Governing self-governance

Identifying barriers for Dutch civic solar energy co-operatives in the municipal governance approach

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Abstract

The Netherlands needs to accelerate in the energy transition. Solar energy projects are considered promising. Many authorities believe that the energy transition should arrive from bottom-up. This makes Dutch civic solar energy co-operatives valuable. However, the co-operatives feel constrained. This research focusses on the relationship between civic solar energy co-operatives and their municipalities in order to tackle some of the barriers present.

Theory explains that municipalities' policies focus on the common interest. Civic solar energy co-operatives, however, are defined as self-governed organizations, arriving from outside the control of government. As a result, municipalities can constrain the individual interests of co-operatives.

The relationship and interaction between municipalities and civic solar energy co-operatives is largely determined by the municipal governance approach. Traditionally, this approach was characterized as hierarchical and administering generic rules. This shows signs of the technical rational approach. Nowadays, the approach seems to have shifted more towards the communicative governance approach, which aims to facilitate valuable individual and collective initiatives more. More urbanized and wealthier municipalities are generally better able to facilitate this. They also seem to see more need to do so.

Nine concrete barriers in the relationship between both parties were identified during interviews with civic solar energy co-operatives. Based on follow-up interviews with their municipalities, five of these barriers seem to be easiest to solve due to the municipalities' willingness and ability to do so. The barriers are related to the themes governance approach, information, networking, and municipal policy. This research provides recommendations to lift these barriers.

Key words: civic solar energy co-operatives, self-governance, municipalities, governance, communicative rationality, technical rationality, facilitation.

List of tables and figures

List of figures

List of tables

List of abbreviations

- RES: Regional Energy Strategy
- MWp: Mega Watt peak
- TWh: Terawatt hour

List of appendices

Table of contents

1. Introduction

1.1 The era of man-made climate change

"We live in an era of man-made climate change", Said Vincente Barros, co-chair of the IPCC, during the presentation of the IPCC's 2014 Report on Climate Change. In this report the UN's International Panel on Climate Change's (IPCC) once and for all confirmed the facts that humans cause climate change. The report argues that the emission levels of greenhouse gasses caused by humans, are higher than ever. This is most likely the leading cause of the widespread changes to human and natural systems. Apocalyptic scenario's, such as the warming of the atmosphere, warming of the ocean, and rising sea levels since the 1950's are discussed (IPCC, 2015). The shift towards renewable energy sources is needed.

The impact of climate change is also noticeable in the Netherlands. Dutch summers are becoming warmer and dryer, and the frequency and intensity of rainfall increasingly causes to flood Dutch neighborhoods (Klimaatbestendige Stad, 2019). This has not gone unnoticed. Slowly, society and the Dutch government are trying to turn the effects of climate change around. Renewable energy sources, such as solar energy, are increasingly adapted (CBS, 2020).

For instance, Dutch citizens are starting up solar energy co-operatives in order to produce more sustainable energy. Solar energy is deemed a promising technology as it can also be applied to the many available roofs in The Netherlands (Deloitte, 2018). Sadly, however, civic solar energy co-operatives in The Netherlands express feeling constrained by, for instance, the government.

This research aims to gain insight into the barriers to successful civic solar energy co-operatives in The Netherlands. The focus is on barriers posed on the co-operatives by municipalities, as the co-operatives express relatively many barriers that arrive from interaction with their municipalities.

1.2 Purpose of this research

As shortly mentioned above in paragraph 1.1 this research aims to find the barriers posed on civic solar energy co-operatives by their municipalities. Accordingly, this research aims to make recommendations to municipalities for lifting these barriers.

Below this chapter provides insight in the previously mentioned chosen focus on civic solar energy co-operatives in The Netherlands. This paragraph also contains a call to governmental action, especially for municipalities.

Focus on civic solar energy co-operatives

This research focusses on barriers for civic solar energy co-operatives, because they seem to have great potential to contribute to the energy transition. This is for instance due to the fact that solar energy technology has become freely available and has decreased in price over the years. This has made the technology very accessible for use on the individual level (Van der Schoor and Scholtens, 2015).

In the past years the renewable energy produced by civic co-operatives has increased substantially. In 2019 The Netherlands hosted 582 civic renewable energy initiatives. This is double the amount of the year 2015, and shows the great force of Dutch civic co-operatives in renewable energy. In 2019 civic solar energy initiatives installed 119 MWp in solar energy. Most was constructed on roofs. Combined with wind energy collectives, civic initiatives in solar energy were able to produce enough energy to provide 235.000 households for one entire year (Klimaatakkoord.nl, 2019). Don't we all want this number to increase even more? According to Deloitte this number could increase much more: 892km2 of Dutch roofs are suitable for holding solar panels and together could produce 217 PJ (60 TWh). This is roughly the equivalent of The Netherlands' entire use of electricity in a year (Deloitte, 2018).

Also others consider civic (solar energy) co-operatives, promising. Gijs Termeer, the director of organization HIER Opgewekt, thinks civic initiatives are more important than ever. HIER Opgewekt is an organization that helps citizens to implement renewable energy (Hieropgewekt.nl, 2021). He believes that by investing their time and money, civic initiatives are able to bring about local support, local control, and citizen involvement in the local energy supply. Support for renewable energy projects has proven to be lacking in when they are governmental projects. In addition, already in 2011 the potential of citizens was noticed. Hajer (PBL, 2011), former director of the Dutch PBL believes that the government should utilize citizens' creativity and power to innovate, instead of viewing the initiatives as a burden. This is believed to offer opportunities for 'green growth'. Hajer strongly believes that in many aspects society is more creative and better capable to come up with the best solutions for the energy transition. In addition, the civic (solar) energy initiatives often make sure that the revenues from the

local project stay in the region. This is opposite to the current and locally unwanted trend in which large foreign project developers gain subsidies for large solar energy farms (Laconi, 2021). It is even argued that in general governmental bodies have become more dependent on self-organizing user groups and societal interest groups to implement their decisions and reach certain goals (De Roo, 2016, in Boelens and De Roo, 2016; Boelens and Boonstra, 2011).

1.4 Research questions

Main research question

The Netherlands need a further acceleration of the energy transition. The main concern of this research is the progress made by civic solar energy initiatives in this transition. The fact that civic solar energy co-operatives are frustrated by processes controlled by (among other things) municipalities is undesirable. It is therefore important to find out more about the barriers, and to formulate policy solutions to the issues. The main question for this research is:

"Which barriers do Dutch municipalities pose on civic solar energy co-operatives in The Netherlands?"

Secondary research questions

In order to formulate an answer to the main research question, it is important to understand the relationship between civic solar energy co-operatives and their municipalities. In order to find out more about the interaction between civic solar energy co-operatives and their municipalities, a definition of both parties is given. As the relationship between both parties contains barriers, it is also important to understand the relationship and way of interaction between both parties. Interactions between citizens and their municipalities is shaped by the governance approach. Therefore the theoretical framework adds information on governance approaches for suitable municipal interaction with citizens. This information provides answers to the following secondary research questions:

1. **How does the existing body of literature define civic solar energy co-operatives?**
2. **Which barriers do civic solar energy co-operatives encounter?**
3. **How does the existing body of literature define municipalities?**
4. **How can the relationship between civic solar energy co-operatives and their municipalities be defined?**
5. **What type of governance approach suits civic solar energy co-operatives best?**

1.5 Reading guide

This chapter, chapter 1, has introduced the issue at hand; promising civic solar energy co-operatives in The Netherlands that feel constrained by their municipalities. The research questions mentioned are answered in the following chapters.

Chapter 2 provides an overview of the relevant theory behind the issue. This way chapter 2 (partly) provides an answer to the secondary research questions. Consequently, chapter 4 further answers secondary research questions 3 by describing the results of the research. The results contain information on the municipal barriers posed on civic solar energy co-operatives and the willingness and ability of municipalities to lift these barriers.

The research method is introduced and discussed in chapter 3. The chapter introduces the research design for formulating answers to the main and secondary research questions.

Chapter 5 aims to draw conclusions from the results, and discusses them. Also, concrete recommendations for policy measures are mentioned. The recommendations are only about the barriers in which municipalities are willing and able to change. After all, these are the barriers in which municipalities can truly make a change. Chapter 6, reflects on the research process and the credibility of the outcomes.

On overview if the literature used in the research can be found in chapter 7. The can be found at the bottom of this document.

2. Theoretical framework

Despite their potential, civic solar energy co-operatives in The Netherlands often feel constrained. Although this chapter provides an overview of all types of potential barriers known for the co-operatives, the focus is on the barriers related to municipalities. The barriers in the relationship between civic solar energy co-operatives and their municipalities is related to the Dutch planning context and the governance approach. This chapter shines light on some of the underlying scientific theory to this issue.

2.1 The Dutch planning context

Complexity

The Dutch planning context is known to be complex. Complex systems typically consist of many actors with multiple interests, which are highly interrelated. Ownership and power are fragmented, which constrains the capacity of any actor to change it (De Roo, 2012; De Roo and Silva 2010; Kemp, 2010, in de Boer and Zuidema, 2015). As a result, spatial planners can only partly influence the development paths of the physical environment (Rauws, 2016). This would also be the case for other individuals, such as civic solar energy co-operatives. The Netherlands host a large variety of (individual) interests, which poses challenges due to (e.g.) the lack of available space (Devine-Wright, 2011).

For instance, the (Dutch) energy system consists of many actors with multiple interests, who are highly interrelated. These are, for instance, the substantial energy grids that grew throughout the 20th century to meet the increasing energy demand. Dutch operator TenneT (owned by the Dutch state) owns large parts of this grid. Other parts of the grid with a lower voltage are in possession of and operated by regional grid operators, who are often owned by energy companies. The Dutch grid is highly connected to the grids in other countries (Vattenfall, 2017). The Dutch gas network is organized in a similar way. Adding to this, the Dutch state can be influenced by large companies' vested interests (Moe, 2010, in Van der Schoor and Scholtens, 2015). Large energy firms are known to lobby to make the national government slow down the transition towards renewable sources of energy (Mulder and Scholtens, 2013).

Not only the energy system is complex. Also the general planning context in the Netherlands can be defined as such (Rauws, 2016). Governmental bodies, such as municipalities, aim to formulate policy that benefits the common interest (Elzinga and De Lange, 2006). However, due to the multiple interests present in complex contexts, this can pose constraints on realizing individual interests, like those of civic solar energy co-operatives. One can especially imagine this in the energy transition, which involves a shift from the second energy landscape (mostly invisible pipelines underground) to the third energy landscape with much more impact on the environment due to for instance, solar panels and wind turbines (Noorman & De Roo, 2012). The following paragraphs further define the relationship between municipalities and civic solar energy co-operatives in this context.

Barriers for civic solar energy co-operatives

A complete list of barriers to successful civic solar energy co-operatives in The Netherlands is not available. Instead, multiple (older) researches on barriers for civic solar initiatives in other countries, combined with general barriers to civic renewable energy co-operatives in The Netherlands is available. This research uses these barriers as a starting point. The barriers are listed below.

1. Financial barriers

The financial barrier is mainly comprised of two aspects, being the business case and the financial incentive to use renewable energy. Research in The Netherlands and the UK (Van der Schoor and Scholtens, 2013; Dunning and Turner, 2005, in Walker, 2008) shows the importance of a good business case: financial risks are avoided (Netherlands), and economic viability is valued (UK). Indirectly related to civic solar energy co-operatives is the willingness of citizens to financially participate in the projects (Sardianou and Genoudi, 2013). Financial participation is avoided when risks are high, return periods are long (Hain et al, 2005, in Walker, 2008), and when citizens do not have sufficient funding to participate (Reinsberger and Posch, 2014; Hain et al., 2005, in Walker, 2008).

2. Technical viability

For the United Kingdom Walker (2008) identifies (technical and) economic viability (Dunning and Turner, 2005, in Walker, 2008) as barriers for community-owned means of energy production and use. In the case of Reinsberger and Posch (2014) (Austria), however, technical viability seemed one of the least concerns of participants in a civic solar energy project.

3. Market entry

As found in the UK, civic solar energy projects (that often practice small scale energy generation) can have difficulties with realizing their income-generating potential due to various barriers to market entry and network connection (Hain et al., 2005, in Walker, 2008). According to Watson et al. (2006, in Walker, 2008) these barriers include the lack of incentive for network operators to connect to small generators, the costs of trading, and the difficulty of obtaining access to green energy certificates (Walker, 2008).

4. Legal barriers, and 5. Policy

Van der Schoor and Scholtens (2013) conducted research on Dutch civic initiatives in renewable energy. They found that many times legal difficulties were barriers. Also Walker (2008) (UK) identifies legal conditions as a barrier for community-owned means of energy production and use (Dunning and Turner, 2005, in Walker, 2008). Van Rooijen en van Wees (2006, in Van der Schoor and Scholtens, 2015) argue that in The Netherlands the national energy policy has been one of the largest barriers to the energy transition. For example, the lack of a stable investment climate in The Netherlands caused problems. As a result, small producers are fiscally disadvantaged (Van Rooijen en Van Wees, 2006). They add that in 2013 national policies in The Netherlands still hindered renewable energy cooperatives by levying energy taxes on co-operative sustainable production, which negatively influences the business case. Fossil fuel producers however, were still subsidized at that time (Van der Schoor and Scholtens, 2013).

6. Planning permission, 7. Politics, and 8. Governance approach

For local renewable energy initiatives in the UK, Walker (2007b, in Walker, 2008) found that obtaining planning permission is an important barrier.

In addition, international literature on barriers to successful bottom-up renewable energy initiatives often identifies the cultural and political traditions as barriers (De Groot et al., 2001; Sardianou and Genoudi, 2013; Painuly, 2001, in Van der Schoor and Scholtens, 2015). More general, Boelens and Boonstra (2011) explain that planning proposals remain controlled by public government. Public government in its turn does not seem to adapt to initiatives that emerge from the dynamics of civil society (Boelens and Boonstra, 2011). In order to get a permit, organizations are expected to fit into narrowly defined pigeonholes. Allegedly, not enough attention goes out to the specific societal characteristics and the low amount of risks that is involved (WRR, 2012). As a result of pigeonholing, governmental bodies are unable to accomplish their promises and become less trustworthy to society (VNG, 2021; WRR, 2012). Also, citizens should not be overestimated (or underestimated) by governmental bodies (WRR, 2012). The barrier related to the governance approach is further explained in the following paragraphs, especially paragraph 2.3 on the governance approach.

9. Physical layout of the environment

International literature on barriers to successful bottom-up renewable energy initiatives often identifies the physical layout of the built environment as a barrier (De Groot et al., 2001; Sardianou and Genoudi, 2013; Painuly, 2001, in Van der Schoor and Scholtens, 2015).

10. Information and networking

Walker (2008) stresses the importance of information on many topics that concern civic solar energy co-operatives. Examples of these topics are legal conditions under which the project operates, and establishing economic and technical viability (Dunning & Turner, 2005, in Walker, 2008). It is deemed essential for the co-operatives to get expert advice, support (e.g. from surrounding citizens and municipal board (Van der Schoor and Scholtens, 2013)), and to learn from others' experiences (e,g, in other parts of The Netherlands) (Adams, 2008; Walker et al., 2007b, in Walker, 2008). Citizens should also be sufficiently equipped to start up the co-operative (WRR, 2012).

2.2 Defining civic solar energy co-operatives and municipalities

This chapter provides insight into the relationship between civic solar energy co-operatives and their municipalities. This is done by providing definitions of both parties. Frist, the concept of a municipality and its tasks is defined by means of administrative law. This section also provides a definition for civic solar energy initiatives, which can be viewed as self-organizing entities. This theoretical definition is used as background information in the following paragraph 2.3.

2.2.1 Dutch municipalities

Defining municipalities

The Dutch state consists of three democratic layers of government. These are the national governmental body, provinces, and municipalities. All three layers used to have their own task. However, as the number of Dutch citizens grew and the economy became more open, the tasks began to blur. As a result, nowadays societal issues cannot be isolated and solved by only one of the governmental layers. As a result, municipalities and provinces more or less have the same competence.

Municipalities are the lowest territorial communities with their own governmental authority (Elzinga and De Lange, 2006). The municipal board consists of different bodies. These are the city council, The Board of Mayor and Aldermen, and the mayor. Municipalities are governed by the democratically chosen city council. The city council installs the aldermen. The municipal board is competent to perform tasks both autonomically and by means of co-administration (Elzinga and De Lange, 2006).

The municipality's tasks

Governmental bodies restrict their themselves to formulating regulations in the areas that serve the common interest, which are health, safety, safety of the environment, or the quality of amenities and services. Also municipal regulations are intended to serve the common interest (Elzinga and De Lange, 2006). The individual interest of, for instance civic solar energy co-operatives, could therefore be restricted sometimes.

The national government, provinces, and municipalities all have a certain competency in overlapping domains, such as spatial planning. Higher governmental policy could restrict municipalities in granting permissions. Also, in some domains the municipalities do not have any competency. Within the municipal territorial area the municipality performs general management tasks. Among other things, municipalities' domains are spatial planning (zoning plans), and permitting environmental licenses within the territorial domain of the municipality. Their jurisdiction roughly goes as far as to where higher rules and regulations end. In order to prevent decentralized governmental bodies (e.g. municipalities) to undermine the general national interest, higher governmental bodies supervise the lower governmental bodies (Michiels, 2014).

In this research the municipalities' relationship with provinces and national government is relevant. This is due to the fact that in some cases, for instance when civic solar energy co-operatives are placed on land and outside of the built-up area, the province instead of the municipality is the competent governmental body. Some issues are even managed by the national government, and cannot be influenced by municipalities or provinces (Michiels, 2014). This research however, focuses only on civic solar energy co-operatives that dealt with their municipalities, as the research focusses on barriers in the relationship between both parties.

2.2.2 Civic solar energy co-operatives

As discussed above, municipalities' rules and regulations serve the public interest. These rules can restrict individual interests of, for instance, civic solar energy co-operatives. These co-operatives are private parties that aim to produce solar energy projects on either land or roofs. In doing so, some co-operatives claim to feel constrained by their municipalities. In order to understand the relationship between both parties, this paragraph defines civic solar energy co-operatives by means of theory.

Defining civic solar energy co-operatives

Civic solar energy co-operatives are a type of bottom-up civic initiative. Already in 2011 Boelens and Boonstra (2011) defined bottom-up civic initiatives as "*initiatives for spatial interventions that originate in civil society itself, via autonomous community-based networks of citizens, outside government control*" (Boonstra and Boelens, 2011, p. 100). Nowadays, the definition of Boelens and Boonstra (2011) also applies to the concept of civic solar energy co-operatives in The Netherlands. These co-operatives indeed arrive from society itself, autonomously, and outside of government control.

In line with Boelens and Boonstra (2011) Bolender (2010, in De Roo, 2016, in Boelens and De Roo, 2016) notes that it is often assumed that self-organization relates to groups of active citizens and social groups that increasingly show their self-organizing ability by constructing their own plans in response to governance approaches they do not agree with (Bolender, 2010, in De Roo, 2016, in Boelens and De Roo, 2016). In doing so, the initiatives do not deviate from the applicable laws, but rather fill in when governmental bodies retrieve, are biased, or simply do not live up to the expectations (De Roo, 2016). Citizen initiatives thus respond to issues in their environment without the control, responsibility, plan, or agenda of a planning expert, as put by De Roo (2016).

In theory civic solar energy co-operatives are defined as self-governing organizations by Roo (2016). De Others often call the phenomenon self-organization. The following section takes the concepts of "self-organization" and "self-governance" further.

Civic solar energy co-operatives as a form of self-governance

Autonomously emerging civic solar energy co-operatives are often linked to the theoretical concepts of self-organization. In this research, however, the civic solar energy co-operatives are defined as "self-governance" as defined by De Roo (2016, in Boelens and De Roo, 2016). This is because De Roo (2016) argues that the concept of self-organization is often used thoughtlessly, and maybe incorrectly. Rather, the term of 'self-governance' is deemed suitable. In fact, both concepts are deemed opposite concepts within organization in the collective level. Both concepts can therefore be placed at the opposite ends of the spectrum in figure 1 below.

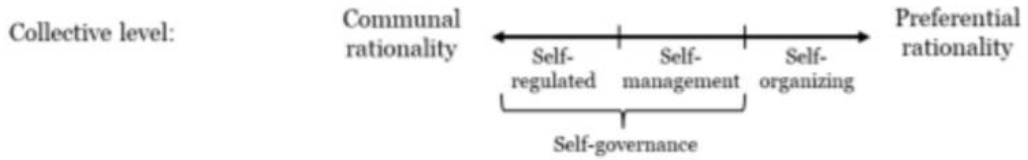


Figure 1: spectrum of governance at the communal level (based on De Roo, 2016, in Boelens and De Roo, 2016).

The difference between "self-governance" and "self-organization" matters. De Roo and Perrone (2021) see the concepts as different forms of rationality at the collective level (societal level), outside control of the government. What exactly is the difference between both concepts? Self-organization is perceived to be a spontaneous process, emerging without the intent of individuals or groups. Self-organization refers to a process without the responsibility of a collective, and thus without organization. It is a spontaneous process. It does, however, lead in collective results in which many individuals act similar and create a pattern. An example of the latter is the "desire path"; many individuals taking a short cut ruining the grass or other vegetation and unintentionally creating a new path, outside of existing paths created by spatial planners. De Roo and Perrone (2021) refer to this as preferential rationality, which is put at one extreme of De Roo and Perrone's (2021) spectrum for collective rationality (also see figure 1 above).

On the other side of the spectrum is the self-governance process, which is used to define civic solar energy co-operatives. According to De Roo (in Boelens and De Roo, 2016), the concept of self-governance can be split up in two types of self-governing activities. These are the concepts of 'self-regulation' and 'self-management'. Processes of self-regulation and self-management involve acting purposefully and are intentional. These processes can be understood as 'under the responsibility of a collective', and start with a joint initiative and actions that support these initiatives. This happens when a mismatch in an existing situation occurs to which initiatives want to create a solution. Both concepts can be placed in the spectrum in figure 1 above. This spectrum ranges from unintentional (preferential rationality) to intentional (communal rationality) and vice versa (De Roo and Perrone, 2020). Civic solar energy The definition of self-governance suits the concept of civic solar energy co-operatives, as the co-operatives also organize themselves with the intent to reach a certain goal.

Table 1 below schematically shows the different characteristics per type of organization (self-governance or self-organization). This table also shows how, according to De Roo (2016), the concept of self-management or self-governance would be the right definition for the civic solar energy initiatives as meant in this research. The overarching term for these two terms would be the self-governed initiative.

	Collective initiative	**Collective action**	**Collective result**	
Self-regulation (self-governance)	X	X	X	**Intentional**
Self-management (self-governance)		X	X	**Intentional**
Self-organization			X	**Unintentional**

Table 1: Self-governance and self-organization (De Roo, 2016).

2.3. The governance approach matters

Governmental bodies (e.g. municipalities) continuously attempt to incorporate their visions for spatial arrangements, spatial development, and spatial quality into the physical environment (De Roo, 2013). They do so by using the (governance) approach that they assume is best. After world war II and for a long time after the top-down, technical rational governance approach was deemed best. However, society has nowadays become more complex, and seems to have different needs. An example is the emergence of civic solar energy co-operatives, which sadly feel constrained. This could mean that a different governance approach would better suit these promising co-operatives. This chapter describes the considerations in choosing a suitable governance approach, and provides relevant theoretical background information.

2.3.1 The governance approach

Healey (2006) notes that the governance approach (referred to as the narrower concept of "planning tradition" by Healey (2006)) is an interesting phenomenon. She describes it as being built up through a mix of evangelism, formal institutional practice, scientific knowledge and increasingly conceptions of the qualities and social dynamics of places. This involves notions of the social processes of shaping places through articulation and implementation of policies (Healey, 2006). Among other things the discourse legitimates what governments do and how they do it. It would also determine the governance approach to spatial and social interventions (Healey, 2006). The governance approach therefore matters to civic solar energy co-operatives, which in most cases also have spatial impact. Different governance approaches observed over time each imply different degrees of autonomy of the (national) government (Healey, 2006).

The following paragraph lists two important planning discourses present in The Netherlands throughout the years. These approaches provide a clear insight in how the planning approach matters in spatial planning issues. Foremost, this paragraph explains the bottlenecks it has caused in the government's relation to citizens in the past years, and why civic solar energy co-operatives might need a change in governance approach.

Technical rationality

During the period after the destructive World War II, The Netherlands were in need of reconstruction. The development of welfare states was believed to provide a reasonable quality of life to the majority of citizens and to stimulate economic growth (Healey and Shaw, 1994, in Healey, 2006). Quite understandably, a high level of certainty and governmental control in spatial planning was desirable. As a result, the typically modernist approach to planning, the technical rational approach, was adopted until the late 1960's (De Roo, 2013).

The technical rational approach involves governments formulating clear planning trajectories for the future, almost as if cause and effect were connected linearly. Scientific knowledge, and instrumental rationality were believed to ensure the spatial planner of reaching the spatial planning goal. Especially technical expertise was perceived necessary for reaching the desired planning outcomes. The technical rational approach assumes that all information can be available at the beginning of a planning process. Because of this, it is expected that the final result of the planning process would certainly resemble the exact objective that was envisioned at the beginning of the planning process. This shows that in the technical rational approach experts strongly rely on the concepts of causality, entity, and stability of a context. The approach gives little attention to differences in local contexts and values within (sub-)communities. In this time a planning issue was primarily seen as an issue that should be resolved by experts. Therefore, usually a singular perspective from one steering authority determined the formulation of a plan (De Roo, 2013). Also, decision-making typically took place at the macro level (top-down oriented) and had a generic character (De Roo, 2013).

Nowadays the technical rational approach is considered to incorrectly perceive the chaotic real-life governance process as simplistic (De Roo, 2013), while in fact rational decision-making in spatial planning is limited (Simon, 1960, in De Roo, 2013). The approach does not quite suit the more complex planning issues that contain conflicts of interest, and in which the government does not have full executive power (De Roo, 2013). As a result, the approach became increasingly unpopular from the view of economic efficiency, democratic practice and social welfare (Healey, 2006). Nowadays, the technical rational approach to spatial planning is considered to be suitable for relatively simple issues and routine-like operations (De Roo, 2013). The approach is arguably less suitable for taking on the complex energy transition at hand.

From "governing" to "governance"

As described above, whenever a planning issue would be even slightly complex, the top-down oriented and generic planning approach would deadlock. Therefore, from the 1980's onwards more attention was given to incorporating greater understanding of how people come to have their ways of thinking. The newly applied governance approach(es) implied different degrees of autonomy of the national government (Lemos and Agrawal, 2006). In this activity of governance, other parties (e.g. market parties of citizens) are invited to collaborate is reaching certain goals. This was done as the government recognized that in some issues the government alone does not have enough power to solve an issue on its own. This resulted in a shift from traditional top-down governing towards governance in which the government collaborates with equal partner. This shift usually does not involve a change in policy objectives, but rather a change in the way in which these objectives are reached(Lemos and Agrawal, 2006).

When shifting to the activity of governance, governmental bodies were demanded to become more open and accountable when there was no longer a match between governmental traditions and the way in which businesses and citizens conduct their lives. The amount of governmental autonomy could be negotiated accordingly (Healey, 2006).

There are different types of governance approaches that fit the umbrella of "governance". This includes the communicative rational approach, which is most relevant for this research. The communicative rational approach is also known as the participative approach. This approach is described as the optimal form of citizen participation, and can be seen as the opposite extreme of the technical rational approach (De Roo, 2013). The approach is discussed in the following section.

Communicative rationality

The technical rational approach and its successive approaches often had limited transformative power due to the complexity of the planning context (Healey, 2006 and De Roo, 2013). The "solution", the communicative planning approach, was embraced in the 1990's (De Roo, 2013), and fits the shift from governing to governance. The communicative planning approach assumes that complete rationality is impossible and decision-making often partly involves factors of extra-rationality: e.g. habit, experience and intuition (Simon, 1957, in De Roo, 2013). Other reasons for the boundedness of rationality are that not everything can be known, lack of consensus, scarcity of resources, etc. Due to the fact that rationality also contains values, rationality becomes subjective, inter-subjective and context-specific.

In the communicative rational approach importance is given to perception, consensus, and discourse in decision-making (De Roo, 2013). The communicative turn therefore represents a shift towards interests instead of ideals. Individuals instead of society become important and issues are addressed specifically at the micro level. As a result, the communicative approach includes the persons behind the planning issue. Differences in local contexts and values within (sub-)communities are given attention (De Roo, 2013).

The character of the communicative rational approach makes it suitable for complex planning issues. Complex issues have a causality that is not clear or unambiguous. This is due to multiple diverging interests and needs within this context. Within a complex situation causality is not linear. Governmental bodies therefore cannot steer a complex situation on their own and need agreements to formulate a common shared opinion on a certain planning issue (De Roo, 2013). Habermas (1973, 1974, 1986, in De Roo, 2013) and others speak of communicative rationality when the outcome is based on the process of interaction among stakeholders. The stakeholders come to a jointly formulated solution after an intensive process of exchanging thoughts. Mutuality and consensus are of great importance. For all the stakeholders the solution would mean the most rational consensus (De Roo, 2013).

The spectrum of planning approaches

The paragraphs above have shown different types of rationalities (technical and communicative) applied in spatial planning throughout the years. These approaches range from the technical rational approach to the communicative rational approach. De Roo (2013) places a spectrum between both extremes (technical rational and communicative rational, see figure 2). The technical rational approach would fail in planning issues characterized by high complexity and when the government has limited execution capacity. Despite the communicative approach being handy in complex situations, simple and straightforward planning issues are most likely affected negatively by this approach. Then the technical rational approach would suffice.

So, the chosen approach to spatial planning should depend on the characteristics of the planning issue (De Roo, 2013). This theory is illustrated in De Roo's (2013) spectrum of planning, illustrated in figure 2 below. The figure shows the relationship between both extreme governance approaches (technical and communicative rational) and the adhering type of planning issue (simple or complex).

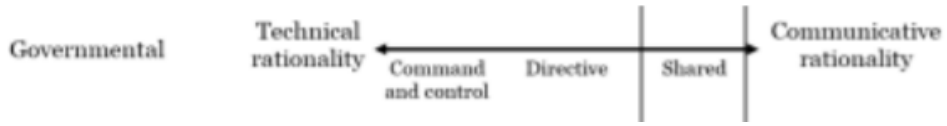


Figure 2: Correlation between type of planning issue and governance approach (based on De Roo, 2016).

Do note that the types of governance in figure 2 above are all organized on the governmental level. This means that the planning approach is chosen at the governmental level. In this perspective citizens are only involved in planning when the governmental body decides so. The communal level (hosting civic solar energy co-operatives, arriving from outside the control of government), as discussed in paragraph 2.2.2 (or see figure 1) does not seem involved in this according to the spectrum depicted in figure 2 above. De Roo and Perronne (2021) therefore merge together both spectrums, and add the "collective" level to the spectrum of the governmental level. The addition is discussed in paragraph 2.3.3 below.

2.3.2 Combining the governmental and communal level

The spectrum of De Roo (2013) only discusses rationality at the governmental level. The communicative governance approach is part of the governmental perspective. This leaves out the perspective of self-governing civic (solar energy) initiatives. It also implies that only governmental bodies decide when citizens influence governmental policy. De Roo and Perronne (2021) therefore add the "collective" level to the spectrum. The addition is discussed in this paragraph.

The combined spectrums

As described in paragraph 2.2.2 De Roo and Peronne (2021) designed the spectrum of rationality at the communal level, the level of society. This spectrum is used to define civic solar energy co-operatives as a type of communal governance, arriving from outside the control of government. Consequently, the spectrum is added together into a complete framework, containing both the governmental and communal level. The spectrum shows how self-governance links to the communicative rational governance approach. Basically, combining both governmental governing and communal governing together. Figure 3 below shows how the governmental and communal spectrum relate to each other.

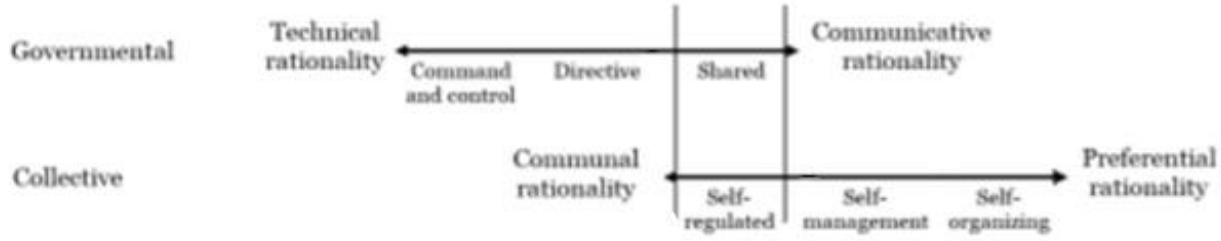


Figure 3. Combined spectrums of governmental and communal level (De Roo and Peronne, 2021).

Shaping a suitable governance approach

Now that we understand the governance types at the communal and governmental level, the challenge is the find a municipal governance approach best suited for civic solar energy co-operatives. This might elevate the barriers experienced by the co-operatives. As seen in the spectrums in this paragraph when involving citizens, the government seem to stay in the lead. Arnstein's (2019) ladder of citizen participation, however, adds different types of civic involvement that can be considered.

The lowest rungs of Arnstein's ladder, *manipulation* and *therapy* are part of the category of non-participation and only serves to educate or cure the participants. In the levels three until five citizens are allowed to hear and

be heard, but lack the power to ensure that their views are given careful attention by those in power. These symbolic efforts for participation is therefore categorized as different degrees of tokenism. From type six onwards, however, citizens do become empowered in the decision-making process. In a *partnership* citizens are able to negotiate and engage in trade-offs with traditional power holders. In the seventh and eighth rung, *delegated power* and *citizen control* citizens get the greatest power in decision-making or obtain full managerial power (Arnstein, 2019). Arnstein's ladder of citizen participation is shown in figure 4 below.

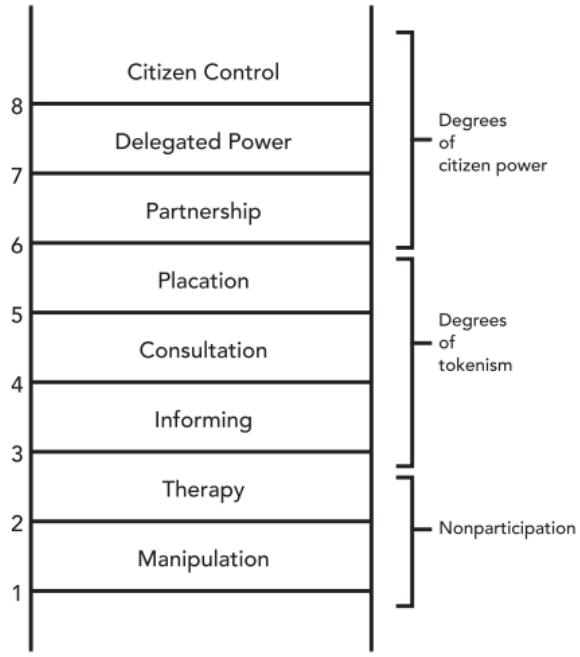


Figure 4. Arnstein's (2019) ladder of citizen participation.

It is rung number eight of Arnstein's Ladder (2019), *citizen control*, that is most interesting to this research. Arnstein stresses that in this type of governance citizens demand the full power. This guarantees that citizens can govern a program or an institution. The participants can also be in full charge of policy and managerial aspects. In these cases citizens are also able to determine under which conditions outsiders are allowed to change this. In exemplary projects in the United States, these citizen organizations have also received governmental funding. Although this type of participation is named *citizen control*, the government does first have to approve the intended activities (Arnstein, 2019). Citizen control shares similarities with this research's civic solar energy co-operative, which also has the full power. The governmental permission needed in "citizen control", however, is not needed for civic solar energy co-operatives. Instead, the co-operatives do need an environmental permit.

Because of this, the ladder of McCall and Dunn (2012) might be more suitable. McCall and Dunn (2012) add another ladder with four levels of citizen participation, ranging from *information sharing* (lowest level of participation) to *self-mobilization* (McCall and Dunn, 2012). McCall and Dunn explain that self-mobilization relates to actions initiated independently from the government and owned by the local people (McCall and Dunn, 2012). This type of citizen participation resembles the activities is civic solar energy co-operatives.

Especially McCall and Dunn (2012) show the overlap between citizen participation as arranged by governmental bodies and civic solar energy co-operatives. In both cases a group of citizens take the lead and the government follows. Instead of citizen participation, this might be better characterized as governmental participation. This is referred to as third generation participation. In this citizens will take the initiative themselves. The government intensively supervises them in the process of plan-making (facilitation). As a result, policy is made in a more interactive way, and the relationship between citizens and government is more horizontal. In order for this to work citizens need to be activated and involved. The government needs to listen to ideas, opinions and let citizens participate and think along (Boom bestuurskunde, 2012).

Adding to this, Rauws (2016) adds characteristics of the approach that spatial planners take in interaction with self-organized initiatives:

- Planners can bring about a connection between the co-operatives' objectives and the goals formulated in municipal policy. The planner can also make an effort to bridge any gaps between policy and the co-operatives' goals, or bring about synergy.
- Planner should try to avoid becoming rigid and bureaucratic when prescribing conditions for preventing negative influences on the environment. Rigidity and bureaucracy could demotivate civic co-operatives.
- Planners can aim to inspire, and empower civic initiatives. This could involve strengthening the initiators confidence, thinking along, sharing best practices, and helping maintain an overview of the project (Rauws, 2016).

2.4 Conceptual framework

This chapter describes that the Dutch planning context is complex. Municipalities aim to formulate policy to serve the commons interest. Due to the complex planning context, and multiple interests within, this can lead to constraints for individuals. It seems to be the case for civic solar energy co-operatives, which do in fact feel constrained. In order to find solutions, this research focuses on the relationship between civic solar energy co-operatives and their municipalities. This makes the governance approach an interesting subject, as this shapes what municipalities do and how they do it.

Different types of municipalities imply different levels of governmental autonomy. A form of the communicative rational approach (also referred to as the participative) approach seems to be best able the facilitate civic solar energy co-operatives. This type of governance approach would seem to provide room for self-governing organisations (such as civic solar energy co-operatives) at the collective level. This would bring together two forms of governance (governmental governance and self-governance) at two different levels, and would involve interaction between both types of governance.

Both governance levels (placed on a spectrums) can be combined into one figure, as done by De Roo and Peronne (2021). This figure is depicted above in figure 3. The red circle added to figure 5 below shows the area in which both levels interact with each other.

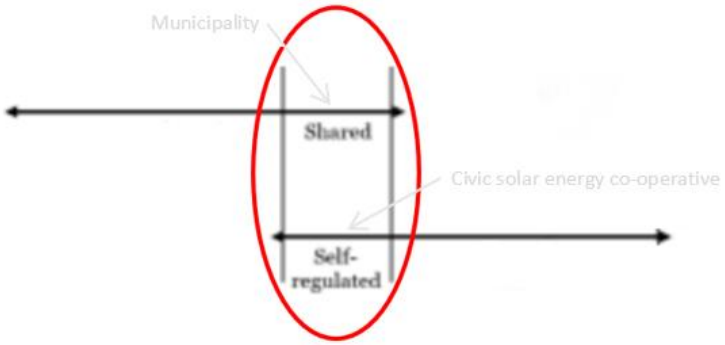


Figure 5: municipalities and civic-solar energy co-operatives are part of different spectrums.

The theoretical background of the interaction between civic solar energy co-operatives (self-governance) and their municipalities (municipal governance) is now clear. Consequently, this research focusses on lifting the barriers experienced by civic solar energy co-operatives. By doing this, the research creates implications for shaping the interaction between both parties at both levels in figure 5's red circle. Some general pointers for this are already provided by Rauws (2016) in paragraphs 2.3.2 above. The following chapters, the methodology (chapter 3) and results section (chapter 4), focus on finding out more about the barriers posed by municipalities on civic solar energy co-operatives. The conclusion (chapter 5) recommends concrete measures for municipalities to take.

3. Research methodology and data collection

This chapter provides an overview of the research process applied for delineating an answer to the main and secondary research questions. The chapter provides arguments for the methods used.

3.1 Research design

Answering research questions

This research applies a qualitative research method. According to Flick et al. (2004, in Flick et al.) qualitative research describes experiences "from the inside out"; subjects are described from the point of view of the research participants. This way social realities and processes are uncovered better (Flick et al, 2004).
This research aims to find out which barriers municipalities pose on civic solar energy co-operatives in The Netherlands. Although some of the barriers are described in theory, a clear overview of all barriers for this specific group can only be found by talking to the subjects themselves. This also goes for obtaining the view of municipalities on these barriers.

In this research both theory and additional research formulate the answer to the main research question: ***Which barriers do Dutch municipalities pose on civic solar energy co-operatives in The Netherlands?*** The table below provides an overview of the main and secondary research questions and how these were answered in this research. The following paragraphs further explain the considerations regarding the methods chosen.

Research method	**Theoretical research**	**Interviews with civic solar energy co-operatives**	**Interviews with municipalities**
Research questions answered	1. How does the existing body of literature define civic solar energy co-operatives? 2. How does the existing body of literature define municipalities? 3. How can the relationship between civic solar energy co-operatives and their municipalities be defined? 4. Which factors are considered constraining for civic solar energy co-operatives? 5. What type of governance approach suits civic solar energy co-operatives best?	4. Which factors are considered constraining for civic solar energy co-operatives? Main research question: Which barriers do Dutch municipalities pose on civic solar energy co-operatives in The Netherlands?	Main research question: Which barriers do Dutch municipalities pose on civic solar energy co-operatives in The Netherlands?

Table 2. Research method applied per research question.

Designing the research approach

Both civic solar energy co-operatives and municipalities are interviewed by means of semi-structured interviews. Semi-structured interviews offer the possibility to stick to predetermined questions, while offering the participant freedom to discuss what they believe is most important (Longhurst, 2012, in Clifford et al., 2016). This benefits the research in the following way:

1. Based on literature potential barriers for civic solar energy co-operatives are identified. These are used in the interview guides.
2. During the interviews with civic solar energy co-operatives the predetermined topics in the interview guide are discussed. Participants also add what they think is important. This results in a complete overview of barriers encountered by civic solar energy co-operatives.
3. The barriers derived from interviews with civic solar energy co-operatives are discussed during interviews with municipalities. During these interviews municipalities are able to provide their views on te barriers, and add what they think is important. This results in insight into the municipalities' willingness and ability to lift certain barriers. Because of this, only barriers related to municipalities are discussed during this second round of interviews. Adding this round of interviews also enables the researcher to compare the responses of the civic solar energy co-operatives and the municipalities, and to draw conclusions from this. This brings about fair hearing.

Selecting cases

Nine civic solar energy co-operatives and 9 municipalities were interviewed. To be able to find results that can be generalized for the civic solar energy co-operatives and municipalities in the Netherlands, the following characteristics were used to select cases:

- Within three provinces three civic solar energy co-operatives were selected. The cases were not spread throughout the Netherlands randomly. This was to spot potential differences between provinces better. Selecting three municipalities within three provinces also adds a triangulation aspect, which makes potential conclusions stronger.
- Geography: the three provinces in which the cases are located, are spread throughout The Netherlands. Hence, the province of Groningen, Noord-Holland and Limburg were chosen.
- Both the provinces and municipalities selected have a good distribution of:
  - Amount of inhabitants
  - Differences in urbanization
  - Mean income of inhabitants

3.2.1 Interviews with civic solar energy co-operatives

This paragraph explains the considerations made in order to set up good interviews with civic solar energy co-operatives in order to obtain the right results.

Interview guide for solar energy co-operatives

The interview topics were based on potential barriers for civic solar energy co-operatives derived from literature. At least these topics would be discussed with the civic solar energy co-operatives. The participants were also asked to discuss any additional topic that was perceived as a barrier, or important to them in another way. The complete list of relevant topics constitutes the interview guide, which can be found in Appendix 2.

Participant selection and recruitment

For participant selection the website "hieropgewekt.nl" was consulted. The website composes a list of civic initiatives in sustainable energy in the Netherlands. Via this website the initiatives' websites can be found to determine the exact activities of the organization. This information was used to select civic solar energy initiatives. The following criteria were used:

- The solar energy project is constructed on either land or a roof;
- The solar energy project works towards solar energy production by means of solar panels;
- No commercial parties or governmental bodies are among the initiators, only citizens;
- The solar energy project is a collective project, meaning it involves fellow citizens to buy into a share of solar panels;
- It concerns a solar energy project that is for many inhabitants of an area, instead of for one household only (e.g. a few solar panels on the own roof).

Members of the co-operative were selected for the interview. They were required to have participated in the project from the beginning throughout. Most were among the initiators of the co-operative. They were also particularly required to have experienced the interaction with governmental bodies for the project. Only that way the interviewee could provide information on barriers related to their municipalities.

Since the research partially aims to find barriers to successful civic start-ups in solar energy, the research would ideally have included initiatives that did not make it. However, due to these initiatives non-existing, it was not possible to find them. The results in this research are therefore unable to represent a potentially large group of civic projects in solar energy that never made it due to barriers caused by municipalities. However, this could also be due to other reasons, such as financial viability or managerial aspects. Other researchers, such as Van der Schoor and Scholtens (2013) have conducted their research in a similar way. They have researched how community energy initiatives contribute to a decentralized sustainable energy system. Presumably this approach, without the failed initiatives, does provide sufficient information for this research. The table in Appendix 1 provides an overview of the solar initiatives that were interviewed.

3.2.2 Interviews with municipalities

This paragraph explains the considerations made in order to set up good interviews with municipalities which obtain the right results.

Interview guide for municipalities

The interviews with the civic solar energy co-operatives were used to establish the right topics (barriers related to municipalities) for the interviews with municipalities. The municipalities were able to give their take on these "issues", and elaborated on how they deal with civic solar energy initiatives and why. The municipalities were also asked about general policy on civic solar energy co-operatives and the reasoning behind it. The answers of interviewed municipalities could be input for interviews with the next municipality. This was to make sure that interesting topics as mentioned by one municipality, would be addressed by other municipalities as well to establish whether the topic is important. The interview guide for municipalities is added in appendix 3.

Participant selection and recruitment

Within municipalities interviewees with the following characteristics were selected:

- The interviewee is a municipal employee and knows the general view of the municipality on civic solar energy co-operatives. The interviewee also knows the way in which municipalities treat these initiatives. Oftentimes the interviewee would be an environmental policy maker.
- The interviewee is specifically able to discuss past, current and future policy on civic solar energy co-operatives.
- The interviewee is able to discuss the barriers that came forward from the interviews with civic solar energy co-operatives: why do these barrier occur and is the municipality willing and able to lift these?

For recruiting the right municipal employees the extensive network of consultancy Antea Group Nederland was utilized. The company works with many municipalities throughout The Netherlands. This method was applied to decrease the rate of refusal. The initial contact was made via Antea Group's acquaintances at the municipality via phone. This was accompanied by an e-mail containing information on the interview questions. Other municipalities were contacted via the customer contact centres.
Due to the COVID-19 pandemic the interviews were conducted online via Microsoft Teams. This was appreciated by the municipalities due to time efficiency, and made them more available.

3.3 General scientific meticulousness

This paragraph reflects on the manner of data collection and analysis to make sure that conclusions drawn in this research are credible. This section also includes considerations on the general research approach.

Data collection and ethics

Despite the fact that this research topic might be considered less sensitive, the research does involve persons, so careful attention is paid to ethics. Also, municipalities care about potential political sensitivity of their statements. The participants were therefore assured that all information was handled with care to create a safe environment for expressing opinions. Also, participants were made clear that they could make requests about how certain information was processed and published. Two of many considerations made in this research are:

- Interviewees of the civic co-operatives need to feel comfortable to explain how they really felt about the process and the interaction with their municipalities. In order to achieve this, the co-operatives needed to feel able to withdraw from this interview at any time, skip a question or tell the interviewer not to transcribe parts of the interview due to "sensitive matters". To prevent interviewees from giving socially desirable answers to questions, they were given the opportunity to tell whenever certain remarks should not be mentioned in the research. Also, the answers of interviewees cannot be linked directly to the civic initiatives in this research.
- Municipalities and their employees serve their citizens. Often politics are involved. As a result, interviews with municipal employees could contain political correctness. The interviewees were asked to avoid this. To ease the respondents, they were told to have the possibility to indicate which parts should be formulated cautiously in the research. The interviewees could also read the results after

processing them and before publishing them. It was also made sure that responses of municipalities cannot be linked directly to the municipality that formulated the answer.

Furthermore, the participants were assured that:

- All data collected will remain secure or on a computer database accessible by password only;
- Information supplied will remain confidential;
- Participants remain anonymous;
- Participants can withdraw from the interview at any time without explanation;
- Participants were sent a summary of the research results when completed. The summary is an electronic copy on the website of the University of Groningen;

Both the interviews are recorded and transcribed. This makes sure that the interviews and focus group can be an in depth conversation, without the hassle of writing the answers down. The recordings are transcribed immediately after to be able to write down some comments on the tone of the interview. This would make some opinions shine through more clearly.

Data analysis and displaying

All transcripts are coded. Codes were added manually to be able to spot small details and corresponding themes better. Appendices 5 and 6 state lists of codes used in the transcripts. The codes for interviews with civic solar energy co-operatives were compiled in two steps, and based on Böhm (2004, in Flick et al., 2004):

1. First, selective coding is applied: topics used in the interview guides were converted into codes. The same overarching code of one main topic in the interview guide was assigned to all sub-topics that fit the topic.
2. Secondly, open coding is applied: while reading the first transcript new topics were assigned an additional code. When reading the second and following documents, the relevance of the first codes is evaluated and more codes are added.

The municipalities' transcripts were coded in a similar manner; codes for the municipalities' transcripts were based on the interviews with civic solar energy initiatives. New codes were added based on the information given during the interviews with municipalities.

The codes used for the interviews with civic solar energy co-operatives are listed in appendix 4. The codes used for the interviews with municipalities are listed in appendix 5.

Confirmability

The findings section describes the data objectively. It also describes how and why certain conclusions are drawn from the data. Also, when describing the data, both similarities and dissimilarities between different sources are made explicit. This means that diverging data is also included in the findings section. The data is interpreted by the researcher, who is positive about the increase of renewable energy production. To make sure the researcher maintains objective, the coded and interpreted data is checked with an objective peer to ensure intersubjectivity.

Credibility

The interpretation of the data and the conclusions drawn should be credible from the perspective of the research participants. For this reason triangulation of sources is applied: theory gives an overview of the barriers for civic (solar) energy co-operatives, which is supplemented with the experience of a total of nine civic solar energy initiatives distributed through three provinces in The Netherlands. As these co-operatives give their opinions on the relationships with their municipalities, also the municipalities are interviewed. Combined, a clear overview of barriers for civic solar energy co-operatives in The Netherlands is constituted, combined with the municipalities' views on these matters. Also, the content of the interviews with both parties validated each other.

Transferability

In order to achieve external validity this chapter provides an extensive overview of the research design and the considerations that underpin the research. This would enable other researchers to copy the research, and get similar outcomes. The interview guides and codes used for coding the transcripts are added in appendices. This research also describes characteristics of the interviewed parties, which can be found in appendix 1. Paragraph 3.1 in this chapter discusses the selection of provinces and municipalities, and the implications for the transferability of this research.

Dependability

This research takes place in a complex, and ever changing context. However, the underlying issues for this research have stayed relatively stable. The underlying issues for this research are found in the relationship between municipalities and citizens. According to the VNG (2021) Dutch society has developed new needs and the municipalities are currently at a crossroad: the future governance approach is about finding out which role the government should take in collaborating with society. This has been argued about for over a decade. The initiatives interviewed in 2018 for this research have in common that they do not feel met in their needs. According to the VNG (2021) finding the right approach is nowadays still an issue. For this reason interviewing the municipalities in 2021 still provides up to date information.

Currently Dutch municipalities are working towards a new governance approach, driven by the implementation of the new Environmental Licencing Act in 2023 (Rijksoverheid, 2022). The new legal framework for environmental licensing is due to be implemented in 2023. Municipalities are currently also working on regional energy strategies. As municipalities are interviewed in 2021 a glimpse of the new governance approach and policies might be visible, which can be incorporated into the results of this research. Consequently, the results of this research can be considered for finalizing the documents and strategies for the regional energy strategies, and the Environmental Licencing Act.

4. Findings

This chapter describes the results of the interviews with nine civic solar energy co-operatives in the provinces of Noord-Holland, Groningen, and Limburg. The interviews shine light on the barriers encountered by the civic co-operatives. The focus is on barriers posed on the co-operatives by municipalities. Added to this information is the municipalities' views on these barriers. This information is derived from interview with municipalities. This chapter only describes the barriers relevant to the relationship between citizens and their municipalities.

4.1 Barriers derived from the interviews

This paragraph discusses the barriers relevant to this research. Every sub-paragraph states the barrier theme. Some themes contain multiple barriers. Per barrier specific information on the severity of the barrier, type of municipality in which the barrier is encountered, and patterns in this information are discussed. As previously mentioned, only the barriers posed on civic solar energy co-operatives by municipalities are discussed.

4.1.1 Barriers related to finance

Results from interviews with civic solar energy co-operatives

- *"Exceptional costs can jeopardize projects"*
  The interviews showed that none of the co-operatives were unable to find sufficient funding for a good business case. However, it did become clear that in most cases some serious resourcefulness was needed in order to comprise a solid business case. Funding came from all sorts of possibilities, some easier to obtain than others. Examples of funding are crowdfunding, provincial loans for renewable energy, national subsidy/tax advantage and municipal funding. The municipal funding consisted of a start-up subsidy of 5.000 to 15.000 euros (at least 5 of the co-operatives mentioned this, the others did not mention it and were not asked), and additional funding for exceptional costs, such as improvement of roof construction (mentioned by two of the co-operatives).
  Clearly, for these co-operative finance was not a barrier. However, in many cases it would be if municipalities would have decided to stop funding, especially the funding of exceptional costs, which would in at least four of nine cases lead to insufficient business case. Examples of these costs are building renovations, changing roof constructions, making a building fit sustainability demands, or setting up funds for removing solar panels in case of emergency. The latter was often required for private roofs. In such cases only an exceptional funding, for instance from the municipality, could grant a project sufficient funding.
- *"The absence of sustained governmental funding is demotivating"*
  A couple of co-operatives mentioned getting enough money to finance their projects. However, the amount of work the initiators put in, did not seem appreciated by their municipalities. One co-operative even mentioned feeling taken for granted when they were actually making sure the municipality met its sustainability goals (this is the co-operatives interpretation). The co-operative also felt like they were asked to advise the municipality often, without being paid for it. The co-operative had preferred a more permanent type of funding (e.g. in terms of salary) rather than incidental funding. One co-operative did receive such a funding, but was over demanded. They did, however, appreciate the municipality trying to be forward-thinking and facilitating on the matter of renewable energy. Mostly one of these co-operatives feels like funding in the form of a salary would make more citizens want to initiate such projects. Eventually the salary could be paid back with the projects' revenues.

Municipalities' willingness and ability to improve

Exceptional costs

The results show that a small majority (5 out of 9) of the municipalities is unwilling to provide funding for exceptional costs that jeopardize the business case. The other municipalities (4 out of 9) are willing to provide the funding. However, only 2 out of 9 municipalities really provide the funding in practice.

The municipalities in the research express different reasons for being unwilling to providing the additional, one-time funding. Two municipalities claim that nowadays the business case should be able to work without financial help of the municipality. For this reason, they do not provide financial help in exceptional costs, whereas a couple of years ago they did. One of these two municipalities expresses the hunch that the need for funding is due to a lack of knowledge of the co-operative. For this reason, the municipality would rather sit down with the co-operative to work out a better business case. This specific municipality does provide other types of help, such as pre-financing, which is later paid back. This could be a solution for exceptional costs. The fourth municipality

feels like the one-time funding would not help the co-operative to grow its resources for following projects. The final municipality was rather neutral as they were unsure what they would do with such a question. However, they did express the opinion that civic solar energy co-operatives should be able to sustain themselves without help. The latter also expressed the possibility of the municipality being unable to provide the funding due to money constraints.

Out of the 4 willing municipalities, only two really provide funding. The other two municipalities do not as they are either unable (due to financial situation) or because co-operatives in the municipality have never requested this.

Striking is the fact that 2 out of three wealthier and more urbanized municipality are willing and able to provide the funding for exceptional costs. The third of this category of municipalities used to provide funding, but feels like the need for funding for exceptional costs would nowadays express a lack of knowledge. This is already mentioned above.

Figure 6 shows the spread of willingness and ability to lift the barrier of financing exceptional costs among the municipalities in this research.

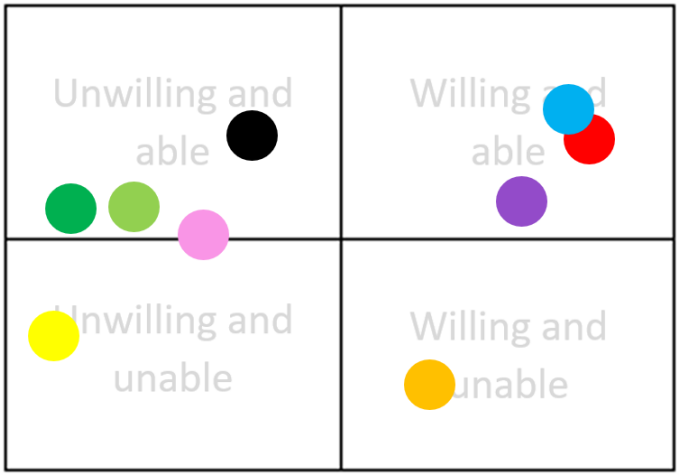


Figure 6. Municipalities' willingness and ability to fund exceptional costs.

Sustained funding

7 Out of nine municipalities are unwilling to provide the sustained funding. In this research only two municipalities provide funding. In these cases the municipalities are both willing and able (within the boundaries of available funding) to do so. The funds are only provided to one or a few existing and strong co-operatives. This can be for three reasons:

- The co-operative either fulfills a supportive and informative role for other co-operatives in the area;
- The co-operative fulfills a key role in the municipal sustainability goals;
- To make sure that the co-operative the co-operative eventually becomes independent, so funding can be stopped.

Strikingly, these municipalities are relatively urbanized areas with higher average incomes. One other municipality sees the need for this, only when civic co-operatives are just starting up, as they do not make enough money yet. The municipality is also both willing and able. However, in the specific case the province provides the funding, which makes municipal funding redundant. The unnecessity causes the municipality to be unwilling to provide extra help. Despite this municipality not being urban, this municipality does host inhabitants with relatively higher average income.

Two other municipalities do not provide this type of funding, but do express the willingness or see the necessity. However, this would only be in the case that a clear question is asked (a form of consulting) by the municipality (e.g. helping with policy). This is deemed necessary as the co-operatives would otherwise be overexploited. One of these municipalities also very urbanized with a slightly higher average income. The other is not urbanized, but does host inhabitants with a slightly higher income.

The four remaining municipalities do not provide sustained funding. Two of them are unable due to financial constraints. The other municipalities are unwilling as they feel like civic solar energy co-operatives should be able to fund themselves. Another reason is that the municipalities do not see the need to provide sustained funding. The funding is deemed unnecessary due to the simple fact that the municipali ties' ambition does not include a certain goal on solar panels in amount of acres. Strikingly, these municipalities are mainly more rural with relatively lower average income per person. Figure 7 below provides an overview of the municipalities' willingness and ability to provide sustained funding.

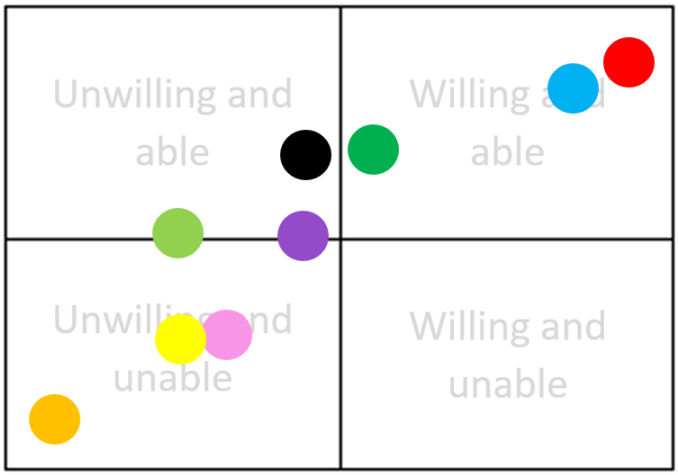


Figure 7. Municipalities' willingness and ability to provide sustained funding.

4.1.2 Barriers related to information and networking

Results from interviews with civic solar energy co-operatives

- *"Finding information is a long and tiring process"*
  The results show that most of the civic solar energy co-operatives (7) struggled with finding information in some way. This was because the co-operatives needed to find information on every aspect of the project: finance, technique, legal issues, subsidies, permits, etc. Especially the earlier projects experienced the strength of the law of inhibitory lead. Although a couple of these co-operatives were partly helped by specialized provincial information centers, the amount of information was not enough. Nowadays these exact co-operatives advise the provincial information centers as they have developed much more expertise. All co-operatives stress the toll the information finding process takes on the co-operatives. Some co-operatives struggled with it more than others. Facilitating factors in this were: help from the municipality, help from provincial expertise centers, learning from other similar co-operatives.
  There were two diverging co-operatives. One of these co-operatives did not struggle with information finding as the board consisted of members with much expertise in the field. The other seemed to struggle less as the project was smaller (and maybe a bit more straightforward), which caused that the provincial expertise center could answer all their questions.
- *"Surrounding citizens' familiarity with the project is important"*
  The results show that some co-operatives experienced that the surrounding citizens were unfamiliar with the co-operative. This was experienced as a mild barrier by five of the co-operatives. Three of these co-operatives experienced mild issues with getting enough members. They expressed that getting sufficient members was a bit more of a challenge, and that they therefore hired communication experts. They did not express that wish for help from their municipalities. Two of the co-operatives strongly expressed their issues on the matter. They expressed having trouble with finding sufficient participants (even though the deal was very good), or found that private parties would not trust the co-operatives enough to provide their roofs to them. One particular co-operative mentioned that the municipality once promoted their solar project on a municipal roof. They wished this would also be possible for placing solar panels on roofs of private parties, to gain more trust.

Municipalities' willingness and ability to improve

Finding information

The results show that five out of nine municipalities are willing and able to facilitate in finding information. One municipality is willing, but unable to do so due to time and money constraints. This makes a total of six municipalities that are willing to facilitate. They (can) do so by means of:

- Setting up municipal informative organizations by means of subsidies;
- Actively disclosing information about municipal policy and processes. One municipality believes this information should never be a barrier as municipalities should be transparent organizations;
- Actively redirecting the co-operatives to provincial or municipal organizations that provide relevant information.

Striking is the fact that the municipalities in two provinces (which totals six municipalities in this research) express that there is a provincial subsidized organization that provides the necessary information. The municipalities feel like these organizations have developed immensely, which has also had a positive impact on the co-operatives'

professionalization. As a result, the municipalities do not see the urgency to facilitate further. This explains the unwillingness of some of the municipalities to further facilitate in finding information. Despite this, some municipalities are still willing to facilitate more. See paragraph 4.1.6 for more information on facilitation by means of information. In the provinces in which the provincial informative organization is not available, two of the most urbanized and wealthy municipalities have installed their own subsidized informative organizations. Another reason to not being willing to facilitate or being neutral was the fact that the municipality had not received complaints from their co-operative.

Figure 8 shows the distribution of municipalities in willingness and ability to facilitate in finding information.

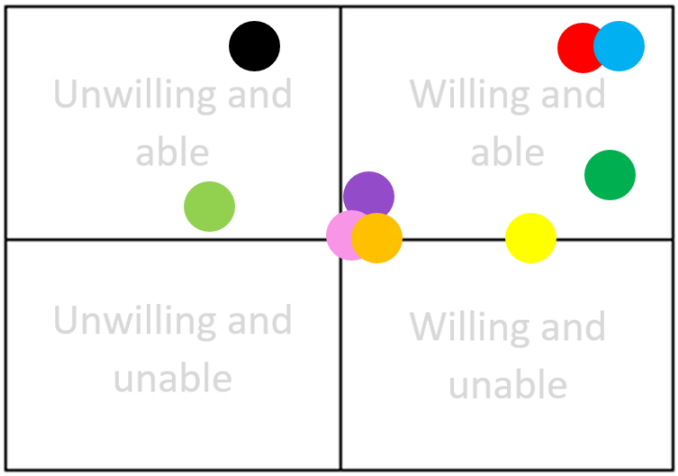


Figure 8. Municipalities' willingness and ability to facilitate in finding information.

Surroundings' unfamiliarity with the co-operative

The results show that five of the municipalities are willing and able to help the co-operatives in communication and advertisement. However, there is a difference in the level of willingness and ability. Three of the five municipalities expressed that they observed the co-operatives' struggle in gaining more publicity for their projects. As a result, they are willing to make an effort to help. Some of them claim to do as much as they can. Examples are messages on social media, municipal websites, internal communication to colleagues. These three municipalities are all larger municipalities, of which two are highly urbanized and wealthy.

The other two municipalities said to be willing and able, but deemed that redundant. This was because the co-operatives are very well able to manage publicity themselves. As a result, these two co-operatives seem very similar to the two municipalities that expressed themselves as rather neutral. This was because they had never identified an issue with the co-operatives' publicity or received requests from the co-operatives.

Furthermore, the results show that only two municipalities are unwilling to provide the co-operatives help with publicity. Strikingly these are a rather small and less wealthy municipality, and one highly urbanized and wealthy municipality. Both municipalities are able to help. The smaller municipality expressed caution with this type of communication as some inhabitants might not like the projects, which make the matter sensitive. The other municipality expressed being able, but unwilling, as the co-operatives are nowadays very well-known in the city. This would make extra municipal communication redundant. The municipality also expresses that in cases in which larger issues are at hand, the co-operative should communicate itself, as the municipal communication would not help in such cases. Figure 9 shows the distribution of municipalities in willingness and ability to support co-operatives with publicity.

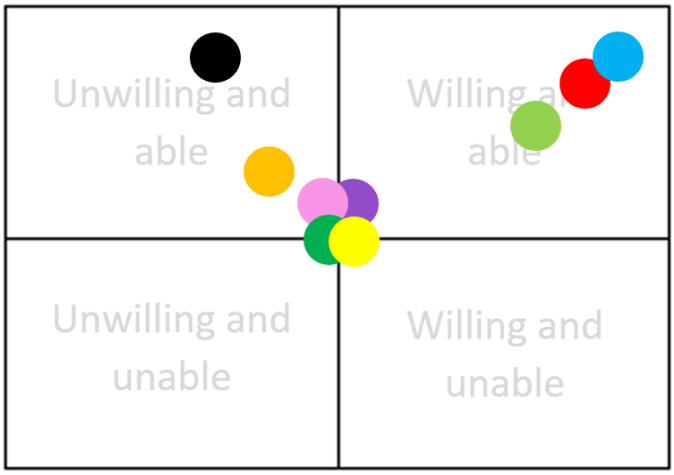


Figure 9. Municipalities' willingness and ability to help with publicity.

4.1.3 Barriers related to policy

Results from interviews with civic solar energy co-operatives

- *"Absent municipal policy delays civic solar energy co-operatives"*

  Four out of nine civic solar energy co-operatives were under the impression that municipalities did not formulate policy on (co-operative) solar energy projects. This was deemed to result in very long procedures (1 to 2 years). This was mostly in the case of solar energy projects placed on land (e.g. project locations are repeatedly turned down, or permission takes long), but also for some projects on roofs

(e.g. municipal funding took one year). In these cases the cooperatives were granted the necessary subsidies after as long as one year.

Five of the co-operatives did not express that procedure times were long due to the absence of policy. In three of these cases there was policy that either did not have a positive nor a negative effects, or did make the project feel welcomed by the municipality. In some cases it resulted in finding a project location slightly easier. In the two other cases policy was also absent. Here it was the politics (instead of policy) that made sure that the co-operatives were facilitated throughout the permitting process. This was received well by the co-operatives. This was also done for some of the co-operatives that did express that the absence of policy was an issue. However, in all cases, the procedure times were still long. For specifically one co-operative the creation of municipal policy meant a real kickstart for the co-operative. This was due to the fact that the municipality had incorporated the co-operative into its policy.

It was the relatively more urbanized (or wealthier) municipalities that were able to create facilitative policy fairly quickly. In these cases policy was already present or in the making. However, as discussed above, the procedure times could still be long.

Municipalities' willingness and ability to improve

Based on the interviews with municipalities, it appears that nowadays all municipalities have formulated policy on solar or renewable energy. This shifts the question towards whether the municipalities are willing and able to facilitate the co-operatives in a suitable and/or ambitious way. The answer can be based on what is in the municipal policy.

Four out of nine municipalities have formulated rather basic policy on solar energy. The policy works out the mandatory parts in contribution to the Regional Energy Strategy (RES), which also includes goals for sustainable energy. The purpose of the policy is to prevent solar projects to become scattered throughout the municipality. For this, certain fixed locations for solar energy are appointed. However, the policies do not aim to facilitate civic solar energy co-operatives. Although, they are of course, welcome. Despite the lack of facilitation, the policies do prescribe that a minimal percentage of a solar energy project should be "participated in locally". This often means that civic solar energy co-operatives need to participate in commercial projects. It can also mean that civic solar energy co-operatives are granted priority. Striking is the fact that these municipalities are rather rural municipalities. The municipalities do not seem to experience the need for more facilitation of civic solar energy co-operatives.

Five of the co-operatives are more willing to facilitate the civic solar energy co-operatives. Strikingly, the three most urbanized and wealthy municipalities' policies advocate the most for facilitating civic solar energy co-operatives. The three municipalities have all created strategic plans to facilitate, and/or get the most solar energy from civic co-operatives. In these three cases the municipalities have analyzed the possibilities in the municipalities (and outside, e.g. European funding) in order to further optimize the facilitation process. The facilitation is a mix of available funding for new projects, information, help with communication and a flexible layer in which non-standard ways of help are considered by the municipality. Important is the fact that the municipalities are still trying to invest their resources with optimal results. This means that not every request from civic solar energy co-operatives is granted.

The two other willing municipalities also express valuing civic solar energy co-operatives. Although their strategy for facilitation is not as elaborate, they do facilitate. This means that in addition to appointing fixed locations for solar energy and requiring a minimal percentage of local participation in solar energy projects, the municipalities have formulated some extra possibilities. These are:

- Customization in facilitation (e.g. to guarantee a loan), depending on wat is necessary;
- Monthly deliberations with the managers of electricity networks. This is nowadays necessary as the net capacity is too low to connect new solar energy projects.
- Policy encourages citizens to take responsibility in creating renewable energy projects. Consequently the municipality promises to facilitate.

- Appointing locations for (civic) solar energy projects.

Figure 10 shows the distribution of the municipalities' willingness and ability to formulate and execute ambitious policy in facilitating civic solar energy co-operatives.

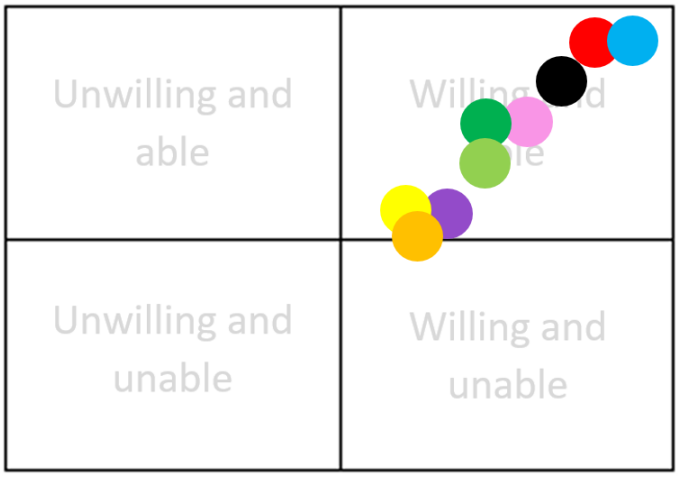


Figure 10. Municipalities' willingness and ability to formulate and execute ambitious policy in facilitating civic solar energy co-operatives.

4.1.4 Barriers related to finding project locations

Results from interviews with civic solar energy co-operatives

Five civic solar energy co-operatives expressed having difficulties with finding project locations. The list of causes contains some causes that cannot be influenced by municipalities. The causes are listed below.

- The chosen location on land was not permitted by either politics or rules and regulations. One of the reasons seems to be absent policy on locations for solar energy projects. This issue was experienced by three co-operatives.
- The national tax advantage "Postcoderoos" limits the amount of locations as only adjacent postcodes can participate together. This issue was experienced by three co-operatives.
- Many roofs are unsuitable due to their sizes, constructions, or obstacles placed on top of it. This issue was experienced by three co-operatives.
- The right of superficies for solar energy projects on roofs is believed to decrease the value of real estate. For this reason, roof owners are unwilling to provide their roofs. This was experienced by two co-operatives.
- Private parties or companies want financial risk reservations for the slightest risks, such as funds for the removal of the solar panels in the rare case a building would have to be demolished. Civic co-operatives are unable to reserve this kind of funding and municipalities are unwilling to guarantee it. As a result, the roofs are not provided for civic solar energy projects. This was experienced by one co-operative.
- Civic solar energy projects based on the national tax advantage "Postcoderoos" are not taken into account for a building's energy label. For this reason, companies are unwilling to provide their roofs as it does not benefit the building's owner. This was experienced by one co-operative.
- Putting solar panels on roofs of buildings in which valuable goods are stored increases the costs for insurance. This makes companies less willing to provide their roofs. This was experienced by two co-operatives.
- In one municipality there is a subsidized organization that develops solar energy projects, but also consults for other solar energy co-operatives. This has causes issues for the other interviewed co-operative in this municipality. This was because the subsidized organization was recognized by the citizens as a municipality-backed organization. Consequently, other co-operatives were not trusted. For this reason the interviewed co-operative experienced difficulties wilt finding suitable roofs for projects. The co-operative would have appreciated some help in communication from the municipality in this matter.

Some of the causes for barriers related to finding suitable projects locations could be influenced by the municipalities. These issues were discussed in the interviews with the municipalities. These were:

- Project locations on land were repeatedly rejected. This was due to (the absence of) policy. This matter is discussed in paragraph 4.1.3, barriers related to policy. That paragraph discusses the current ambition of municipal policy to support civic solar energy co-operatives, also in finding project locations. The governance approach, discussed in paragraph 4.1.6, adds how strict municipalities would follow the rules in permitting civic solar energy projects on land.

- Many roofs are unsuitable due to the size, the construction, or obstacles placed on top of it. A solution could for instance, involve improving a roof construction. As discussed in paragraph 4.1.1, barriers related to finance, some municipalities consider this as part of the business case, other would consider financially supporting co-operatives in this.
- *"Private parties and companies are unwilling to provide their roofs due to financial consequences*". These consequences are decreasing value of property, inability to cover financial risks, increased insurance costs, tax advantaged civic solar energy projects do not pitch in for a building's energy label. The municipalities view in this barrier is discussed below.

Municipalities' willingness and ability to improve

The results show that five of nine municipalities are willing to help civic co-operatives in resolving issues with finding suitable project locations on large roofs of private parties and companies. Three of five municipalities, however, feel unable to help. This is due to the fact that the barrier is believed to be outside the control of the government, as it involves a deal between two private parties. The remaining two municipalities feel largely unable. Despite this, they try to do the most they can. The two willing and able municipalities came up with the following solutions:

- One of the municipalities has hired former business men to inform companies about the possibilities for their roofs. This could potentially persuade some of the roof owners by making fears go away.
- Another municipality gives out vouchers to roofs owners to provide funding for researching the options for the roof. However, this solution does not seem to be installed for finding project locations for solely civic co-operatives. It should be considered more general.
- A third municipality informs companies on the possibilities for solar panels on their roofs. This includes putting civic solar energy projects on them. This municipality also works together with a solar energy co-operative to find and provide plenty of roofs to the co-operatives.

The other municipalities in this research express being unwilling to provide help in finding project locations on privately owned roofs. This is for the following reasons:

- The municipalities either feel like finding a project location is the civic so-operatives' own responsibility.
- Some municipalities do not see the need for helping
- One municipality does not want to get involved in private deals, as it would make the municipality responsible. The municipality does express being willing to work on roof owners' awareness for the possibilities. However, this will only be done when there seems to be a need for more roof-locations.

Figure 11 shows the distribution of the scores of municipalities described above.

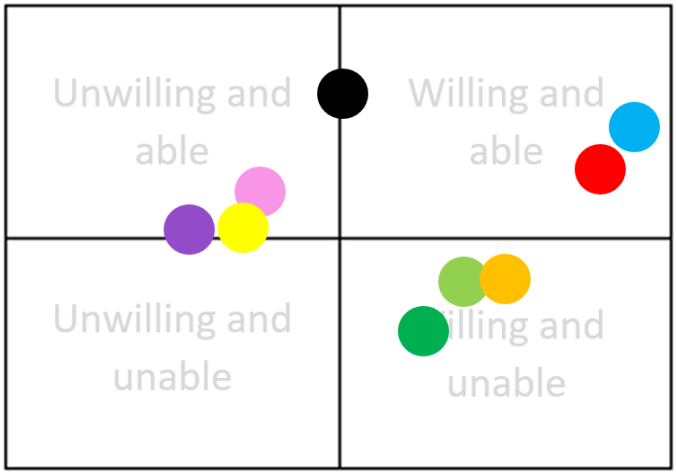


Figure 11. Municipalities' willingness and ability to help in finding available privately owned roofs as project locations.

4.1.5 Barriers related to planning permission

Results from interviews with civic solar energy co-operatives

The interviews with civic solar energy co-operatives show two important barriers. These are:

- *"Planning permission takes long (1,5 to 2 years) and discourages the co-operatives."*
  The civic co-operatives believe this is due to the internal processes of the municipality, and the municipalities' inexperience with this type of projects.
- The process of obtaining planning permission requires handing in a lot of information during a complicated process. The co-operative does not receive any help with this from the municipality. This barrier is discussed in paragraph 4.1.6, "barriers related to the governance approach", and will not be discussed in this paragraph.

Long permitting procedures

Obtaining planning permission could take up to two years. This oftentimes demotivated the civic co-operatives. The co-operatives suspected that this was due to the municipalities' lack of experience with solar energy projects. The issues were experienced by all solar energy projects that were placed on land, which were three. One of the projects on land did mention extensive help from the municipality, which was appreciated. Unfortunately it did not shorten the procedure time.

The four other co-operatives placed their solar projects on municipal roofs and did not feel like the process took too long. However, there were some minor hiccups, such as the municipality responding slightly late. Two of these co-operatives had considered projects on land, but eventually decided to place them on roofs in order to avoid long procedure times. By doing so the projects accepted the fact that much less solar panels could be placed on roofs compared to land.

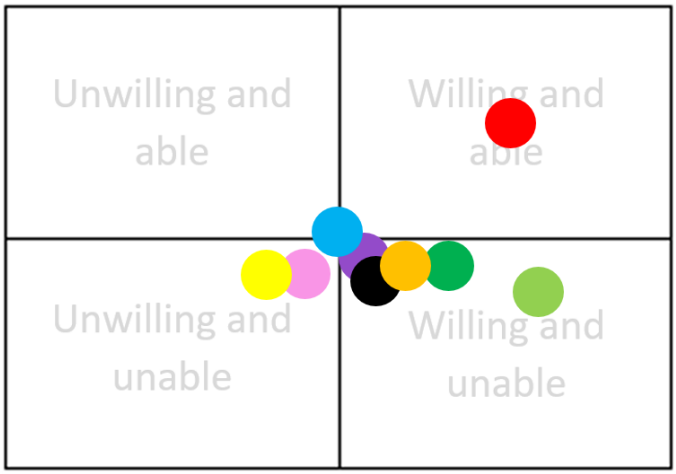
Municipalities' willingness and ability to improve

The municipalities respond by explaining that the procedure for a solar energy project permit can be completed in six months. However, such a procedure needs to be prepared extensively, which could also take at least six months. An example of this preparation is citizen participation. When the preparation phase appears to be insufficient during the municipal review, the municipality will ask to correct this by improving the permit application. This can lead to longer procedure-times, as the co-operative again takes time to improve their application. When asked whether this process could be sped up, the municipalities responded with:

- We do not want the process to be sped up, because it would negatively impact the carefulness of the application preparation (mentioned by two municipalities)
- We cannot speed up the process, as the preparation, and procedure simply take this long (mentioned by 7 municipalities). The only thing that can be done, is helping the co-operative in the preparation phase. Not many municipalities are willing to do so. This is discussed in paragraph 2.4.6, barriers related to governance approach.
- We could speed up the process by working very hard within the municipality. However, this would require extensive internal organization, which is not the normal way of working. The municipality would not do this for civic solar energy co-operatives, only in extraordinary circumstances. The same municipality mentioned the municipality composing a list of types of projects that do not need permission from the College of mayor and alderman, when the project complies to policy. Solar energy projects are included in the list, however, it does not seem to speed up the process. The measure also does not seem to be installed for speeding up the processes. This was mentioned by one municipality.
- Only one the of the municipalities mentioned helping the co-operatives in preparing the permit application. This would prevent the applications from being turned down and needing extra information added during the municipal review process. The same municipality mentioned being able to process certain permit applications first.

This means that one of the municipalities is willing and able to speed up and help with the permit application process. This happens to be a very urbanized and wealthy municipality, which much values citizens participation. The other municipalities expressed simply being unable, and not seeing any options to speed up the process, as the procedures simply take this long. About two of these municipalities also mentioned not being willing to help, as they believe that this kind of project deals with a lot of money and should therefore at least be able to file a good permit application. Figure 12 show the distribution of the municipality in willingness and ability to speed up the permitting process.

Figure 12. Municipalities' willingness and ability to decrease procedure times for permit applications.



4.1.6 Barriers related to governance approach

Results from interviews with civic solar energy co-operatives

- *"The projects need to fit the municipal rules precisely and are not allowed to diverge, even if the projects' ideas are better and unharmful diversions."*
  Civic solar energy co-operatives mention the municipalities demanding that every single rule is lived up to by the co-operatives. One example is a co-operative that placed a project on the edge of a village on land. Next to the solar energy project were existing eucalyptus bushes. As the municipality also wanted the other side of the solar energy project to be surrounded by bushes, the cooperative proposed more eucalyptus bushes. This was chosen as it would complement the existing bushes, and as they stay green all year, which hides the solar panels from view. However, as eucalyptus bushes were not part of municipal policy, they were to be replaced by other types of bushes. This is one of multiple examples of the municipality being (too) strict and causing a lot of extra work for the co-operatives. This was very demotivating. All civic solar energy co-operatives mentioned the municipality asking the initiatives to comply to the rules. However, quite a few (four) mentioned it being out of proportion, as described in the example above. Two out of these four projects were severely discouraged or patronized by this. Strikingly, these are both two projects on land. The third project on land in this research mentioned the municipality taking a very different approach in which it was helping to navigate to existing and non-existing rules in order to get the project done. This project was an early project, which caused a different approach to be taken.
  In between are the five co-operatives that did not feel like the municipality was nitpicking excessively on the rules. In fact, three co-operatives felt like it was easy to comply to the small amount of rules. One of these co-operatives was placed in a designated area in which other rules complied. This area was meant for experimenting with initiatives that would otherwise not fit the rules and regulations in spatial planning. This barrier mostly shows the difference between solar energy projects on land and on roofs. Projects on roofs generally experiences less issues with strict rules.
- *"Municipalities are thought to overestimate the co-operatives in the process of applying for either permits or subsidies."*
  This means that the municipalities insufficiently facilitated (either financial or with information or project locations) the co-operatives. Also slow responses to questions were an issue. Five co-operatives mentioned feeling insufficiently facilitated by their municipalities. One co-operative mentioned the municipality using the co-operative's knowledge as the municipality did not know much. The co-operative wished it were the other way around as the process was difficult enough. The overall wish was to be facilitated better. One exception here is the municipality that made a "green deal" with their co-operative. This was done to create as many solar energy projects on roofs in the municipality. This also involved facilitation through regular meetings. Despite the facilitation, the co-operative might have been over-asked in a different way, as the amount of work was high.
  The remaining four co-operatives felt like their municipalities facilitated sufficiently. The municipalities did so in their own ways. One example is the organization of a workshop for the co-operatives. One of these municipalities was an exception as they might have over-steered or over-facilitated. This was, of course, done to help the co-operative. However, the municipality made a mistake, which the co-

operative would not have made as they had a lot of knowledge. This might have been a cause of underestimation of the co-operative by the municipality.

Municipalities' willingness and ability to improve

Fitting the rules precisely

The solar energy co-operatives mentioned being frustrated by many restrictions coming from "unnecessary" rules, such as the example of the proposed eucalyptus bushes, which had to be replaced by other types of bushes. All municipalities respond by explaining that rules and regulations (law and policy) are there to comply to. However, within the framework of rules many things are done by the municipalities. These are:

- Making an effort to fit the project's characteristics the rules and regulations. An example is that some municipalities make an effort to find ways to install solar panels on roofs of monumental buildings, whereas this was fist deemed impossible. This is done by two municipalities.
- Changing policy documents, based on experience. This is done to improve the opportunities or processes for civic solar energy co-operatives. Two municipalities constantly try to improve their policy. These are relatively wealthier and more urbanized municipalities.

Understandably, some rules and regulations are not to be altered or applied flexibly. After all, rules are there to be met. All municipalities comply to this notion. An example is finding locations for civic solar energy projects. Especially for projects on land the rules need to be strict in order to prevent solar fields to be scattered throughout the municipality.

Seven municipalities consider themselves willing and able to be flexible and creative with the rules. However, the interviews show that not all municipalities are equally willing and/or able. The three largest, most urbanized, and relatively wealthiest municipalities seem to be able to do more. It is specifically these municipalities that try to improve policy as much as possible and continuously look for possibilities within policy. These municipalities seem to have the right mindset and resources to execute this approach towards solar energy co-operatives. Two other, slightly smaller, municipalities, make the same type of efforts. The other municipalities do not have preset approaches, but take smaller actions when necessary. They do feel like they facilitate the co-operatives, however, they do not mention attempts to decrease the barrier of inflexibility in rules and regulations. One of the municipalities mentions being willing, but unable to help. One municipality mentions being rather unwilling to take this approach, as all applicants (either companies or citizens) should be treated equally. It seems that the latter is also unable due to financial constraints. The figure below shows the spread of municipalities in willingness and ability to tackle the barrier.

Figure 13 show the distribution of the municipalities in willingness and ability to apply the rules flexibly.

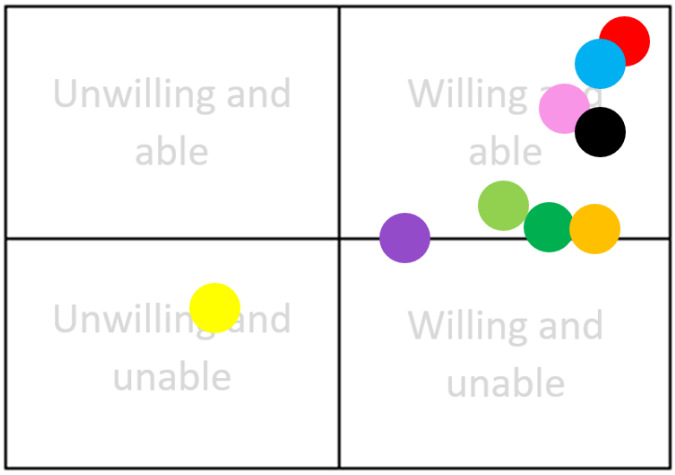


Figure 13. Municipalities' willingness and ability to apply the rules flexibly.

Facilitating the co-operatives in permit and subsidy applications

The co-operatives mentioned the barrier of being overestimated when applying for permits or subsidies. This means that according to the co-operatives the municipalities have not facilitated them in these processes. Municipalities respond by mentioning that the co-operatives are expected to take their own responsibility, and need to have sufficient expertise to be able to organize a solar energy project. This means that some municipalities expect the co-operatives to organize the expertise on permits themselves. Despite this, all municipalities claim to be willing to facilitate in the process. However, the municipalities' definitions of facilitation differ. Four municipalities do not see the co-operatives are solely companies. They rather treat the co-operatives as citizens and tend to offer more. The municipalities are willing and able to facilitate the application processes by means of:

- One of the more urbanized and wealthier municipalities: providing a roadmap to new co-operatives.

- One of the more urbanized and wealthier municipalities: Making a so-called “green deal” with the co-operative, which provides them with regular meetings between municipality and co-operative, facilitation of roof-finding, and the incorporation of the co-operative into the municipal process and policy.
- One of the more urbanized and wealthier municipalities: Subsidizing an entire municipal support center for civic solar energy co-operatives, providing knowledge on different subjects, such as permits and communication with the municipality. This measure is unnecessary in one other province, as a support center was already organized for the entire province. This elaborate infrastructure makes sure that new co-operatives are almost automatically guided in the right direction, without the help of municipalities. This does cost money. However, not too much.
- Regular meetings with the municipality, for instance, to ask questions about permits. This is applied by one municipality.
- A facilitative mindset among the municipal officers. This means a good relationship and willingness of the municipality to provide much of the help needed, for instance, finding ways to make the rules fit the project. This was applied by all four willing municipalities.

Four municipalities seem willing to take the same approach, however they seem rather unable to do so. As a result, the municipalities do what they can when asked for, but they are not able to find the right amount of time and energy to take the facilitative approach as described above. This is either due to lack of time and finance, or the lack of knowledge. These are the medium to very rural municipalities. Luckily, some of the tasks are filled in by the provincial organizations that support the co-operatives with high-quality information for a good (subsidized) price. These municipalities also tend to express the definition of a co-operative as “a company that needs to stand on their own two feet” more.

The final municipality takes this notion further, and is unwilling to provide more help to civic co-operatives as it would to commercial developers. The figure below shows the spread of the municipality in willingness and ability to facilitate.

Figure xx shows the distribution of the municipalities’ scores in terms of willingness and ability to facilitate.

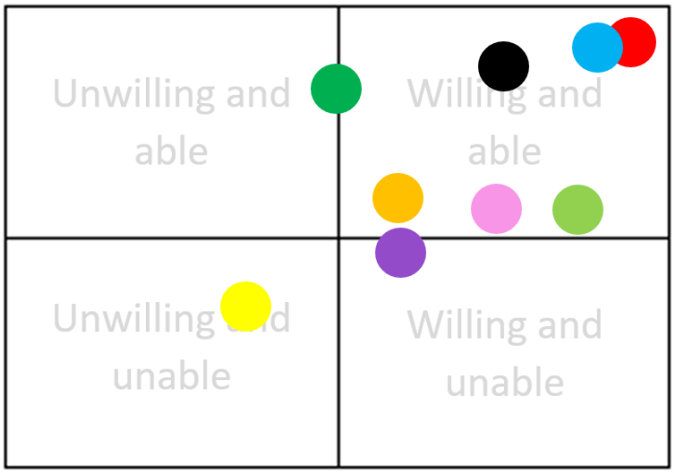


Figure 14. Municipalities’ willingness and ability to facilitate.

4.2 Considering the interview themes

Throughout the multiple steps in this research, it became more clear which barriers or barrier themes are related to the relationship between civic solar energy co-operatives and their municipalities. As a result, some themes are more worthwhile elaborating on than others. This paragraph explains why certain themes are not considered part of the list of municipal barriers for civic solar energy co-operatives. These topics were mentioned as barriers for civic solar energy co-operatives, but not described in the list of barriers above.

Physical layout of the built environment

International literature on barriers to successful bottom-up renewable energy initiatives often identifies the physical layout of the built environment as a barrier (De Groot et al., 2001; Sardianou and Genoudi, 2013; Painuly, 2001, in Van der Schoor and Scholtens, 2015). Based on the interviews with civic solar energy co-operatives, this research concludes that the environment can in fact be a barrier. This is because in most cases the physical lay-out determines the solar project’s locations. It has proven to be difficult to find a suitable project location: e.g. roofs can be unsuitable or agricultural land should stay just that. However, these factors are considered unchangeable. Therefore this research does not discuss this barrier. Paragraph 4.1.4 discusses the barrier of finding project locations.

Market entry

As found in the UK, civic solar energy projects can have difficulties with realizing their income-generating potential due to various barriers to market entry and network connection (Hain et al., 2005, in Walker, 2008). According to Watson et al. (2006, in Walker, 2008) these barriers include the lack of incentive for network operators to connect to small generators, the costs of trading, and the difficulty of obtaining access to green energy certificates (Walker, 2008). This barrier was mentioned by the civic solar energy co-operatives. In their experience the grid connection to very long to be made. Nowadays this issue has become worse, as it is now common knowledge that the Dutch energy grid has become overcrowded and downtime has lasts up to years. This research, however, considers the information as a given. This is because it is outside of the influence of municipalities.

Technical viability

For the United Kingdom Walker (2008) identifies technical (and economic) viability (Dunning and Turner, 2005, in Walker, 2008) as a barrier for community-owned means of energy production and use. In the case of Reinsberger and Posch (2014) (Austria), however, technical viability seemed one of the least concerns of participants in a civic solar energy project. Also in this research technical viability does not seem to be a barrier to successful civic solar energy co-operatives. This was especially a matter earlier when solar panels were more expensive. Nowadays, solar panels have become more affordable. For this reason the technical and economic viability is considered a given thing. The technical viability is outside the reach of the relationship between citizens and their municipalities.

Legal difficulties

Van der Schoor and Scholtens (2013) conducted research on Dutch local citizen initiatives in renewable energy. They found that many times legal difficulties were barriers. Also Walker (2008) (UK) identifies legal conditions as a barrier for community-owned means of energy production and use (Dunning and Turner, 2005, in Walker, 2008). The interviews with civic solar energy co-operatives have shown that rules and regulations are indeed barriers to successful co-operatives. However, could the rules be influenced by the municipalities? The concrete rules and regulations mentioned during the interviews were mostly issued by the national government. An example is the tax advantage regulation (SDE and Postcoderoos), which often did not provide sufficient financial advantages. Other examples are the protected cityscape, or the fact that civic solar energy projects do not contribute to a building's energy label. Most of the examples of constraining rules and regulations are outside the control of municipalities. Some rules can be influenced by the municipalities. These are often embedded in municipal policy. Although rules are there to be met, sometimes flexibility is possible. This is discussed in paragraph 4.1.6.

Municipal politics

International literature on barriers to successful bottom-up renewable energy initiatives often identifies the (cultural and) political traditions as barriers (De Groot et al., 2001; Sardianou and Genoudi, 2013; Painuly, 2001, in Van der Schoor and Scholtens, 2015). However, the interviews with civic solar energy co-operatives have shown that in fact politics usually is not a perceived as a barrier. This is because many of the co-operatives were welcomed with open arms by local political parties. However, unfortunately this did not contribute to speeding up the project. It did sometimes provide some advantages. An example is that one municipality made sure that a water retention area was roofed, so the roof could be provided to the co-operative. This idea came from the political arena. Also some negative remarks were made about politics. For instance, three co-operatives mentioned the large amount of funding for renewable energy, which was not allocated properly due to political choices.

Almost all actions taken within municipalities are based on political choices. An example is municipal policy. This means that most barriers in this research could eventually be traced back to politics. For this reason, this research does not deal with politics as a barrier itself. Instead, the research focusses on concrete barriers, which politics could take notion of.

4.3 General observations

In discussing the barrier themes with municipalities it appeared that some of the answers were based on general developments in the past years. These developments seem to have influenced the debate on facilitating civic solar energy co-operatives. The developments are listed below as contextual information.

- *Energy grid capacity.* In 2021 the first news items appeared on the limited capacity of the energy grid in The Netherlands. The grid operators were especially unable to connect new energy projects to the energy grid due to an employee shortage. As a result, many new projects are waiting for grid connections, possibly for years. Inoperative solar energy projects cost money and don't have any income. Due to this issue some municipalities expressed that they do not feel the urge to develop many (civic) solar energy projects. This also impacts the urgency to facilitate civic solar energy co-operatives.
- *Policy-making.* In 2018, during the interviews with civic solar energy co-operatives, many noted that there was no specific policy for civic solar energy or renewable energy co-operatives. In 2021 this has changed (see paragraph 4.1.3 on policy). Part of this change is due to the 2019 "climate agreement" in The Netherlands. The agreement obliges municipalities to jointly comprise a "Regional Energy Strategy" (RES). The RES describes every energy region's choices in combining sustainable energy sources (Nationaal Programma RES, 2021). This could impact municipal policy.
- *Professionalized civic solar energy co-operatives.* Some municipalities mentioned the fact that the small civic co-operatives have now become more experienced and better organized. As a result, the co-operatives can take on more projects or can be consulted as an advisory body for other co-operatives or municipalities. As discussed in paragraph 4.1.6 (on facilitation and the governance approach) this has implications for some of the municipalities' relationship with their civic solar energy co-operatives.
- *Technical development.* According to interviews with municipalities the solar panels have become more technically viable and thus more financially viable. As a result, cases with insufficient funding due to expensive solar panels will most likely not be subsidized by municipalities anymore. This is one of the reasons for municipalities treating co-operatives' finance issues differently. This is discussed in paragraph 4.1.1, barriers related to finance.

5. Conclusion

5.1 Summary

Barriers for civic solar energy co-operatives

This research has aimed to discover the municipal barriers posed on civic solar energy co-operatives in The Netherlands. First, potential barriers for civic solar energy co-operatives were gathered from theory. These barriers were input for the interviews with civic solar energy co-operatives, which finally resulted in a list of concrete barriers for discussion with the municipalities. These barriers are listed in table 3 below.

Barriers in relationship between municipalities and civic solar energy co-operatives		
1. Exceptional costs can jeopardize projects (finance) 2. The absence of sustained governmental funding is demotivating (finance) 3. Finding information is a long and tiring process (information and networking) 4. Surrounding citizens' familiarity with the project is important (information and networking)	5. Absent municipal policy delays civic solar energy co-operatives (policy) 6. Private parties and companies are unwilling to provide their roofs due to financial consequences (finding project locations) 7. Planning permission takes long (1,5 to 2 years) and discourages the co-operatives (planning permission)	8. The projects need to fit the municipal rules precisely and are not allowed to diverge, even if the projects' ideas are better and unharmful diversions (governance approach) 9. Municipalities are thought to overestimate the co-operatives in the process of applying for either permits or subsidies (governance approach)

Table 3. Barriers in relationship municipality and civic solar energy co-operative.

Municipal willingness and ability to facilitate

The list of barriers experienced by civic solar energy co-operatives was discussed in interviews with municipalities. The barriers were scored in terms of willingness and ability of the municipalities to solve these barriers. The scores in terms of willingness and ability were based on interviews with municipalities. By solving the barriers, better conditions for civic solar energy co-operatives are created. This would mostly involve municipal facilitation. The average scores per barrier is portrayed in figure 15. The barrier numbers correspond with the numbers of the barriers in table 3 above.

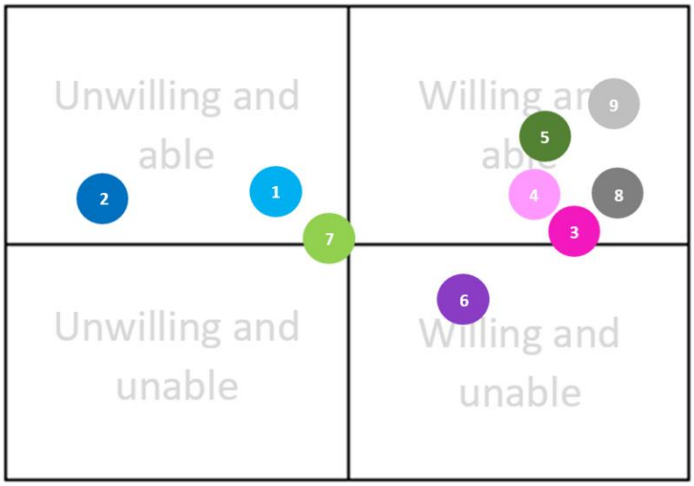


Figure 15. Distribution of municipalities in willingness and ability to support co-operatives with publicity.

As shown in figure 15 above, five barriers contain the best possibilities for municipalities to improve conditions for solar energy co-operatives. These are barriers 3, 4, 5, 8, and 9.

A shift in governance approach

As discussed in chapter 2 of this research, municipalities operate on the governmental level, and civic solar energy co-operatives arrive from the collective level. The collective level hosts self-regulated groups, such as civic solar energy co-operatives (De Roo and Peronne, 2021) (see figure 5 in chapter 2). Both types of governance interact with each other when civic solar energy co-operatives (societal level) consult the municipality (governmental level) on realizing a solar energy project. The way this interaction is shaped, is determined by the governance approach.

The results of this research seem to show a shift in the governance approach towards civic solar energy co-operatives. The municipalities' willingness and ability to improve on the barrier themes seems the have shifted over time. Generally, the municipal governance approach in The Netherlands seems to get rid of some of the characteristics of the technical rational approach (rigidity, "pigeonholing", generic rules with little flexibility) and

to gain some of the characteristics of the communicative rational approach (bespoke approach to planning permission, facilitation by means of better subsidies, effort to make a project happen, etc.).
At the time of the interviews with civic solar energy co-operatives the barriers seemed to portray relatively many characteristics of the technical rational approach. This is illustrated by means of the following examples in barriers mentioned by civic solar energy co-operatives:

- Pigeonholing means that in order to get a permit, organizations are expected to fit into narrowly defined rules and regulations. Allegedly, not enough attention goes out to the specific societal characteristics of projects and the low amount of risks that is involved (WRR, 2012). This is illustrated by barrier 8: municipalities need the co-operatives' projects to precisely fit the generic rules, and predominantly assesses whether the co-operatives comply or not. This makes the relationship between the citizens and municipalities hierarchical. The municipalities are in control. It also causes there to be little to no room for attention to individual projects.
- Pigeonholing also shows in barrier 5 in which absent municipal policy is thought to slow down the permitting or facilitation process. Despite the absence of policy the municipalities aim to make the projects fit existing rules precisely. Consequently, the municipalities take their time to figure out to which rules the projects should comply. The long processes frustrated the co-operatives.
- Also barrier 9 shows the hierarchical relationship between citizens and their municipalities as the municipalities do not provide much help in the permitting process: the co-operatives are expected to deliver the expertise themselves and the municipalities solely test their compliance. The same type of governance approach is reflected by the smaller barriers 3, and 4, in which co-operatives expected more municipal help in finding information, or contributing to the co-operatives' publicity.

Note that the municipalities in this research do not portray the complete list of characteristics typical for the technical rational governance approach. In fact, in this research the term is used to illustrate the characteristics of the municipalities' approach then, as opposed to the approach seen nowadays, which seems to show more signs of the communicative rational approach. This shift is illustrated in figure 16 below, starting at number 1 before and during the time of the interviews with civic solar energy co-operatives in 2018 and arriving at number 2 during the time of the interviews with the municipalities in 2021.

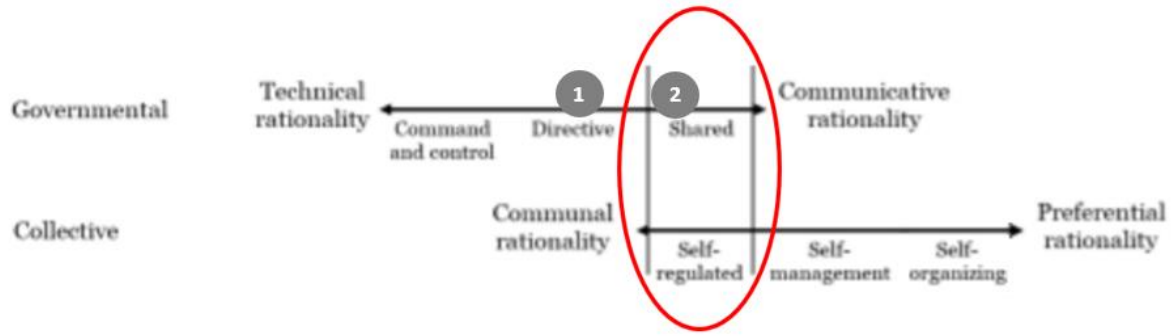


Figure 16. Shift in municipal governance approach in The Netherlands over time.

Note that there are differences among the municipalities. Generally, the more urbanized and wealthier municipalities seem to have been and still be more willing and better able to take a facilitative approach towards the co-operatives. It is these municipalities that portray relatively more characteristics of the communicative rational approach both then and now. The reason for this seems to be more available funding, more employees that focus on civic solar energy co-operatives, and generally more civic solar energy co-operatives in the areas.
During the time of the interviews with municipalities the contemporary governance approach to portray relatively more characteristics of the communicative rational approach. This is illustrated by with the following examples mentioned by municipalities:

- The municipalities' willingness and ability in facilitating civic solar energy co-operatives seems to have increased over the years. This conclusion arrives from the differences between interviews with civic solar energy co-operatives in 2018 (mentioning the barrier of insufficient facilitation in permit applications and information finding, barriers 3 and 9) and the interviews with municipalities in 2021. The interviews with municipalities show that a strong majority of the municipalities is nowadays willing and able to facilitate. Some municipalities facilitate more than others. Striking is the fact that wealthier and more urbanized municipalities were already able to facilitate more. This has stayed the same in the past years or increased in terms of ability. Moreover, some municipalities that appeared to be less willing during the interviews with civic solar energy co-operatives seem willing and able to facilitate nowadays. It is especially these municipalities that can still improve the most. As discussed above, better facilitation of civic solar energy

co-operatives (when necessary) is a sign of a more participative oriented governance approach. The policy recommendations are listed in paragraph 5.3 below.

- The municipalities willingness and ability in being more flexible with the rules, or writing policy that facilitates civic solar energy co-operatives better, seems to have increased over the past years. This conclusion arrives from the differences between interviews with civic solar energy co-operatives in 2018 (mentioning the barriers 8 and 5, respectively being too strict with the rules and not having sufficient policy) and the interviews with municipalities in 2021. Interviews with municipalities shows that a strong majority of the municipalities is nowadays willing and able to actively look for possibilities within the rules in order to facilitate. Some municipalities are also able to formulate ambitious policy that aims to facilitate civic solar energy co-operatives. These policies arrive from the municipalities' experience with the co-operatives in the past years, and their beliefs that the energy transition should come from bottom-up. Again, wealthier and more urbanized municipalities were already able to facilitate more. This ability and willingness has increased in the past years. Moreover, some municipalities that appeared to be less willing during the interviews with civic solar energy co-operatives seem more willing and able to facilitate nowadays. It is especially these municipalities that can nowadays improve the most. As discussed above, finding solutions for individual issues is a characteristic of the participative governance approach. The policy recommendations are listed in paragraph 5.3 below.
- The concrete changes in governance approach, as summarized above, also show a more equal relationship between citizens and their municipalities. The results show that municipalities start to trust and value the expertise and work of civic solar energy co-operatives. The municipalities facilitate when necessary, after the co-operatives took the initiatives. This is a characteristic of "third generation citizen participation". This is also referred to as "governmental participation". However, this type of interaction can still be improved. It seems that whenever this is not applied, the municipalities are slightly to more unable to do so due to time constraints of their employees.

5.2 Contribution to planning theory

This research contributes to planning theory by summarizing barriers for specifically civic solar energy co-operatives in The Netherlands. This contributes to previously existing literature on barriers for either general civic renewable energy co-operatives in Austria (as discussed in Reinsberger and Posch, 2014), Greece (Sardianou and Genoudi, 2013), and The UK (Walker, 2008). It also contributes to the previously existing literature on barriers for civic renewable energy organisations in The Netherlands (as discussed in Van der Schoor and Scholtens, 2015). The information added is specific for civic solar energy in The Netherlands updated until the year of 2018.

In addition, this research shines light on the willingness and ability of Dutch municipalities to solve the identified barriers. This provides insights into how municipalities could improve conditions for civic solar energy co-operatives best. This is determined by listing the areas in which Dutch municipalities are most willing and able to do so.

Finally, this research provides insights into the governance approach that is applied by Dutch municipalities in dealing with civic solar energy co-operatives. It also provides insight into how the governance approach could be altered to achieve good results for civic solar energy. The research also shows that between different types of municipalities there can be differences in the governance approach. This information provides relevant background information for further research into the relationship between civic solar energy co-operatives and their municipalities in The Netherlands.

5.3 Contribution to and recommendations for planning practice

This research contributes to planning practice by providing pointers for municipalities to increase the opportunities for civic solar energy co-operatives. Hence, the research is especially valuable for municipalities that are looking for ways to improve the co-operatives' chances, or cherish highly set goals on renewable energy production, especially solar energy. The research in helpful in two ways:

1. The research summarizes barriers for civic solar energy co-operatives, from the view of the co-operatives themselves. Municipalities can use this list to find out which barriers are relevant in their specific municipality. This can be used by policy consultants is a session of self-reflection.
2. This research also provides recommendations for planning practice, based on the barriers that are deemed to be solved easiest. These barriers were determined based on the municipalities' willingness and ability to do so. These are barriers 3, 4, 5, 8, and 9, as shown in figure 15 above. Many of the policy

recommendations arrive from examples in this research's interviews. The recommendations are stated below.

Barrier	Recommendations for Dutch municipalities
3. Finding information is a long and tiring process	Although some municipalities assume support in finding information would be redundant (due to subsidized knowledge institutes), the following is recommended to municipalities: A. In the case of available (and sufficient) subsidized provincial or municipal knowledge institutes municipalities could provide active referrals to these organizations. B. Municipalities could also provide vouchers to civic solar energy co-operatives to make use of the knowledge institutes. C. Municipalities could add to the available knowledge at the institutes by providing other relevant information themselves. D. In municipalities in which no provincial or municipal knowledge institute is available, municipalities could think of different ways to unlock information. Municipalities could establish an informative organization specifically for civic solar energy co-operatives. An example is Kennemer Kracht in Haarlem. This organization is subsidized by the municipality, and has available all relevant knowledge, including knowledge of environmental permits, project management and good contacts with the municipality. E. Smaller municipalities might deal with less civic solar energy co-operatives and less available funding. These municipalities could inventory the available information sources and provide active referrals. F. In order to make the information for civic solar energy co-operatives complete, the municipalities could add a municipal informative document which explains the remaining necessary information and on which topics the municipality is willing the support (e.g. permits and permit preparation). This facilitation by means of information can be shaped as extensive and complete as wished (and possible) by the municipality. An example is the province of Groningen, which offers a step-by-step plan. Conditional for these recommendations is that the municipality knows what the co-operatives need. If this information is unavailable, the municipality could learn from other municipalities. For instance, the municipality of Groningen is hired by other municipalities to help.
4. Surrounding citizens' familiarity with the project is important	Gaining more members and buyers for the solar participations is especially important to civic solar energy co-operatives. A. Municipalities could use letters or digital newsletters to citizens, or name the project on the municipal website. An example of the latter is a municipal website on which all sustainable initiatives are mentioned. Municipalities can choose to solely redirect readers to the website of the co-operative or to actively promote their products. The approach depends on the amount of trust between the municipality and the civic co-operatives.
5. Absent municipal policy delays civic solar energy co-operatives (policy)	Missing or insufficient policy can slow the permitting or subsidy process down. A. If policy is absent, municipalities could write it. B. Municipalities could improve policy with low ambition in civic solar energy should be improved. Municipalities could also add concrete steps to reach these more ambitious goals. This could involve describing how civic solar energy co-operatives are facilitated. This results in insight in the capacity needed, to which the municipality could anticipate. C. Municipalities could actively work on improving policy based on experiences in the past years. The goal in this could be to continuously improve policy in favor of civic solar energy co-operatives. D. Municipalities could consult other experienced municipalities in order to write ambitious policy and the obtain the right capacity to execute the policy.
8. The projects need to fit the municipal rules precisely and are not allowed to diverge, even if the projects' ideas are better and unharmful diversions (governance approach)	All municipalities agree that rules and regulations are there to be followed. However, there are some things that can be done to improve conditions for civic solar energy co-operatives. A. As discussed for barrier 9 below, municipalities can alter their governance approach. In lifting the barrier of "fitting the rules precisely" this would involve making an effort to make possible projects that would not be permitted at first glance. This involves looking for ways or alterations that do fit the rules. This entails a collaborative-like approach between the municipality and civic co-operative. An example is the municipality of Haarlem, which used to totally forbid the placement of solar panels on roofs of monumental buildings. However, more recently the municipality has carried out research to find out how solar panels on monumental buildings can be possible. As a result, the amount of suitable roofs for solar panels has increased. B. Municipalities could also alter policy for the benefit of civic solar energy co-operatives. This can be done based on experience, but also based on interviews with municipalities with knowledge on the matter. Conditional for these measures is creating capacity to execute these tasks.
9. Municipalities are thought to overestimate the co-operatives in the process of applying for either permits or subsidies	Changing the governance approach requires a different governance approach. This is also mentioned as a recommendation for barrier 3 (facilitating in finding information) and 8 (putting in effort to fit the rules). In this approach civic solar energy co-operatives are treated as citizens , instead of being treated like companies. This requires more governmental guidance. In order to implement such an approach, municipalities could: A. Write ambitious policy, which states how the municipality helps to reach the goals.

	B. Make available more capacity and knowledge in order to be able to provide the guidance. C. Provide instructions to municipal employees in order to make them understand the approach that is desired.

Table 4. (Policy) recommendation per municipal barrier.

6. Reflection on the research process

This chapter describes a critical view on the research process during which relevant theory was gathered. This chapter describes what went well, what could have gone better, and what will be done differently next time. The process also contributes to whether the outcomes are convincing or not. This is also discussed below.

6.1 Time span for the interviews

This research consists of two rounds of interviews. First, civic solar energy co-operatives were interviewed in 2018. The interviews provided a list of barriers encountered in their relationship with the municipalities. Second, the barriers from the first round of interviews were discussed in interviews with municipalities. During these interviews the views of the municipalities on the barriers was discussed. Also the municipalties' level of willingness and ability to solve the issues was discussed. This resulted in a smaller list of barriers that could "easily" and willingly be solved by the municipalities.

The second round of interviews initially also took place in 2018. However, unfortunately some questions were missing during the interviews. This was due to mistakes in the preparation of the interviews. As a result, the second round of interviews in 2018 had to be repeated. After a period of improving the interview guides for interviews with municipalities, the new interviews should have taken place in 2019. However, this planning was not met due to planning issues and (personal) time constraints. Eventually the second round of interviews took place in 2021. As a result, the first and second round of interviews were three years a apart. Although, the research did anticipate some time in between both interview rounds (for processing and interpreting the first round of interviews, and for preparing the results for the second round of interviews with municipalities) the three years were much more than that.

The following considerations on the large gap between both rounds of interviews were made:

- Municipalities continuously work on improving their policy. Also new elections bring about changes in policy. Waiting three years after the first round of interviews may have caused that some barriers were already resolved during the second round of interviews in 2021. This could mean that the list of barriers was (slightly) outdated at the time of the interviews with municipalities. In practice, however, this seems to have been the case for some municipalities, but not for all. During the interviews the development paths of municipalities over the years were discussed. As a result, it was possible to determine when and how certain barriers were (attempted to be) tackled. This brought to light some interesting differences between the municipalities that were still struggling with the barriers, and those that had already solved it: oftentimes the more urbanized and wealthier municipalities were better able to solve barriers. Also, the best practice municipalities are still looking for ways to improve. Therefore this research seems not to have become redundant for any of the municipalities in this research.
- This research aims to unite both rounds of interviews as well as possible. Despite the three year gap this seems to have worked. This was due to the fact that new input from more recent interview with municipalities made it possible to connect to what is relevant nowadays and in the future. For instance, the municipalities have started to work towards the implementation of the Environmental Licensing Act. Some of these thoughts were incorporated into the results, which makes this research up to date for the years after implementation of the new framework for environmental licensing and the accompanying governance approach. This also contributes to the list of recommendations.
- Over time, new barriers could have emerged for civic solar energy co-operatives, just like some barriers disappeared after being solved by their municipalities. As a result, this research could be incomplete. However, it rather seems that some of the already existing barriers have decreased in only some of the municipalities. Also, the barriers that became worse over time (e.g. energy grid connection) do not seem to be part of the relationship between civic co-operatives and their municipalities, hence irrelevant for this research. However, it cannot be known for sure whether some barriers are missing in this research.

In conclusion, the interviews with both the civic solar energy co-operatives and the municipalities went well. The interviews provided sufficiently clear results in order to draw conclusions, and make recommendations. This means that the failed round of interviews with municipalities was redone well. Despite the long period of time between the interviews with the civic co-operatives and their municipalities, it was still possible to draw clear conclusions, and to provide relevant recommendations.

In order to prevent planning issues in the future new researches will design follow-up interview guides more carefully in order to prevent the need for redoing interviews. Also, better attention will be paid to (personal) planning schemes, including more realistic time frames for (especially) processing interviews and gathering

relevant theory. Despite the issues discussed above (mostly related to the gap between both interview rounds) the outcomes of the research are convincing.

6.2 Socially desired answers and subjectivity

Subjectivity played an important part during the interviews, especially during the interviews with municipalities. Some municipalities thought they facilitate a lot, whereas other municipalities simply facilitated more. However, both municipalities scored themselves as very willing and able to facilitate civic solar energy co-operatives. As a result, it was sometimes difficult to determine the municipalities' true score on willingness and ability on improving certain barriers. Socially desired answers (e.g. on political matters) would also be given. This added to the complexity of assigning the right scores.

The issue was partly tackled by asking additional questions that would support the interviewees claim. Furthermore, the scores were finalized in comparison to all other municipalities. This process depends on the judgement of the researcher. Therefore, a potential following research would involve methods to tackle the subjectivity and socially desired answers better.

Despite the issues in assigning scores to municipalities. The municipalities overall provided a clear picture of their willingness and ability. As a result, the outcomes of this research have not become less convincing. In addition, the results section in chapter 4 provides all relevant background information concerning the municipalities' scores.

6.3 Gathering relevant theory

Part of the delays in this research's planning was difficulties with finding theory relevant to the research questions. It took some time to figure out which theory truly describes the issue that underlie barriers for civic solar energy co-operatives in relation to their municipalities. Eventually, it became clear that the governance approach ties together this research. The results show that the governance approach matters, and encompasses most other barriers identified in this research.

Gaining insight into relevant theory in a slow way has not detracted from this research's quality. Therefore the outcomes have not been compromised in terms of credibility.

6.4 The interview refusal rate

Chapter 3 claims that the civic solar energy co-operatives and municipalities were carefully selected in order to comprise a list of different types municipalities. The different types were to be distributed over the three provinces evenly. For example, within a municipality the interviewed municipalities ought to be a collection ranging from highly urbanized to rural areas.

In practice, however, the right distribution was not entirely lived up to due to a high refusal rate: some co-operatives were overloaded with interview requests and did not participate in this research. Appendix 1 provides an overview of the selected municipalities, and their scores on the selection criteria.

Despite this issue, the selection of suitable municipalities still more or less fits the criteria. Also, the total number of selected municipalities did contain a right distribution. As a result, the outcomes are still credible.

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Appendix 1. Research Participants

Table 1. Interviews with civic solar energy initiatives

Organisation	Province	Municipality
DuurzaamMenterwolde	Groningen	Midden-Groningen (previously Menterwolde)
Zonnewal Oostwold	Groningen	Westerkwartier (previously Leek)
Zonnedorpen	Groningen	Eemsdelta (previously Loppersum)
EnergieCoöperatie Ten Boer	Groningen	Gemeente Groningen (previously Ten Boer)
Joris Wekt Op	Limburg	Beesel
LeudalEnergie	Limburg	Leudal
ReindonkEnergie	Limburg	Horst aan de Maas
Peel Energie	Limburg	Peel en Maas
Bergen Energie	Noord-Holland	Bergen
Hilverzon	Noord-Holland	Hilversum
Opgewekt in Purmerend	Noord-Holland	Purmerend
Spaarnezaam	Noord-Holland	Haarlem

Table 2. Characteristics of interviewed municipalities

Municipality	Province	Average income per person in municipality / per province in 2021	Inhabitants per km2 per municipality/ per province	Urbanization grade per municipality 2021
Midden-Groningen (previously Menterwolde)	Groningen	29,6 x 1 000 euro / 29,9	217 per km2 / 253 per km2	Little urbanization
Eemsdelta (previously Loppersum)	Groningen	29,2 x 1 000 euro / 37,5	170 per km2 / 253 per km2	Little urbanization
Gemeente Groningen (previously Ten Boer)	Groningen	30,7 x 1 000 euro / 37,5	1 257 per km2 / 253 per km2	Very urban
Beesel	Limburg	29,9 x 1 000 euro / 31,4	481 per km2 / 520 per km2	Little urbanization
Leudal	Limburg	32,3 x 1 000 euro / 31,4	222 per km2 / 520 per km2	Not urban
Horst aan de Maas	Limburg	31,4 x 1 000 euro / 31,4	225 per km2 / 520 per km2	Little urbanization
Bergen	Noord-Holland	37,9 x 1 000 euro / 37,5	300 per km2 / 1 084 per km²	Little urbanization
Hilversum	Noord-Holland	39,8 x 1 000 euro / 37,5	2 000 inwoners per km2 / 1 084 per km²	Very urbanized
Haarlem	Noord-Holland	38,6 x 1 000 euro / 37,5	5 573 inwoners per km2 / 1 084 per km²	Very urbanized

Source: Statline (2021).

Appendix 2. Interview guide for civic solar energy co-operatives

General questions on project and process

- Please elaborate on your solar energy project: location, roof/land, stage, year of completion.
- Please generally explain the project stages: which steps were taken?

Topics related to general barriers

- **Finance**. Some related themes: financial risks, creating a water tight business case, economic viability, insufficient subsidies/tax deduction for both producer and participants/low fossil fuel energy prices, residents only partake when financial viable, (long) return of investment for participants, little private funding.

- **Market entry**. Some related themes: market entry and network connection, lack of incentive for network operators to connect to small generators, costs of trading, and the difficulty of obtaining access to green energy certificates

- **Information and networking**. Some related themes: obtaining knowledge on legal conditions, business case, and technical viability. Also insufficient networking with surroundings (project becomes controversial), other co-operatives and municipal boards or other bodies of interest.

- **Technical viability.**

- **Physical layout of the built environment.**

Topics related to barriers in relationship with municipality

- **Legal difficulties**
  Some related themes: legal barriers for community-owned means of energy production and use

- **Policy.**
  Some related themes: National energy tax, lack of a stable investment climate and consequent fiscal disadvantage.

- **Planning permission**.
  Some related themes: cultural and political traditions, perceived gap between government and citizens' wishes/needs, pigeonholing, insufficient governmental flexibility.

- **Politics.**

- **Planning tradition**
  Some related themes: government unable to adapt to changing society and needs, oriented inside-out, level of equipment of citizens: governmental bodies both over- and underestimate their abilities (government is not transparent, does not provide sufficient information, and thinks citizens are incapable).
  Common interest. Health, safety, safety of the environment, quality of amenities and services, multiple diverging wishes, government is unable to grant every wish, complexity.

- **Information and networking**
  Some related themes: obtaining knowledge on legal conditions, business case, and technical viability. Also insufficient networking with surroundings (project becomes controversial), other co-operatives and municipal boards or other bodies of interest.
  Obtaining knowledge on multiple project aspects and networking with surroundings (citizens and influential bodies/government).

General conclusive question

- How would you describe the relationship with your municipality in general during the process?
- What did the municipality do well and what should they improve?

Appendix 3. Interview guide for municipalities

General questions on policy

- What is the municipality's view on civic solar energy initiatives?
- Describe the governance approach applied to civic solar energy co-operatives (e.g. facilitation and policy goals).

Topics based on interviews with civic solar energy co-operatives

Nr.	Barrier topics and coherent barriers
1.	Finance: - Exceptional costs can jeopardize projects of civic solar energy co-operatives - The absence of sustained governmental funding is demotivating for civic solar energy co-operatives
2.	Information and networking: - Finding information is a long and tiring process for civic solar energy co-operatives - Surrounding citizens' familiarity with the civic project is lacking in some cases
3.	Policy: - Absent municipal policy delays civic solar energy co-operatives
4.	Project locations: - Private parties and companies are unwilling to provide their roofs due to financial consequences, which are not borne by the municipalities.
5.	Planning permission: - Planning permission takes long (1,5 to 2 years) and discourages the civic solar energy co-operatives.
6.	Governance approach: - The projects need to fit the municipal rules precisely and are not allowed to diverge, even if the projects' ideas are better and unharmful diversions. This frustrates and delays the civic solar energy projects. -Municipalities are thought to overestimate the co-operatives in the process of applying for either permits or subsidies. In fact, the co-operatives would like better facilitation.

General questions per barrier in the table above

- Are these barriers familiar?
- Why do these barriers occur?
- Is the municipality willing and/or able to do something about this barrier and why?

Appendix 4. Codes for interviews with civic solar energy co-operatives

Step 1. Codes from literature
List of main codes derived from literature, including adhering sub-topics.

- **1. Finance** (business case, risks, incentives for participants).
  Financial risks, creating a water tight business case, economic viability, insufficient subsidies/tax deduction for both producer and participants/low fossil fuel energy prices, residents only partake when financial viable, (long) return of investment for participants, little private funding.

- **2. Technical viability**

- **3. Market entry**
  Market entry and network connection, lack of incentive for network operators to connect to small generators, costs of trading, and the difficulty of obtaining access to green energy certificates (project market entry and perspective of network operator)

- **4. Legal difficulties**
  Legal barriers for community-owned means of energy production and use

- **5. Policy**
  National energy tax, lack of a stable investment climate and consequent fiscal disadvantage

- **6. Planning permission**
  Cultural and political traditions, perceived gap between government and citizens' wishes/needs, pigeonholing, insufficient governmental flexibility.

- **7. Politics**

- **8. Planning tradition**
  Government unable to adapt to changing society and needs, oriented inside-out, level of equipment of citizens: governmental bodies both over- and underestimate their abilities (government is not transparent, does not provide sufficient information, and thinks citizens are incapable).
  Common interest. Health, safety, safety of the environment, quality of amenities and services, multiple diverging wishes, government is unable to grant every wish, complexity.

- **9. Physical layout of the environment**

- **10. Information and networking**
  Obtaining knowledge on legal conditions, business case, and technical viability. Also insufficient networking with surroundings (project becomes controversial), other co-operatives and municipal boards or other bodies of interest.
  Obtaining knowledge on multiple project aspects and networking with surroundings (citizens and influential bodies/government

Step 2. New codes from interviews

- **Setting up the co-operative**. Creating a board, officially registrating the co-operative, time-consuming.

- **Finding locations for projects**. E.g. roofs of non-governmental parties, land, governmental roofs, other locations.

Appendix 5. Codes for interviews with municipalities

1. Finance

Related themes:

- Municipalities contributing to business case in exceptional situations (exceptional costs). E.g. financial guarantees for projects on private roofs.
- Municipalities do not pay co-operatives for contributing to environmental goals and policy-making.
- Subsidies are not allocated optimally (political choices).

2. Information and networking

Related themes

- Municipalities insufficiently support co-operatives in networking with surroundings.
- The co-operative is not well known by other citizens (derived from civic interviews).
- Finding information takes very long (derived from civic interviews).
- Finding project locations (derived from civic interviews).
- Setting up the co-operative (derived from civic interviews).

3. Policy

Related themes:

- Municipalities do not have policy on the matter and therefore take long to permit projects (1,5 – 2 years) or grant necessary credit (one year). Usually political ambitions provide help when policy is not there.
- Due to absent policy new projects are rejected repeatedly.
- Due to the absence of policy/concrete political ambitions co-operatives do not experience incentives to start a new project.

4. Finding project locations

Related themes:

- Privately owned roofs require additional funding.

5. Planning permission

- Planning permission takes long (1,5 to 2 years) (projects on land).
- Municipalities are unsure about the steps to take in order to grant planning permission. As a result, the process takes a long time.

6. Governance approach

Related themes

- Projects need to fit the rules exactly
- No exceptions to rules and regulations: even when the co-operatives' ideas are better, the municipal rules need to be followed precisely.
- Co-operatives are overestimated and expected to respond to every municipal request (e.g. make new additions to permit application repeatedly, sometimes no facilitation in finding project locations, no financial facilitation in terms of salary).
- Co-operatives are underestimated: their good or better ideas are disregarded when not coherent with existing rules.
- Municipalities respond slowly when requests do not fit the habitual rules