	2

Membership
The initiatives were asked about their current membership options.

Membership	**Initiative #**
Paid membership	1, 2, 4
Thinking of paid membership for the near future	3
No membership because it is not a cooperative	5, 6

Number of solar panels installed
All of the initiatives focus primarily on promoting solar power as a means of renewable energy. The number of households/clients who had solar panels installed by them, with their help, or based on their advice is displayed in the table below. This is the number per initiative, at the time the interviews were conducted (end 2012 to early 2013).

Number of households	**Initiative #**
0 (have not reached that phase yet)	2
25	6
At least 45	3
About 60	1
Exact number unknown	4, 5

The initiatives where the exact number of households/clients at the time of the interview is unknown are however the initiatives with likely the highest number of households/clients who had solar panels installed. Of one of them, there is a known score of 1488 **solar panels** (please note: not households) by the 1st of January 2014. Regarding the other initiative in this category, it is known that, among other things, they convinced their local municipality to install +/- 1000 solar panels on 7 different municipal buildings (out of which 96 were placed at the town hall).

Pursuit of profit
All the organizations can currently be considered non-profit organizations. If there are any profits, they will flow back into projects, the community or the region. One interviewee mentioned that they may set up some private companies in the future, and hire paid employees.

Importance of self-organization
The interviewees were asked to give their opinion with regards to the importance of self-organization of citizens in this matter. Is it necessary or important for citizens to set up initiatives as theirs? Is a bottom-up approach needed? The table below shows their explanations.

Initiative #	**Importance of self-organization**
1	It is important; one of our motives. We do not want to wait any longer for the big energy companies to change things. Also it is important that there is not too much distance between an organization and the people. That is why the target area should also not become too big.
2	We do not mean to rebel against the government and big businesses, but the intention is to fill a gap. It would be great if citizens become more independent.
3	It is important to become energy neutral, and if you cannot do it on your own, then do it together with others.

4	We think it would be good if the profits could be reinvested in the local region. It stimulates local employment. Also we believe that a local cooperative will appeal to the locals. (..) It is nice that, if you participate, you have a say in the way things are organized.
5	It is important because the government is not going to solve this issue. Also you can observe a trend that people want to become more self-sufficient. They want to be less dependent on governments and monopolists.
6	(Website:) People think of it as an opportunity to improve the livability. It also has a positive impact on the local employment and solidarity within the community.

Professional background
The table below shows the different professional backgrounds of the board members per initiative.

Initiative #	**Professional backgrounds**
1	Legal background; gardener/business owner; government position/chairman of village council; accountant; general practitioner
2	Retired entrepreneur; chemistry; retired CEO of healthcare organization; consultant at government department; account manager; HR department Ministry of Internal Affairs; executive secretary; project manager civil engineering
3	Education; business; politics
4	Education; nature & environment; management investment engineer; distribution manager; civil engineering; government; physiotherapist; ecologist; consultant project management (some are retired)
5	Consultancy; Ministry of Transport, Public Works and Water Management
6	Entrepreneurs; agriculture expert; energy expert; part-owner of energy related company; manager

Sub groups

Working group / tasks	**Number of organizations**
Local fiber optic infrastructure	1
Neighborliness	1
PR	4
Vision/future	2
Activities	1
Website/ICT	2
Education	1
Project management	2
(Purchasing) renewable energy	1
Technology	2
Promotion/campaign	1
Insulation	1
Energy savings measures	1

Appendix C

Interview questions

General details

- What sort of organisation?
- When founded? Which stage are they in?
- How many members / people involved?
- What are their goals?
- Hierarchy?
- What exactly do they do?
- Which problems do they encounter?
- Why have they set up their own initiative?
- And how did this take place?
- Which phase are they currently in? (starting off / few years old / stable or not etc.)
- How much work is there to be done? How active are they? (meetings etc.)
- What do they feel they lack or need?
- What do they believe is necessary in order to be(come) successful? (factors, conditions etc.)
- How hard is it to organise things themselves? What are the main barriers?

Requisite variety

- How many people work there / are involved in the initiative?
- Are as many as possible involved in organisational activities or is a limited number of people (in charge) prefered?
- What are their tasks? Do they have multiple tasks?
- Which main functions/positions can be identified?
- Are the tasks interchangeable?
- How is the work that needs to be done organised?
- To what extent are people and tasks flexible?
- Do tasks change depending on the circumstances? Do they adapt?
- How are tasks/jobs assigned to people?
- Is there variety among the skills/people etc.?
- When problems arise, who deals with them? Depending on the circumstances?

Double-loop learning

- Is there room for reflection/learning/evaluation?
- Who are involved in these processes?
- To what extent is there double-loop learning?
- How actively are they trying to change things?
- Are people encouraged or stimulated to share their knowledge/experiences etc.?
- To what extent are they trying to learn from eachother?
- How are decisions made? Collectively?
- Who decides on the appropriate course of action and how is that done?

Minimum critical specification

- How much is specified/fixed within the organisation?
- Which things need to be specified in order to get the system going?
- To what extent is the organisation pre-designed?
- Are self-organising capacities favoured or valued?
- Are options kept open?
- Is research being carried out by members of the organisation?