Understanding Residents' Public Acceptance of the Development of Solar Farms

Master Thesis

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Abstract

This study aims to understand which factors correlate with residents' public acceptance of solar farms. To do so, a triangulation of methods is used around a case study in Enschede, the Netherlands, where an energy cooperative aims to develop several solar farms. By 1) conducting a document study, 2) through surveys held among residents and 3) interviews with relevant stakeholders, various factors are found. Best practices with regards to improving public acceptance are found by conducting interviews around a second case study, in Nijmegen, the Netherlands. The findings of this study imply that factors discussed in academic literature concerning public acceptance of other sustainable energy projects can be used to understand residents' public acceptance of solar farms as well. New factors are found as well, such as the aversion of residents against the use of farmland for solar farms and the role of local municipalities in the level of residents' public acceptance. This study recommends further research into factors that specifically explain public acceptance for solar farms. Lastly, this study gives several practical recommendations for improving public acceptance for solar farms.

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1. Introduction

Currently, the use of renewable energy in the Netherlands is a long way behind that of other nations in the European Union[1]. With only 6.6 percent of energy being generated from renewable sources in 2017, the goal of 32 percent in 2030 seems almost unattainable. Therefore the Dutch government has decided to draft a climate agreement, which aims to diminish the emission of CO-2 and increase the use of renewable energy technologies[2]. While the agreement has been finalized only recently, many solutions that work towards a CO-2 reduction have already been in full effect for longer. The Dutch government aims to both stimulate consumers to generate sustainable energy and companies that want to develop renewable energy technologies by providing them with subsidies[3]. Along with a strong support for sustainability in the Netherlands, as was found by Van der Lelij, De Graaf and Visscher (2016), this policy has caused many local initiatives to improve sustainability to emerge. In 2018 a record was set regarding the amount of energy cooperatives that were founded, with an increase of 20 percent[4]. These cooperatives develop sustainable energy projects to reduce CO-2 emissions together with citizens. One of the main projects that are developed by energy cooperatives is solar farms. Over the last years, there has been a quick growth in the amount of solar farms in the Netherlands, with an increase in the generated energy from 1500 megawatts in 2018 to 4400 megawatts in 2019.[5]

Although this seems to be an important step in the direction of the desired energy transition, conflicts with residents that live near project development sites are often encountered. Conflicts and complaints by citizens show that there is often a lack of acceptance of the development of solar farms. In many cases, residents even go to court with the aim to prevent the development of solar farms.[6] This causes long delays in the development trajectory and can possibly completely stop the development altogether.

This lack of acceptance of solar farms can be seen in a broader context. Although a study done for the Dutch government by Van der Lelij et al (2016) shows that a majority of Dutch citizens supports sustainability and views CO-2 emissions as harmful, conflicts arise when solutions are implemented locally. Wolsink (2007) shows that these problems have occurred throughout the European Union. Anywhere in Europe public attitudes show moderate to strong support for the implementation of renewable energy technologies (which includes solar farms), but nevertheless complications are present when renewable energy projects are actually developed on a local level (Wolsink, 2007). Local residents often show a lack of support for the development of renewable energy technologies 'in their backyard'. As Wolsink (2007) argues, it might be easy to explain these backyard motives as mere selfishness of citizens, but this is not an adequate explanation of actual motives. The not in my backyard (NIMBY) mentality refers to people having a positive attitude towards something, such as renewable energy technologies, until they are confronted with it (it is built in their backyard), when they oppose it for selfish reasons. Both Wolsink (2007) and Kempton et al. (2005) argue that explaining opposition to local projects as selfishness is outdated, as it does not explain the actual cause of opposition by citizens, which is more complicated and often has nothing to do with selfishness. For a good implementation of the proposed solutions regarding the energy transition it is of crucial importance that these true causes of opposition by citizens are found. Based on the causes of opposition, projects can be developed in a way which is more agreeable to local residents. This study aims to find the factors which influence public acceptance of sustainable energy projects by focusing on public acceptance of solar farms. This focus offers added value, as current literature towards the causes of opposition of solar farms is limited,

[1] https://nos.nl/artikel/2271660-nederland-onderaan-eu-lijst-duurzame-energie.html
[2] https://www.klimaatakkoord.nl/
[3] https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/meer-duurzame-energie-in-de-toekomst
[4] https://nos.nl/artikel/2260420-recordaantal-nieuwe-energiecooperaties-opgericht.html
[5] https://www.cbs.nl/nl-nl/nieuws/2019/17/vermogen-zonnepanelen-meer-dan-de-helft-toegenomen
[6] https://solarmagazine.nl/nieuws-zonne-energie/i21440/rechtbank-gelderland-verklaart-bezwaren-tegen-zonnepark-wijchen-ongegrond
https://www.waldnet.nl/wn/nieuws/63173/Rechtszaak:_werk_aan_zonnepark_acuut_stilgelegd.html

as most scholars focus on other sustainable energy projects, such as wind farms, instead of solar farms. More specific research towards solar farms is therefore needed. Furthermore, specific factors that come into play for community based initiatives such as cooperatives receive little attention by academics. Therefore, this study has both a high practical and academic relevance. It can fill the gap in academic literature regarding public acceptance of solar farms and the effects of energy cooperatives on the level of public acceptance of renewable energy projects. Practically, this study can help to improve residents' public acceptance of renewable energy projects, which can lead to an improved development trajectory of solar farms, which contributes to meeting goals concerning sustainability. Developing solar farms in a more acceptable way for local residents leads is beneficial for those residents as well.

This thesis aims to find the factors that influence residents' public acceptance of solar farms and propose solutions. Therefore, a case of a conflict between an energy cooperative and citizens in Enschede, the Netherlands, is used. Furthermore, best practices are described based on a successful case in Nijmegen, the Netherlands. In the case of Enschede, residents caused a delay of the development of three solar farms in their neighborhood. They did so by collecting over 200 signatures against the development and submitting notices of objection to the municipality, which led the municipality of Enschede to reconsider the project. This in turn led to the energy cooperative having to wait with the development of their projects until agreement was reached with the residents or the municipality had taken a final decision on the subject. This is in contrast with the developments in Nijmegen. Here energy cooperative WindPowerNijmegen reached 1013 members in 2016 and received much support for its development of a wind park and for its plans to develop a solar farm[7]. This resulted in the cooperative realizing the development of a wind farm in less than four years[8].

These large differences are noteworthy and warrant further research. As mentioned, this study aims to find the factors that correlate with public acceptance of local residents of solar farms. The following research question is proposed: *Which factors influence residents' public acceptance of the development of solar farms by energy cooperatives?*

To answer this main research question, several sub-questions have to be answered. Firstly, this study examines the factors that are already described in relevant literature. The following sub-question is used: *Which factors that influence public acceptance of residents of the development of solar farms can be found in academic literature?* Besides the literature, this study also focuses on new empirical evidence, by researching the attitudes and motives of local residents in Enschede. Doing so is crucial in finding specific factors that correlate with the public acceptance of solar farms. The following sub-question is used: *Which factors correlate with local residents' public acceptance of solar farms in Enschede, the Netherlands?* Furthermore, this study aims to find best practices in a case study in Nijmegen, the Netherlands. The following sub-question is used: *What best practices regarding improving public acceptance for solar farms can be learned from energy cooperative WindPowerNijmegen?* Based on these findings, this study aims to propose recommendations for improving public acceptance of the development of solar farms. Therefore, the following research question is used: *What solutions can increase local residents' public acceptance of the development of solar farms?*

1.1.Methods and research design

This study proposes a combination of qualitative and quantitative methods to answer the various sub-questions and eventually the main research question. In this subchapter the chosen method for each research question is presented below the question. As the research design is quite complicated, the used methods and participants for each sub-question are presented in table 1, to provide clarity.

[7] https://www.windparknijmegenbetuwe.nl/cooperatie/
[8] https://www.windparknijmegenbetuwe.nl/windpark/

- SQ1: *Which factors that influence public acceptance of residents of the development of solar farms can be found in academic literature?*

In order to answer this sub-question a literature study is conducted, which is presented in the theoretical framework of this study. For the literature study, both Google Scholar and Scopus are used.

- SQ2: *Which factors correlate with the public acceptance of local residents of solar farms in Enschede, the Netherlands?*

This research question focuses on a case in Enschede, the Netherlands. In order to answer this research question, a combination of methods is used. Firstly, a quantitative method is used in the form of a survey. By using this survey, the hypotheses formed in answering SQ1 are tested. This method is used to collect results from a representative sample of residents that live in close proximity to the development sites of three solar farms in Enschede. A quantitative method is chosen because it provides the opportunity to get results from a much broader sample compared to qualitative methods. Furthermore, variables can easily be transformed into clear items.

Furthermore, another quantitative method is used in the form of a document study of filed notices of objection by residents against the development of the three solar farms.

Lastly, to provide more in depth results about the factors that influence public acceptance, interviews are conducted. A variety of stakeholders is interviewed, including residents that live near the development sites, board members of the energy cooperative that aims to develop the solar farms and members of the municipality of Enschede. The interviews are conducted in a semi-structured way. This method is chosen because it gives participants the possibility to bring up other factors that are not included in the questioning, or elaborate further on points they deem important.

To conclude, this sub-question is answered by using both the results of the survey, the document study and the conducted interviews.

- SQ3: *What best practices regarding improving public acceptance of solar farms can be learned from energy cooperative WindPowerNijmegen?*

To provide insight in how public acceptance for solar farms can be improved, another case is researched in Nijmegen, the Netherlands. Semi-structured interviews are conducted with board members of energy cooperative WindPowerNijmegen and a member of both the supervisory board of Enschede Energie and WindPowerNijmegen.

- SQ4: *What solutions can increase local residents' public acceptance of the development of solar farms?*

Based on the results of the other sub-questions, in the discussion of this thesis, solutions will be presented to increase the public acceptance of local residents. Solutions are proposed by using 1) recommendations from the literature found in answering SQ1, 2) the empirical results from the document study, interviews and survey used to answer SQ2 and 3) found best practices for SQ3.

Table 1.
Used methods and participants for each sub-question

Sub-question	Used method(s)	Participants
SQ1	Literature review	N/A
SQ2	Survey (1) , document study (2) and interviews (3)	Residents of Enschede (1)

		Anonymized residents of Enschede who submitted a notice of objection (2) Stakeholder in Enschede (3)
SQ3	Interviews	(Supervisory) Board members of cooperative WindPowerNijmegen
SQ4	Results from SQ1, SQ2 and SQ3	N/A

2. Theoretical framework

This chapter aims to answer the first sub-question of this study:

Which factors that influence public acceptance of residents for the development of solar farms can be found in academic literature?

The factors that are found are used to form hypotheses for sub-question 2.

2.1. Public Acceptance: A Structural Approach

This study focuses on factors that influence public acceptance, because public acceptance appears to be crucial for the development of renewable energy projects. This is supported by relevant literature: according to Devine-Wright (2005, p.125) "It is widely recognised that public acceptability often poses a barrier towards renewable energy development". Devine-Wright (2007, p.3) furthermore mentions that "public acceptability is a necessary condition of technology development". Wüstenhagen, Wolsink and Bürer (2007) also recognize social (public) acceptance as a constraining factor for the development of renewable energy in many countries. Therefore, it is important to understand what causes public acceptance of renewable energy projects.

This study aims to take into account a large amount of factors that determine public acceptance of solar farms. To provide a comprehensive overview, it is important that a clear structure is present. This study recognized two categories of factors that help in understanding public acceptance: factors that are driven by citizen characteristics (such as general opinion regarding sustainability) and factors that are driven by project characteristics (such as the location of the project).

2.2.Citizens Characteristics

This subchapter focuses on factors that are driven by citizens' characteristics.

2.2.1. Not in anyone's backyard

The first factor that causes public acceptance that is discussed in this study is 'not in anyone's backyard' mentality, or in other words, a lack of public acceptance towards sustainable energy projects in general.

Although Wolsink (2007) argues that mainly local factors, such as the local landscape, are of importance, he also shows that the general attitude of citizens towards wind energy plays has a positive effect on the resistance to local wind developments. The argument of residents that oppose renewable energy projects in general is called the 'not-in-any-backyard' argument by Wolsink (2007), which means that residents do not accept the development of renewable energy projects, regardless of the siting or characteristics. Poortinga, Pidgeon and Lorenzoni (2005) also show evidence that suggests

that this effect of general attitudes on the development of sustainable energy projects can also improve public acceptance. Poortinga et al (2005) show that support for renewable energy projects is motivated by environmental concerns, especially about climate change. This implies that the general attitude towards renewable energy has a positive effect on the acceptance of renewable energy projects, as it can be assumed that environmental concerns about climate change lead to a positive general attitude towards renewable energy. Therefore, the following hypothesis is proposed:

H1: The general attitude of residents toward renewable energy correlates positively with residents' public acceptance of solar farms.

2.2.2. Not in My Backyard

The phenomenon of supporting something in general, but not when it is developed in proximity of one's home is referred to as 'Not in My Backyard' (NIMBY). Wolsink (2000) explains this more elaborately: in the case of NIMBY, a whole society is better of when something is developed or produced, in this case the development of sustainable energy projects. However some individuals face some negative personal consequences, such as a solar farm being in their backyard. Therefore the individual weighs his/her personal costs and benefits and chooses individually not to cooperate. This way, a project that is beneficial for society cannot be developed because of individuals that place their individual costs and benefits above that of society. Examples of NIMBY attitudes are found regarding the storage of carbon, as described by Krause et al. (2014), or the storage of hazardous waste (Groothuis and Miller, 1994).

Scholars such as Groothuis and Miller (1994) and Easterling (1992) argue that NIMBY (as a personal cost-benefit analysis) influences public acceptance for projects. NIMBY arguments for lack of public acceptance are also used by Easterling (1992, p.469), who describes the opposition towards nuclear waste repository as "parochial and short sighted". It could be argued that personal cost-benefit motives also cause the local opposition towards the development of sustainable energy projects.

More recently there have been disagreements regarding the notion that people base their acceptance of the development of sustainable energy projects purely in personal costs and benefits. Wolsink (2000) argues that there are large flaws in the theory that NIMBY is responsible for the lack of public acceptance regarding wind energy. Only about a quarter of people of the population clearly look at their individual costs and benefits regarding the development of wind farms in their neighborhood. Wolsink (2000) therefore argues that it is too simplistic to simply explain lack of public acceptance of wind energy as selfishness (personal costs and benefits) and that other underlying and more important factors have to be taken into account. Devine-Wright (2005, p.131) agrees with this sentiment, as he mentions that "empirical results have not supported the presumed prevalence of NIMBY views". According to Wolsink (2007), is very rare to find people that support wind power in general, but oppose it locally because of selfish reasons. The gap in attitude between general support in energy but a lack of support locally can be explained by the fact that people start to actually think about local factors when plans for a project are presented. Because of local factors, such as the local landscape, they choose to support or oppose the development of projects, rather than the distance to their house. According to both Wolsink (2007), Kempton et al. (2005) and Bell, Gray and Haggett (2005), explaining opposition as selfishness leads to obscuring and simplifying the actual causes of opposition.

To avoid falling into the trap of describing local opposition as NIMBY while other underlying factors are present, this study distinguishes between NIMBY and residents that are *conditional* supporters, who would support solar farms near their homes if certain conditions are present. If this clear distinction is made, NIMBY can be taken into account for this study without obscuring the actual causes of opposition.

This leads to the following hypothesis:

H2: Personal cost-benefit analyses (NIMBY motives) correlate negatively with residents' public acceptance of the development of solar farms.

2.2.3. Trust

To define trust, Firestone et al (2012) use the definition by Bellaby (2010, p.2615), "a feeling or belief that someone (or some institution) will act in your best interest". If residents trust a developer of a sustainable energy project, they are also more likely to view the procedures of the project as fair. This works the other way around as well: a high perceived procedural fairness can also lead to a higher level of trust (Firestone et al, 2012). Zoellner, Ittner and Schweizer-Ries (2005) show the negative effect of a lack of trust on public acceptance. They argue that residents of a community where wind energy plants were developed believed the developers did so because economic interests, instead of environmental concerns. This led to the residents deeming the developers as 'disconnected elites' and untrustworthy. In turn, this led to a lower acceptance of the projects and unwillingness to take part in the procedures.

Although the developer of a project can strongly influence trust, this factor is classified as a factor driven by citizen characteristics. It can be argued that a low level of trust can also be caused by a distrust in the local government, or a personal disposition of residents to distrust new developments. Although no specific research has been done towards the effect of trust on the public acceptance of solar farms, it can be argued that, as the relation is present in other projects that focus on sustainability, this relation is present for solar farms as well. This leads to the following hypothesis:

H3: Level of trust in the developer correlates positively with residents' public acceptance of the development of solar farms.

2.3. Project characteristics

This subchapter focuses on factors that are driven by characteristics of the project itself.

2.3.1. Landscape Disruption

One of the most important factors that caused resistance to wind turbine projects, as described by Wolsink (2007), is the landscape that is disrupted by the project. The shape of landscapes plays an important role in the development of sustainable energy projects. According to Nadaï and Van der Horst (2010, p.143) "landscape has become a key arena for the debate on energy policy". Nadaï and Van der Horst (2010) also argue that the landscape of a country is part of its cultural process. Furthermore, Pasqualetti (2001, p.691) argues that "the resistance to wind power originates in its inherent spatial characteristics". Wolsink (2007) found strong support for landscape as a leading cause for support or opposition for the development of sustainable energy projects. He found that the public acceptance of these projects strongly depends on the surrounding landscape. Furthermore, Warren and McFadyen (2010) even argue that for the development wind farms, the evaluation of visual impact is the factor that dominates all others in explaining the opposition to it. As solar farms change the landscape as well, this implies that this factor could have an effect on the public acceptance for these types of projects as well, although research focused specifically on solar farms is limited.

It is important to distinguish between the perceived landscape disruption before and after the development of a project. Pasqualetti (2001) shows, by citing multiple reports, that after the development of wind turbines, public perception shifted positively. This suggests that the public gets used to the new landscape over time and positives begin to outweigh the perceived negative impact on the landscape. The findings are supported by Arkesteijn (1992) and Elliott (2004), who both measured the public approval of a wind energy project before, during and after the development. They show that post installation, the public perception greatly improves.

It can be concluded that, as landscapes are often seen as an integral part of the local culture, the unavoidable impact of solar farms on landscapes can worry local residents. Furthermore, the decided location for the development of a solar farm can be of crucial importance for the chance of the project succeeding. However, after the installation of sustainable energy projects, public acceptance seems to improve quickly. This can be because residents become used to the new landscape, or their worries are

disproved. It is implied that this could also be the case for solar farms This study focuses on the phase before development of solar farms, which leads to the following hypothesis:

H4: Perceived landscape disruption correlates negatively with residents' public acceptance of the development of solar farms.

2.3.2. Annoyance

Besides affecting the local landscape, the choice for a certain location as a development site can also cause annoyances for residents in close proximity. According to Wolsink (2007), this annoyance can cause resistance to the development of wind turbines. This is mainly caused by the noise that is produced by wind turbines. While noise is not a relevant complaint for solar farms, annoyance can be a problem. For instance, residents of Enschede argued that solar farms look like 'mirrors' and expected the light reflection of the solar farm to be of annoyance[9].

Annoyance is found frequently in relevant literature as a typical factor that causes a lack of public acceptance for the development of sustainable energy projects. Pasqualetti (2001) mentions that although wind turbines have become so quiet that the noise does not affect residents anymore, noise still is a cause of resistance before the development of wind turbines. However, according to Pasqualetti (2001, p.694), the experience of noise "is more anticipated than realized". That the anticipated annoyance is higher than the real annoyance of renewable energy technologies could be one of the causes for the findings Arkesteijn (1992). He found that post installation, the public acceptance of wind turbines greatly improved. It appears that in general, residents expect the negative impact of the development of a sustainable energy project to be stronger before the development, while afterwards the perception of the project shifts more positively.

It can be concluded that annoyance often plays a role in causing opposition towards the development of renewable energy technologies. Although research towards this factor's effects on public acceptance of solar farms is limited, certain characteristics of these projects can lead to annoyance as well. This leads to the following hypothesis:

H5: Perceived annoyance correlates negatively with residents' public acceptance of the development of solar farms.

2.3.3. *Fairness*

According to Firestone, Kempton, Lilley and Samoteskul (2012, p.1390), "implementing fair, transparent and just decision making and planning processes may be a significant determining factor in success". This perceived fairness of the procedure and the eventual outcome can lead to an improved level of acceptance, even though not all concerns residents have are addressed. Skitka, Winquist and Hutchinson (2003) show that the fairness of an outcome even has stronger effects than the favorability of the outcome (to what degree participants are in favor of the outcome). The procedural fairness matters to the public according to MacCoun (2005), because they believe that fair procedures will lead to fair outcomes.

It can be concluded from relevant literature that fairness of the procedures and outcomes of a project can lead to a higher public acceptance. Although no specific research towards the effects of this on the acceptance of solar farms has been conducted, it can be argued that this relation is also present within the context of solar farms. The following hypotheses are therefore proposed:

[9] https://www.tubantia.nl/enschede/enschedeers-komen-in-actie-geen-zonneparken-in-de-achtertuin~af46af94/

H6: Perceived level of fairness of procedures and outcomes correlates positively with residents' public acceptance of the development of solar farms.

2.3.4. Communication Strategy

As mentioned, scholars such as Pasqualetti (2001), Arkesteijn (1992) and Elliott (2004) show that public acceptance of renewable energy projects shifts positively after the project is realized. After the realization of a project, many worries of residents were proved to be unfounded. It can therefore be argued that accurate communication could be used to take away unfounded concerns of residents beforehand, which could lead to a higher level of public acceptance.

According to Wolsink (2007, p.1191), "all the research on public perceptions, on planning wind power schemes and on the lack of success as regards implementation in some countries, indicates that poor communication may indeed play a role". Wolsink (2007) and Breukers and Wolsink (2007) argue that communication concerning the development of sustainable energy projects is often poor because it does not address the real concerns of residents. He argues that often, advocates of the development of the project use arguments about global warming and the greater good, instead of focusing on local issues such as the landscape and annoyance. Therefore, policymakers and project developers tend to communicate ineffectively, causing a lack of public acceptance (Breukers and Wolsink, 2007).

It can be concluded that the communication strategy is found in relevant literature to have a strong effect on public acceptance. It is argued that a communication strategy that addresses the actual concerns of residents leads to a higher public acceptance compared to a communication strategy that does not. Therefore, the following hypothesis is proposed:

H7: A communication strategy that addresses the actual concerns of residents correlates positively with residents' public acceptance of the development of solar farms.

2.3.5. Project Processes and Outcomes

It is important to recognize the role of the way a developer handles the project processes and outcomes in the public acceptance of its projects. The way a developer forms its procedures and divides its benefits can influence whether residents view the procedures and benefits as fair, which as mentioned in turn influences the public acceptance. It can be argued that projects developed by energy cooperatives can elicit a different level of public acceptance compared to projects that are developed by more commercial developers. Cooperatives fall in the category 'community owned energy production' (Walker, 2008), which strongly differs from 'regular' developers, who are more distant and private, instead of community owned. Warren and McFadyen (2010) show that in general public acceptance is higher when the public is (at least partly) the owner of a sustainable energy project. Being the (partial) owner of a project has two implications: 1) owners can participate in the project process and 2) owners get a share of the project benefits (profits, energy).

There are differences between different community owned energy initiatives in the degree to which the projects are actually owned by the community. According to Walker and Devine-Wright (2008), two dimensions are of importance to define the type of community owned energy production: the process and the outcome. The process refers to who a project is developed and run by and the outcome refers to who the project is for, who benefits economically or socially (Walker and Devine-Wright, 2008). The findings of Walker and Devine-Wright (2008), which show the positioning regarding project process and benefits (outcome) that is desired by different groups, are presented in figure 1.

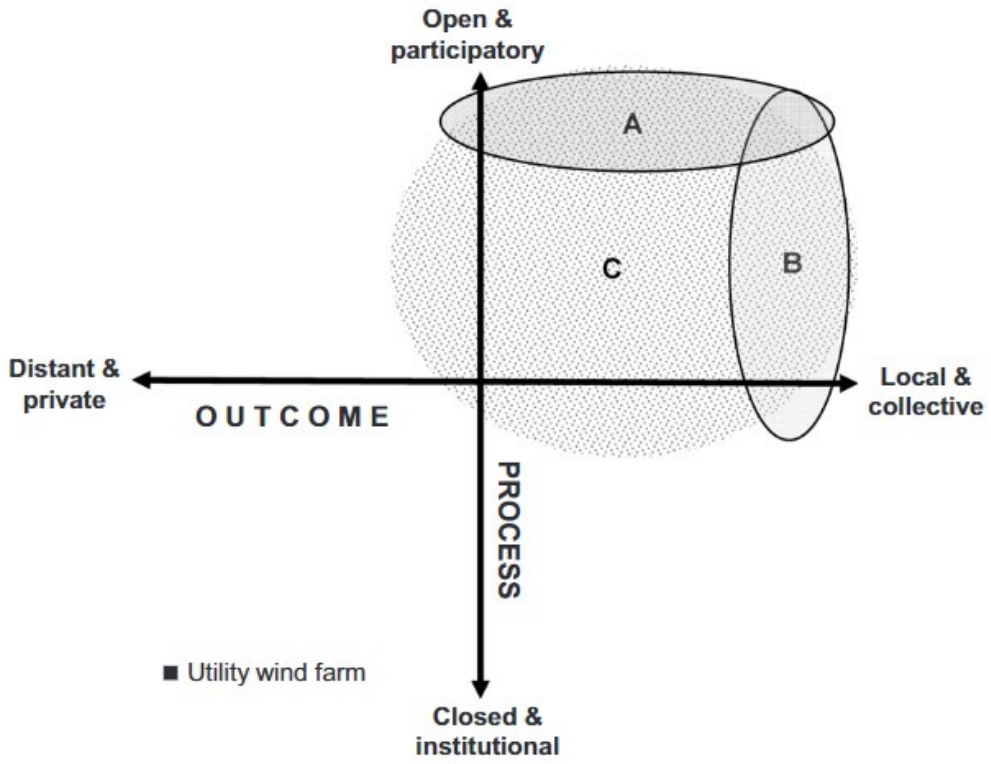

Figure 1. "Understanding of community renewable energy in relation to project process and outcome dimensions" (Walker and Devine-Wright, 2008, p.498).

Walker and Devine-Wright (2008) found that more direct and substantial involvement of residents in projects improves the acceptance of the project. Breukers and Wolsink (2007) mention that, although it is unlikely to turn residents who strongly oppose renewable energy projects into supporters, participatory decision making can improve the support of *conditional* supporters. Coenen (2009) also recognizes the positive effects of participation, as he mentions that the government (or in this case, the developer) can gather relevant information through participation, which can lead to improved decision making by more accurately identifying relevant problems. Through participation, stakeholders also learn of the interests of governments or cooperatives, which can lead them to change their behavior. Furthermore, Coenen (2009, p.8) describes "broadening of public support for environment-related decisions" and "reducing the level of conflict" as arguments for public participation. He also mentions that participation in environmental decisions can increase the legitimacy of these decisions and reduce the level of conflict.

Although participatory processes hold great promise for increasing public acceptance, managing the expectations of participants can be a pitfall. According to Coenen (2009, p.12) "allowing participation processes to take place could raise expectations of real influence". When this real influence is not there in practice, it can be argued that this could lead to unsatisfied or disillusioned participants. Spyke (1998) argues that in participatory processes, citizens and agencies (organizations that will carry out the discussed project) often have different goals, which leads to different expectations. According to Spyke (1998), citizens can choose to participate because they view themselves as experts on the specific subject that is discussed. On the other hand, agencies view the participatory process as a quick and easy way to get approval from citizens, while not actually seeking or using their input, as the agency views itself as capable of making the right decision. It can be concluded that expectations of participating citizens and organizations have to be managed and aligned very carefully in order to improve public acceptance through participation, otherwise the desired effects are not reached.

In relevant literature, evidence can be found that local and collective outcomes have a positive effect on public acceptance. Walker and Devine-Wright (2008, p.499) suggest that "renewable energy projects can become more locally divisive and controversial if benefits are not generally shared among local people". In other words, if energy cooperatives do not share benefits among residents, public acceptance for these projects can suffer. These findings are in line with Wolsink (2007) his arguments for more collaborative development of sustainable energy projects and more participation.

In relevant literature, positive effects of open and participatory project processes and local and collective benefits on public acceptance of sustainable energy projects are found. A potential pitfall of participatory processes is that the expectations of participants do not align with the actual situation. These findings lead to the following hypotheses:

H8: Open and participatory project processes correlate positively with residents' public acceptance of the development of solar farms.

H9:Participatory processes that align with the expectations of participants correlate positively with residents' public acceptance of the development of solar farms.

H10: Local and collective project benefits correlate positively with residents' public acceptance of the development of solar farms.

2.3.6. Organizational Processes and Benefits

Besides the *project* processes and benefits, this study also focuses on *organizational* processes and benefits of energy cooperatives, as these can also lead to an improved sense of fairness.

In academic literature, energy cooperatives are mostly known as part of 'community owned energy production'. Walker (2008, p.4401) defines the ownership model of cooperatives as a model where "people in the local community or further afield become members of the cooperative and buy shares to finance the project". This means that members can not only participate in decision making regarding specific projects, but in decision making concerning the cooperative as a whole.

Walker (2008) warns that although many projects use the word 'community' in their title or rationale, only a small proportion of these projects were actually developed by a community owned organization. It can therefore be argued that not all organizations that identify as cooperatives necessarily have the same level of community participation. As shown by Warren and McFadyen (2010), community owned organizations can invest their profits to renovate the community, which can lead to strong public acceptance of their projects. Therefore, residents are potentially not only profiting from specific project outcomes such as cheaper or cleaner energy, but also from organizational outcomes, such as other investments in the community. This view is supported by Devine-Wright (2007), who mentions that is has been argued that the key to earning local community support is to use compensation in a financial or other way. If the cooperative invests its profits in a local and collective way, this could mean the *organizational* outcomes, just as the *project* outcomes, lead to improved public acceptance.

Following the academic literature, the participatory nature of energy cooperatives can lead to improved public acceptance, compared to more centralized ownership models. Warren and McFadyen (2010) show these differences by comparing public attitudes toward a community owned windfarm to the public attitudes toward several developer owned windfarms. Their results show significantly more positive attitudes toward the community owned windfarm, which is mainly based on the possibilities for participation in the community owned projects. The positive relation between community ownership and public acceptance is supported by Bolinger (2001), who describes the UK as a striking example of this relation.

To conclude, both organizational processes and organizational outcomes are found in relevant literature to have a positive effect on public acceptance. These findings regarding organizational processes and outcomes lead to the following hypotheses:

H11: Open and participatory organizational processes correlate positively with residents' public acceptance of the development of solar farms.

H12: Local and collective organizational outcomes correlate positively with residents' public acceptance of the development of solar farms.

2.4. Found Factors: Project characteristics and Citizen Characteristics

This literature review shows that both the characteristics of the citizens living near a project and the characteristics of a project itself drive factors that influence public acceptance. Table 2 displays the found factors, which are hypothesized to affect public acceptance of solar farms.

Table 2.
Found factors divided into two categories: project factors and citizen factors

Citizen factors	**Project factors**
General attitude of citizens (Not in Anyone's Backyard)	Landscape disruption
NIMBY (personal costs and benefits)	Caused annoyance
Trust	Fairness of procedures and outcomes
	Communication strategy
	Project processes
	Project outcomes
	Organizational processes
	Organizational outcomes

2.5. Conceptualization

An overview of the conceptualizations of the different variables found in the literature review is displayed in table 3.

Table 3.
Conceptualization of the variables used in this study.

Variable	**Conceptualization**
Public Acceptance	The general acceptance of the development of solar farms by residents.
General Attitude	The general attitude towards sustainable energy
Selfishness (NIMBY)	Selfish economic rational reasons to reject the development of a renewable energy project.
Fairness	The perceived fairness of decision making regarding the development of a renewable energy project.
Trust	A feeling or belief that the project developer will act in your best interest.

Landscape disruption	The expected disruption (by residents) of the landscape caused by the development of a renewable energy project.
Annoyance	The expected annoyance caused by the development of a renewable energy project.
Communication strategy	Chosen focus on certain content in the communication regarding the development of the renewable energy projects to residents.
Project outcome	The degree to which the benefits of a project are distributed locally and collectively.
Organizational outcome	The degree to which the benefits of the organization are distributed locally and collectively.
Project process	The degree to which the project is open and participatory for residents.
Organizational process	The degree to which the organization is open and residents are able to participate in the decision making process.

2.6. Found Factors and Hypotheses

In this chapter relevant literature regarding the factors that cause public acceptance of solar farms has been discussed. In the literature, various factors are found, which lead to 12 hypotheses. To provide a clear overview, all hypotheses are displayed in table 3. This chapter aimed to answer the following sub research question: *Which factors that influence public acceptance of residents of the development of solar farms can be found in academic literature?* Although very little specific research towards solar farms has been conducted, various factors are found that influence renewable energy technologies in general, which are therefore hypothesized to influence public acceptance of solar farms as well. Table 4 can be used to answer this sub-question, as each of the hypotheses describes one of the found factors, along with its hypothesized effect on public acceptance. It can be concluded that the relevant academic literature provides a wide variation of possible factors that influence public acceptance. In this chapter, the most relevant factors have been described.

Table 4.
An overview of the proposed hypotheses in this study

Hypothesis	
H1	The general attitude of residents toward renewable energy correlates positively with residents' public acceptance of solar farms.
H2	Personal cost-benefit analyses (NIMBY motives) correlate negatively with residents' public acceptance of the development of solar farms.
H3	Level of trust in the developer correlates positively with residents' public acceptance of the development of solar farms.
H4	Perceived landscape disruption correlates negatively with residents' public acceptance of the development of solar farms.
H5	Perceived annoyance correlates negatively with residents' public acceptance of the development of solar farms.
H6	Perceived level of fairness of procedures and outcomes correlates positively with residents' public acceptance of the development of solar farms.
H7	A communication strategy that addresses the actual concerns of residents correlates positively with residents' public acceptance of the development of solar farms.

H8	Open and participatory project processes correlate positively with residents' public acceptance of the development of solar farms.
H9	Participatory processes that align with the expectations of participants correlate positively with residents' public acceptance of the development of solar farms.
H10	Local and collective project benefits correlate positively with residents' public acceptance of the development of solar farms.
H11	Open and participatory organizational processes correlate positively with residents' public acceptance of the development of solar farms.
H12	Local and collective organizational outcomes correlate positively with residents' public acceptance of the development of solar farms.

3. Analysis and Operationalization

3.1.Participants

This study has recruited three groups of participants: (1) stakeholders of the Enschede based energy cooperative Enschede Energie, (2) board members of cooperative WindPowerNijmegen and (3) 108 residents of Enschede that live in close proximity to the proposed development sites of the solar farms included in the case study.

The first group, stakeholders of the cooperative Enschede Energie, exists of board members of the cooperative, as well as residents that live near the development site and a consultant that has had extensive contact with farmers in the region of Twente regarding renewable energy projects. All stakeholders are contacted through the existing network of the cooperative. The second group, board members of the energy cooperative WindPowerNijmegen, is recruited through contacts of Enschede Energie. Through an organization that helps local farmers in Enschede with sustainability, residents of the outskirts of Enschede were recruited to participate in a survey. 108 residents started the online survey and 82 finished it.

3.2.Analysis

The survey results are analyzed in SPSS. First, items that measure the same construct are grouped into scales. By conducting a reliability analysis, Cronbach's Alpha is measured. If the Cronbach's Alpha of the items is at least 0.70, the scale has an acceptable reliability level and can be made. However, if Cronbach's Alpha improves by excluding items, those items are excluded from the scale. After the scales are designed, a descriptive analysis is done to find the means and standard deviations for each scale, as well as other variables that are not grouped into a scale. Furthermore, correlation coefficients are conducted to find whether the factors have a significant effect on the public acceptance of the solar farms. A significance level of a=0.05 is used. To improve validity, if possible, already tested items are used that are found in the literature.

To answer SQ2 and SQ3, semi-structured interviews are conducted, which are analyzed in Atlas.Ti. Both codes and an interview scheme are used that can be re-used for similar interviews, which gives the method reliability. To protect the anonymity of the participants, in the analysis no information is disclosed that could be used to reveal the identity of them. Therefore, no references are made to which type of stakeholder is discussed. Stakeholders are simply referred to as 'participant' or 'stakeholder'. The interview questions that are used are displayed in Appendix A, B and C. These interviews focus on the factors the stakeholders distinguish to be of influence on public acceptance. The semi-structured nature of the interviews means that extensive follow-up questions are used to obtain clarification or underlying information.

To answer SQ2, a document study is conducted, of 35 filed notices of objection against the development of three solar farms in Enschede, the Netherlands. These documents provide an elaborate

data source for objections that are held by local residents of Enschede. The arguments given in the notices of objection are summarized and categorized by the municipality of Enschede. This data source holds both quantitative and qualitative value: on the one hand, the frequency of the used arguments shows how widespread certain arguments are among residents, which provides quantitative value. However, the main use of this research method is qualitative, as there are too few notices of objection included to form generalizable conclusions. The qualitative value comes from the elaborate summaries of the give arguments. This data source can be consulted freely, although the notices of objection are anonymized (Nota samenvatting en beantwoording zienswijzen (geanonimiseerd), 2019). In this document, each argument in every objection is provided with counterarguments by the municipality of Enschede. These refutations provide a good source for the recommendations for an adequate communication strategy, which this study aims to offer. The analysis is done by using a coding schedule, to systematically group similar objections together. An important part of the grouping already has been done by the municipality itself, which can be adopted for this study. The municipality has summarized all given arguments from every notice of objection and added a standardized response for each type of argument. Therefore, the standardized response that is given can be seen as a code for the type of argument it concerns and is used as such in this study.

3.3.Operationalization

As mentioned and shown in table 1, to answer SQ2, a survey is conducted to find which factors correlate with residents' public acceptance of the development of a solar farm in/near their neighborhood in Enschede. As mentioned, a representative sample of residents is used. The dependent variable of this study is 'public acceptance'. The following independent variables will be taken into account: 1) NIMBY, 2) Perceived Fairness, 3) Landscape factors, 4) Trust, 5) Annoyance factors, 6) General attitude towards sustainable energy, 7) perceived communication strategy, 8) perceived project process, 9) perceived organizational process, 10) perceived project outcome and 11) perceived organizational outcome. Following Wolsink (2007), all items are measured on a five point scale, ranging from 'completely disagree' to 'completely agree'.

First, the dependent variable, public acceptance, is measured by using three items such as 'on a scale of 1 to 5, to what extent do you accept the development of a solar farm here?' and 'it is a good idea to develop a solar farm here'.

Following Wolsink (2007), the survey continues with the question: From the presented list of possible consequences of the development of a solar farm in Enschede (location is specified in the survey), which ones do you consider significant? Beneath this question, eight consequences regarding annoyance, landscape consequences and improving the environment are presented.

Furthermore, items are used regarding NIMBY and fairness which are presented by Wolsink (2007). To measure NIMBY, six items are used, such as: 'I would not accept it because others would not accept it either' and 'I would only accept the development of the solar farm if solar farms are developed elsewhere in Enschede as well'. Regarding fairness, two items from Wolsink (2007) that are used are 'I do not consider it fair' and 'it is in conflict with my ideas about equality'.

Concerning landscape factors, four items are used, such as 'I worry the landscape will be disrupted because of the development of a solar farm' and 'I find it important that the landscape of Enschede remains as it is' are used. Relevant items are not found in the literature, which means new items are developed for this study.

To measure the level of trust residents have in Enschede Energie, two items are used: 'I trust Enschede Energie' and 'I believe Enschede Energie will act in my best interest'. The latter item is derived from the used definition by Firestone et al (2012), which is used in this study as well.

Concerning annoyance factors, factors found in the literature all focus on wind turbines specifically. Factors such as noise are not applicable to solar farms. Therefore, two new items are developed. Examples of items to measure this variable are: 'I think the solar farm will reflect light in an annoying way' and 'I think during the development of the solar farm, noise will be an issue'.

To measure the general attitude towards sustainable energy, items from Wolsink (2007) can be used. A question described by Wolsink (2007) to measure the general attitude towards sustainable energy is: "which issues do you think are important regarding the development of sustainable energy? " Respondents can then choose from issues regarding improving the environment, annoyance and landscape factors. Furthermore, items included are: "I am positive towards the use of sustainable energy".

For perceived project process, no items are found in the literature, so to measure this variable, new items have to be developed. This study proposes to include the items "I had a clear say in the development of this project" and "I felt heard regarding the development of this project", "the project felt open and inclusive to me".

Regarding perceived project outcomes, no items are found in the literature either. Used items are: 'I think the benefits of this project will be shared in a fair way', 'I think the benefits of this project will be shared locally' and 'I think the benefits of this project will be distant and private (reverse)'.

Lastly, the effect of the communication from the energy cooperative upon the acceptance of the development of the solar farms will be measured. Items that will be used are "The cooperative communicated clearly about the project" and "It was clear to me why the project would be developed in this location".

4. Results

This study uses a wide variety of methods to answer its research questions. Therefore, a clear structure in describing the findings of this study is necessary. This chapter answers SQ2: *Which factors correlate with the public acceptance of local residents of solar farms in Enschede, the Netherlands?* To answer sub question 2, a case in Enschede, the Netherlands is used, where cooperative Enschede Energie aims to develop three solar farms. First, this case is described in order to understand the context. The case description is made by using several sources: interviews with board members of the cooperative and other stakeholders, undocumented conversations had with employees of the cooperative and web sources. After describing the case of Enschede Energie, this chapter describes the findings from interviews with various stakeholders of the case. These stakeholders are regarded as experts, as they have been strongly involved in the case for at least a year. Through their experiences, they have developed opinions regarding which factors influence the public acceptance of local residents for solar farms in Enschede. After describing the findings from the held interviews, findings from the conducted document study are discussed. Lastly, to answer SQ2, the results of the held survey are described.

4.1.Case description: Enschede Energie

This section provides a description of the case that is used to answer SQ2. This case focuses on three solar farms that are planned to be developed by energy cooperative Enschede Energie[10]. This cooperative is based in Enschede, the Netherlands and develops solar farms and other solar power projects on roofs. The stated goal of Enschede Energie is to make the municipality of Enschede more sustainable and to be a cooperative of residents, for residents and by residents[9].

4.1.1. Cooperative Set-up and Members

Conversations with members and staff members of Enschede Energie were used to form this subchapter, as they provide the necessary information regarding the set-up of the cooperative. Residents can become a member of the cooperative for a contribution of 10 euros a year[9]. This membership gives them decision making power, as they are then allowed to visit general meetings of the cooperative, where members

[10] https://enschede-energie.nl/

can vote for ideas that are brought up and suggest their own ideas. Besides, members receive information regarding the projects of Enschede Energie and suggest their own ideas for further sustainability in Enschede. Furthermore, becoming a member of the cooperative also means financially supporting projects that improve sustainability. Members can also profit from these projects, by investing in the projects of the cooperative and receiving an interest rate, or a discount on their energy bill. Currently, the cooperative has approximately 230 members.

4.1.2. Projects

Enschede Energie develops solar power projects on roofs of large buildings such as farms, stables, large office buildings and large houses[11]. Furthermore, the cooperative aims to develop solar farms. Currently, four solar power projects on roofs of buildings have been realized and are generating power. The power that is generated is distributed mostly locally, by a partner of Enschede Energie: energy supplier 'om | nieuwe energie[12]'. The development of solar farms has not yet been realized, but the cooperative aims to develop four solar farms within the municipality. Developing solar farms has clear advantages and disadvantages compared to solar projects on roofs of buildings. The main advantage of solar farms is that these farms have a far larger surface compared to roofs, which means they generate more energy. One of the main disadvantages is that these projects generate more resistance in residents, compared to solar roofs.

This case study focuses specifically on three solar farms that Enschede Energie aims to develop. This is because the cooperative submitted a single application for the three farms together. This was done to spare costs and efforts of submitting a different application for each solar farm, according to one of the interviewed stakeholders. The consequence of this choice is that, if the application is rejected, the cooperative is not allowed to develop any of the three solar farms. This leads to the main problem this case encountered: for two of the three solar farms Enschede Energie included in the application, a great amount of opposition was encountered. A large number of residents signed a petition to stop the development, while some of them also submitted a notice of objection to the municipality of Enschede[13]. Four residents that live closest to the development site started this petition and threatened to legally appeal against the development. This legal appeal will cause the development of projects to be delayed, or even possibly be canceled (if the cooperative and the municipality lose the appeal). The residents that are appealing legally have expressed their willingness to continue their appeal until the highest court for public cases in the Netherlands (Raad van State). This is a very lengthy process, after going through the lower court, the highest court uses a norm of 1 year before a ruling is issued [14]. To conclude, this case shows that a lack of acceptance by residents can lead to large delays of the development of solar farms.

4.1.3. Local Landscape

In order to fully understand the case, it is important to have an understanding of the local factors that are of influence. The projects of Enschede Energie are planned to be developed in the outskirts of Enschede, which is classified as 'farmland' by the municipality of Enschede[15]. The municipality describes the type of landscape as ecological valuable because of the variety and diversity. The allotment stemming from the 19th century is still present in this landscape, which means the landscape

[11] https://enschede-energie.nl/projecten/
[12] https://www.samenom.nl/
[13] https://www.tubantia.nl/enschede/honderden-inwoners-keren-zich-tegen-zonnevelden-in-enschede~a49a67dc/
[14] https://www.raadvanstate.nl/bestuursrechtspraak/uitspraak/
[15] https://www.ruimtelijkeplannen.enschede.nl/NL.IMRO.0153.SV00001-0003/b_NL.IMRO.0153.SV00001-0003_3.3.3.html

exists of various small 'lots'. There is no far reaching view or great open areas, as the view is blocked by pieces of forest[14]. According to conversations within Enschede Energie, this type of landscape could be suitable for the development of solar farms, as these are seldom placed in full open view, because of the type of landscape.

4.1.4. Political Climate of Enschede

Another important piece of context to understand the level of acceptance within a city consists of the political preferences that are present. In Enschede, there is a very mixed local council. In 2019, the Dutch Labour Party (left wing/progressive) won the local elections with 19,5% of all votes[16]. The following three parties however could all be classified as right wing and more conservative, with the Christian Democatic Party reaching 12.2% of the votes, the Liberal party reaching 12.2% and Forum for Democracy (a far right party) reaching 12.0% of the votes. The Green party reached 11.9% of the votes. As mentioned, this shows very mixed political preferences within the city of Enschede. It can be concluded that Enschede has a mixed political climate.

4.2. Document Study

The first results that are discussed in this study are of a document study of a summary of 35 notices of objection submitted to the municipality of Enschede (Nota samenvatting en beantwoording zienswijzen (geanonimiseerd), 2019).

The categories used by the municipality (and for which therefore a standardized counterargument is described) are the following 1) fit with the local landscape/landscape disruption, 2) the use of farmland as the development site, 3) the not yet realized policy of the municipality regarding the development of sources of energy (Dutch: de energievisie), 4) a lack of support by residents, 5) the existence of preferable alternatives and 6) the damage to flora and fauna. Besides these arguments, a wide variety of other arguments is included in the notices of objection, but these arguments do not warrant a standardized response, as these are only mentioned once or twice. To provide a clear overview of the arguments included in the notices of objection, this study follows the structure of the municipality and the categories that are used. A final sub section is included to describe the arguments that do not fit one of the six categories. Table 5 displays the frequency of the used arguments and the amount of notices that included a certain category at least once. The latter can be seen as an indicator of how widespread a certain category is. It is possible that some residents included several arguments that fall into the same category, which increases the total frequency of the category, but there are relatively few notices that include the category. This way, only including the total frequency can be somewhat misleading. This is especially true for the 'other' category, which is used 48 times, but is included in only 13 of the notices of objection.

This chapter discusses each category of arguments that is included in the notices of objection in both a quantitative and a qualitative way. Note that no elaborate quantitative analysis is done, as the frequency of arguments are merely viewed as an indication of the prevalence of the arguments.

Table 5.

Frequency of used categories of arguments in the 28 unique notices of objection

Category	**Total frequency**	**Notices of objection that included the category**
Fit in local landscape	22	16

[16] https://www.tubantia.nl/regio/hoe-stemde-twente-bekijk-hier-de-uitslagen-in-jouw-gemeente~adfd3dff/

Use of farmland	16	12
Lack of policy	11	10
Lack of support by residents	9	8
Preferable alternatives	22	19
Damage to flora and fauna	17	15
Other	48	13
Total	145	93

4.2.1. Fit in Local Landscape

The first argument that is described in the notices of objection concerns the fit of the solar farms in the local landscape. As displayed in table 6, this argument is mentioned most frequently, on par with the 'preferable alternatives' argument. Furthermore, 16 of the 28 included notices of objection included this argument. Therefore, it can be argued that this is one of the arguments that is spread most widely among the residents that objected to the development of the three solar farms.

The arguments that fall under this category have some variety. Various arguments mention the typical landscape of the region Twente (Dutch: coulisselandschap). One of these arguments is summarized as: *"The use of farmland for generating energy causes severe damage to the local landscape. It takes away the pleasure of recreating for a lot of people"*. This argument is supported by other notices objection. Another argument that is given is summarized as: *"the solar farm at the Allemansveldweg is located in a typical small landscape, an area that is popular for hiking and cycling"*. Other arguments are more focused on personal motives, such as residents' view from their homes: *"the pleasure of living in a pretty agrarian environment is greatly diminished"*. Another argument that is included in one of the notices of objection is that the vegetation that is planned around the solar farms takes a lot of time to grow large enough to keep the solar farms out of view for residents. This argument is presented in the following way: *"The solar farms will disfigure the landscape. Wooded banks will be strengthened and newly developed, but it takes 5 to 10 years before these are sufficiently high"*.

To counter these arguments, the municipality of Enschede argues that extensive efforts have been made to develop plans for fitting the solar farms in the local landscape as well as possible. Furthermore, it is argued that solar farms are one of the few realistic options concerning the generation of sustainable energy in the municipality of Enschede.

4.2.2. Use of Farmland

A second category of arguments that is used in the notices of objection is the use of farmland for the development and use of solar farms, instead of agrarian purposes. As displayed in table 6, this category is used 16 times and is included in 12 notices of objection.

This category focuses on the purpose which the landscape should have. It is generally included by residents who hold the opinion that the ground that is planned to be used for the development of solar farms should be used for food production instead of energy generation. The worth of this farmland to residents is expressed in one of the notices of objection: *"precious farmland is used for solar farms"*. The sense of residents that farmland should be used for the production of food is illustrated in another notice of objection: *"The use of farmland for solar energy is not sustainable. Food supply is a global problem because of the growing world population. The choice for solar panels on roofs and windmills is a much more sustainable option"*. Other residents do not refer to a global food shortage, but argue that within the Netherlands a food shortage might arise if farmland is used for other purposes than food production. Residents also worry that prices of land rise when solar farms start competing for the available land. One notice states that, because of the use of farmland for solar farms *"scarcity will arise,*

with corresponding rising prices". A further concern of residents regarding farmland is that less farmland (because of solar farms) will lead to a need for more intensive use of the land that remains available for farming, which is in contrast with existing plans for a more extensive use of the land. This notice states:*"The plan for circular agriculture is not compatible with the plans for solar farms. Farmland cannot be missed in order to create a self-sufficient sector"*.

In response to these arguments, the municipality states that the available surface of roofs and residual spaces is not sufficient and that therefore farmland has to be used to supply Enschede with sustainable electricity. The municipality notes that the owners of the farmland that is planned to be used for solar farms have decided for themselves that to them, the generation of sustainable energy is more valuable than food production. Furthermore, the municipality notes that the solar farms are only planned to stay for 25 years, after which the land can possibly be used for food production. Lastly, the municipality argues that there will be no notable reduction of the capacity for food production because of these plans.

4.2.3. Lack of Policy

Another category of arguments used in the notices of objection is the lack of energy policy (Dutch: De Energievisie) in the municipality of Enschede. This category is mentioned 11 times and included in 10 notices of objection.

This category of arguments concerns a specific energy policy within the municipality of Enschede, which is not finished yet. Residents argue that developing solar farms without a clear policy and long term vision seems haphazard and is unlawful. One notice of objection argues that *"it is necessary that a policy is formulated first, before the municipality gives permission to haphazardly place solar panels at a few plots"*. Other residents simply state that a policy is not yet present and that the municipality should therefore not grant permits for solar farms yet. Another resident wonders whether *"all possibilities for energy generation have been researched sufficiently"*. Another notice argues that the energy policy of the municipality should not only first be developed, but should also be linked to the energy policies of the surrounding municipalities.

The municipality of Enschede counters arguments in this category by arguing that in anticipation of the energy policy, permit requests are judged by their merits. In this case, the municipality has ascertained that there are no heavy weighing concerns against the plans and that the spatial integration is done well. Therefore, the municipality has granted the permit.

4.2.4. Lack of Support by Residents

The category of arguments 'lack of support' is used 9 times and is included in 8 notices of objection.

This category of arguments generally refers to the lack of support for the planned solar farms by residents in the area. According to the document that includes the notices of objection, one of the notices was accompanied by a list of signatures, with about 520 cosigners (Nota samenvatting en beantwoording zienswijzen (geanonimiseerd), 2019). Two of the notices of objection refer to this list of signatures in order to support their argument that there is insufficient support for the planned solar farms. One of these notices includes the following: *"There is no support for the plans. 362 people disagree with the plans (list of signatures) and 520 residents have submitted a notice of objection with us as well"*. Other notices simply state that there is a lack of support for the solar farms.

In response, the municipality argues that it always aims for support for projects, but that it realizes that this support cannot be forced. When the developer and residents do not come to an agreement, the municipality weighs the interests of the different stakeholders and makes a decision. In this case, it was decided that the benefits of the solar farm outweigh the costs and therefore a permit was granted.

4.2.5. Preferable Alternatives

The category of arguments 'preferable alternatives' is included in the most notices of objection of all categories (19) and is used 22 times.

This category of arguments refers to the presence of alternative sources of sustainable energy that are perceived as preferable to the development of solar farms. Windmills and the development of solar panels on roofs are often mentioned as preferable alternatives. One notice mentions that *"a better alternative is to put solar panels on the roofs of agricultural sheds and possibly a windmill"*. Other roofs than those of agricultural sheds are also mentioned as preferable alternatives. One notice mentions that *"there are sufficient alternatives such as the roofs of civilians or companies"*. Another notice elaborates on why windmills are preferable: *"two windmills generate more energy than 12 hectares of solar farms"*. Other notices elaborate on the preference for solar panels on roofs instead of solar farms. These notices refer to the 'solar ladder' (Dutch: Zonneladder), a policy document of the Dutch national government which states a sequence of locations at which solar farms should be developed[17]. This solar ladder states that municipalities should prioritize the development of solar panels on roofs.

The municipality of Enschede has provided a standardized counterargument for this category of arguments. The municipality states that the development of solar farms in locations other than farmland is not sufficient to reach the goals of the municipality regarding the generation of sustainable energy. Furthermore, the municipality argues that owners of roofs first have agree to the development of solar panels on their roofs and that not all owners have done so. Therefore, the development of solar farms on farmland is a necessity.

4.2.6. Damage to Flora and Fauna

The category of arguments 'damage to flora and fauna' is mentioned 17 times in the notions of objection. 15 notices of objection include an argument that belongs to this category.

The premise of this category of arguments is that the development of solar farms damages the local flora and fauna. Some notices of objection only argue that in general, the development of solar farms is at the expense of local animals and vegetation, while others are more specific. One notice of objection argues *"the solar panels and the accompanying fences do not fit in the landscape and form a barrier for flora and fauna"*. Other notices of objection specifically refer to one of the three solar farms, located at the Allemansveldweg, which is located near a nature reserve, called 'De Elsmoat'. One of the notices argues that *"because of the solar farms, the landscape and nature will be damaged and the beautiful area, especially nature reserve De Elsmoat will lose its value"*. Other notices mention specific animal species that would suffer from the development of the solar farms, such as tree frogs, salamanders, owls, roe deer, kingfishers and bats.

To counter arguments of this category, the municipality of Enschede uses a standardized response. The municipality argues that through research, it was found that the development of the solar farms would have no possible negative effects on protected flora and fauna. Furthermore, the municipality argues that the developer of the solar farms will take the present flora and fauna into account. For instance, the fences around the solar farms will have passages at every 50 meters, thus not forming a barrier for animals. Lastly, the municipality emphasizes that the locations for the solar farms are not nature reserves, but farmland.

4.2.7. Other

Besides arguments that fit into one of the categories that are used in this study, various other arguments are included in the notices of objection as well. In total, 48 other arguments are used in the notices of

[17] https://www.omgevingsweb.nl/nieuws/elk-dak-een-zonnedak-zonneladder-en-verruimde-mogelijkheden-voor-gemeenten/

objection, albeit only 13 notices of objection include such arguments. This shows that some notices of objection included a relatively high number of 'other' arguments.

Many of the 'other' arguments are very specific and only mentioned once. Therefore, mentioning all included arguments falls outside the scope of this study and provides little value, as it can be argued that arguments that are only mentioned once are not widespread and are no main influence on residents' level of acceptance of solar farms. Two arguments that are categorized as 'other' are however mentioned more than once. Firstly, multiple arguments (5) are used in the notices that mention planning damage. Residents mention that if the plans for solar farms are continued, they will file for planning damages. The municipality responds to these arguments that filing for planning damages is indeed possible. The other argument that is included repeatedly is that the pleasure of recreating here gets diminished by the development of the solar farms. In response, the municipality of Enschede argues that existing cycling paths and foot paths will remain in place and therefore the possibilities for recreation remain the same.

4.3.Interviews

To further answer SQ2, interviews with different stakeholders surrounding the development of the three solar farms by Cooperative Enschede Energie are analyzed. This chapter describes the factors which influenced residents' public acceptance of solar farms in Enschede according to the interviewed stakeholders. Besides these factors, the factor 'role of the municipality' is included, which is a new factor that emerged from the interviews, but was not included beforehand in the interview schedule. The dependent variable, level of acceptance, is discussed as well.

4.3.1. Level of Acceptance

Participants generally agreed that the level of acceptance for the solar farms is relatively low. A participant of the municipality of Enschede illustrates this perceived low level of acceptance: *"with these three, we were suddenly taken by surprise by fifty notices of objection, of which one was signed by 300 signatures I think. So, there is the support, you actually see the resistance grow"*. Another participant notes that the level of acceptance did not appear to be as low until the later stages of the process: "*Actually now, in the end, you get people saying "no, we shouldn't do this""*. Another participant mentions that there was a lot of support for protests against the solar farms. To conclude, it seems clear from the interviews that all participants agree that the level of acceptance is low.

4.3.2. General Attitude

Regarding the general attitude towards solar farms, stakeholders argue that there are many residents in Enschede that simply do not believe in the energy transition and therefore do not accept the development of solar farms. One participant (a board member of Enschede Energie) argues that this lack of belief in the energy transition is fueled by Dutch political parties on the right as he notes: *"There is a general skepticism based on the disbelief in facts, disbelief that is fueled by political parties, such as PVV and Forum voor Democratie, who claim it's all nonsense"*. Other participants argue that the message of climate change has just not been spread wide enough at the moment. One participant is quoted: *"I think on the one hand that a lot of people is not aware yet of the necessity"*. However, all participants argue that this group is only a small group of residents, as others do not reject the idea of the energy transition, but do not accept the development of solar farms based on other factors. One participant mentions that *"of course there are always a few people that say that it's all rubbish and say why are there climate problems? Well, this minority is not possible to convince, so it's better to not even try"*.

4.3.3. Personal Cost-Benefit Analysis (NIMBY)

Regarding personal cost-benefit analysis, one of the stakeholders mentions that farmers often say to them: *"we get that there must come an energy transition and we understand that we have to do something about this, but not in my backyard"*. Other participants describe these typical not in my backyard motives as well. One participant mentioned as a reason for residents lack of acceptance that they think *"well, my neighbor does nothing, so why am I always screwed over"*. When asked why residents use certain arguments against solar farms, a participant responded *"Well, I don't think this is their true argumentation, I think these are arguments that are sought for, to be able to not want it. In the end it's about them not wanting to change"*. This aversion to change is mentioned by another participant as well: *"in general, if something is new, in Twente the residents have an attitude of: well that should pass by my door"*.

Another way the personal cost-benefit analyses of residents are expressed is that residents purely protest the development of solar farms in order to be able to possibly claim planning damages. One participant expresses this in the following way: *"Some also have the possibility to ask for planning damages. Well, then you won't say beforehand "I agree"*. Another participant agrees with this sentiment as they argue that there is a category of people that *"resist it for very practical reasons. Because they can possibly get a little more money"*. Closely linked to the planning damages is the possibility that residents' homes lose value because of the development of a solar farm near them. One stakeholder mentions*: "a second point that is more rational, is that they are afraid that the property that they own in the area near it could face a decreasing value"*. Another participant specifically explains the degree of this loss of value: *"well, if I calculate a little bit what would be the value of this house and if you hear a realtor say that the loss of value of homes could be around 30% till 50%, only little remains of their home"*.

4.3.4. Landscape Disruption

The factor landscape disruption can roughly be divided into three sub-categories: the effects on the view from residents' homes, the effects on the typical local landscape and the use of ground that according to residents should be used for farming purposes.

Participants of the interviews argue that residents that live close to the development site worry that the view from their home will drastically change because of the development of solar farms. One of the participants explains this more elaborately: *"People see it a little bit as an impairment of their living pleasure. They deliberately live in the outskirts for its green character, the free view"*. Another participant mentions that *"the beauty is pretty much gone with a solar farm. And I think that is the argument for the majority of people to be against it, because it is just ugly, it looks bad and we shouldn't want this"*. Another participant argued that the effects of solar farms on residents' view should not be overstated*: "if they are in the kitchen and they can look over the hedge which just has been pruned and it's winter, then maybe they can see the panels"*. Some stakeholders argue that the solar farms will be kept out of view by surrounding nature: "*they can actually be kept out of view really well. We have done it in a way that you barely see them"*.

The second sub-category relates to the typical local landscape of the region Twente, in which Enschede is located. According to one participant, residents argue that *"this is the old landscape of Twente, like we always had"*. This is a reason why residents could be aversive to change in the landscape. One stakeholder however argues that the way the solar farms are placed strengthens the local landscape: *"And I think that because of this diligent fitting, we fit the small plot structure and hedge structure there used to be here. So bringing something back of the characteristic landscape of Twente"*.

According to the stakeholders, the use of farmland for solar farms is a factor has a strong effect on the level of acceptance. The basic premise of this category is that residents hold the opinion that land that is available for farming is a scarce good and should be used for farming purposes only, instead of energy generation. One of the participants explains this in the following way: *"it is more like, you're going to use good farmland for something like this. While it could also produce food for animals. And that is more looking from the farmer's perspective. The square meters for farming ground should be*

kept free, you shouldn't use that for that, use other surfaces such as roofs, etcetera". Another participant argues that the use of farmland for the development of solar farms is difficult for farmers, because they are told by the Dutch government to extensify, as they are using the ground to intensively. For this extensification, extra ground is needed. The same participant also refers to the Solar Ladder (Dutch: Zonneladder), a Dutch policy document regarding the prioritization of locations for the development of solar farms. This Solar Ladder states, according to this participant, that farmland should have the last priority in choosing a suitable location for solar farms. First, other locations such as roofs, industrial areas and business parks should be used, following this argument.

4.3.5. Annoyance

Participants mention the factor 'annoyance' only sporadically and argue that the (perceived) annoyance of the development of the solar farms is very limited. One of the participants, when asked about the possible annoyance, answered *"no I don't think there will be any. During the building there will be some hindrance, but after that it will be an oasis of peace for 25 years".* Another participant follows this line of reasoning, saying *"I don't think so, these three farms will almost have no radiation towards their environment that people could experience annoyance from".*

4.3.6. Fairness

According to the participants, a perceived lack of fairness is present among residents. This does not have much to do with the projects themselves, but with the (perceived) unfairness occurred in the process leading up to the development. Some residents were not included in the invitation for participatory events, which according to the participants could have led to a sense of unfairness. One participant mentions *"I know there are responses of people that say: "well, they haven't been to me".* Another participant agrees that not everybody was included in the process leading up to the development: *"at one of the farms this went wrong anyway and then you see that everyone thinks 'this won't be a big deal', but right that point, 'you did not send everyone the same information, why is that'. That causes suspicion and then you are instantly 1-0 behind".*

Another reason a sense of unfairness is present among some residents is, according to one participant, that farmers do not feel appreciated, because of the way farmland is treated. *"The worth of farmland is continuously being labeled as inferior. Like it's a kind of sandbox in which the farmer is baking sand cakes. That is not the case, it is land that we need extremely hard to realize our production".* Because of this, residents in the area perceive the choice for farmland as unfair.

4.3.7. Trust

Some participants mentioned a general lack of trust, others provided a more in depth explanation. One participant mentions: *"there is indeed some distrust in Enschede Energie".* One participant argued that the lack of fairness during the procedures *"raises suspicion"* among residents, which can be interpreted as a lack of trust.

Other participants argued that the lack of realized projects by cooperative Enschede Energie led to a lower trust, as actual results of projects could not be shown, which made it more difficult to counter arguments against the solar farms. Residents did not believe the cooperative's description of the solar farms. One participant, when asked about annoyance caused by solar farms mentioned: *"no, that is complete hogwash, but it can only be debunked when we have realized a farm somewhere.* […] *No, I think when we have realized the first farm, then we have to have an open day. And give people the chance to look".* Another participant argued that this was also the case for project outcomes: residents do not believe Enschede Energie until they have experienced something themselves: *"If you can actually show projects, like this is the outcome of.. Yes, I think that would help. But we are not yet in the phase where we make money".*

4.3.8. Communication Strategy

Various aspects of the communication strategy were discussed by the participants. Participants pointed out some parts of the communication that, according to them, could have been done better. Firstly, various participants argue that in the communication strategy of Enschede Energie, too little attention is paid to the positive project outcomes. Plans for starting a fund for the environment with the yields from the solar farms were not communicated clearly to residents, although this could have improved their level of acceptance for the plans. One participant wonders: *"What agreements have they made with residents? Nothing right?"* This participant mentions: *"Yes, a missed opportunity, because if one thing has proven itself, it's that if you want the neighborhood to go with you, then you have to use a neighborhood focused approach, with a revenue model"*. Other participants focus on other project outcomes, such as the possibility to become a co-owner of the solar farm and receive benefits in this way. One participant notes: *"we missed the opportunity in the participation process to say: 'guys, you can become co-owner of the farm".* Later in the interview, this participant emphasizes this point: *"we barely focused on taking people with us and making them co-owner. That's a whole other process, that's about emotions. That's not about formal policy".*

Another point of critique concerning the communication strategy is the lack of communication regarding the fact that Enschede Energie is a local cooperative. One of the questions that was asked was whether residents know the difference between a commercial developer from Germany that is active in Enschede and the cooperative. One participant answered: *"No. I don't think they know how that works exactly"*. Another participant supports this conclusion: *"Some people don't see the difference. They simply say 'you are just like the commercial parties, you need to realize a solar farm and that's it".* This participant furthermore argues that through their own actions and communication, residents have started seeing Enschede Energie in the wrong light: *"I think they still have very few members. I'm wondering… That's because people have started seeing them as developer"*.

4.3.9. Project and Organizational Process

The project processes and organizational processes of Enschede Energie were discussed elaborately during the interviews.

A main negative aspect that was mentioned is a lack of collaboration with the municipality of Enschede during the project process. One participant mentions that the municipality was not involved at the start of the participatory process: *"they have chosen deliberately to do those conversations at the kitchen table during the summer vacation, in the middle of the summer leave period. That is a difficult one, because it is forbidden for the municipality to do this in the summer. The municipality is not allowed to do that by the council, because people are on holiday. Then you don't reach everyone.* […] *And I think this has caused much trouble for the cooperative".* Other participants agreed that there were issues in the collaboration with the municipality. Different effects of a lack of collaboration with the municipality were however found. When asked if the resistance would have been less if there was a stronger collaboration with the municipality, one participant argued: *"no, I don't believe that at all. Many times, when the municipality brings out a story, perhaps this leads to even more resistance".*

According to the participants, other issues in the project process were caused by a lack of experience of Enschede Energie. One participant mentions*: "look, I think that Enschede Energie and ECBE are young organizations, starting, and yes I think there is a piece of expertise that is missing as well. Knowledge, skill, experience. And from them, because they are volunteers, who all did good things during their working live, but this just requires something different".*

Another negative influence of the project processes originated from the locations already being chosen for the solar farms. Participants argued that if residents got more opportunities to participate in decision making then they might have a higher level of acceptance. One stakeholder explains another way the procedures could be shaped: *"what you could say is that in a future project, you don't say we*

have a farm over there, but that you visualize the assignment: 'we are looking for a location for 10 hectares of solar, in this demarcated area'. 'Do you see a chance for that'? That would be a more open approach. […] *So we have to establish with each other that there is a problem, we have to handle the energy transition with each other, we need space for that and with each other we can find this space in our area. Well, that is a bit opener towards a result. So, that might be an even better approach".* Another participant mentioned a similar, more open approach.

Besides the possibilities for improvement, various positive aspects of the project process were recognized as well. Stakeholders mentioned that Enschede Energie allowed residents to participate on various occasions. The elaborate process of participation is described by one stakeholder: *"I have not heard of any other solar project that did it as careful as we did. Because we really have set around the table with practically all neighbors, we have visited them, held conversations at their kitchen table and gave them honest information. I wouldn't know how we could have done that more diligently".* Another stakeholder mentioned: *"They could at least watch and think with us, and where possible we looked if we could adjust it a little so it might be more sufferable for them".* Another stakeholder mentions a specific example of a large adjustment based on the input of residents: *Where there was a need for it, we have spoken more often, which has led to us making a few adjustments to the solar farms. We created a larger buffer zone between the farm and the houses. That buffer zone was already adequate, but we have enlarged it once more".*

4.3.10. Project and Organizational Outcome

Albeit not always communicated clearly to residents, as mentioned in subchapter 4.3.8. , stakeholders described the project and organizational outcomes positively. Two main project/organizational outcomes were discussed: the possibility for sharing in the profits of projects through two different revenue models and the area fund Enschede Energie is planning on setting up.

One of the interviewed stakeholders argues that there could be an effect of sharing the profits with residents and the level of acceptance: *"it sounds lame, but there is a social aspect in some sense. There are many people with a low income in Enschede, so if you get a 150 euro discount on a yearly bases, than that's interesting. So if we can gather support that way, then yes please".* They elaborate: *"this* [revenue model] *is very important, because you specifically show this discount. That is one thing, and the second thing is that with this model you can say: 'people, you have solar panels yourself!'"* Other stakeholders were not as convinced of the positive effects of the outcomes. A stakeholder argues: *"Enschede Energie offers a way of profiting of the solar farm. They believe that. But that benefit doesn't outweigh the negatives for them* [the residents]. *That is no argument for them to say: 'that is very good, then we retract our objection'. The benefits do not outweigh the drawbacks".*

Various stakeholders furthermore mention the planned area fund. This fund, held by Enschede Energie, would be filled with the profits the cooperative makes through its projects. The fund would be used to invest in local projects, to give the money back to the local community. One stakeholder describes the possibilities for such a fund: *"a farm can also yield something for your own services in that area. Think for example about a community house that stands there, or a football pitch or a park that you want to maintain, manage or keep going. Yes, then you can also think about the revenues of such a farm as a contribution. So there are also win-win situations".* Another participant mentions: *"that is a wish, besides reinvesting resources, to put a part of the revenue apart for social motives. A social side".*

4.3.11. Role of the Municipality

A new factor that is discussed is the role of the municipality of Enschede surrounding the process. Two main aspects of the role of the municipality came forward: the lack of a finished energy policy and a lack of support for Enschede Energie.

The energy policy participants refer to is the "Energievisie" (Energy Vision), a specific policy that describes the long term goals and plans of the municipality. As it has not been finished yet, many residents experience the placing of solar farms as haphazard or random and would be less likely to accept this. One participant mentions that the resistance against the solar farms *"has everything to do with that piece of policy, the Energy Vision. People are all shouting 'establish that policy first!'"*. Later in this interview, this participant elaborates: *"Yes, but that is the Energy Vision again, if you don't agree with each other within the city where you stand for, how you're going to do it and when you're going to do it.. Well, that would make it a lot easier to explain"*. Another participant agrees that the Energy Vision not being finished could influence acceptance: *"yes, that is missing indeed. There is no clear coat rack on which you can hang it on. And if this clear coat rack is there then people will say 'well, the pain is divided equally'"*. Another participant mentions that the Energy Vision provides the opportunity to *"make things clear. According to them "this really necessary. There is nothing more crippling in these kinds of processes than a doubting government, a hesitating government, a government which is vague"*.

The other aspect concerning the role of the municipality that is discussed in the interviews is the support of the municipality for Enschede Energie. One participant notes that the municipality does not promote Enschede Energie sufficiently, by saying: *"what the municipality does not, or does barely, is saying in a general sense: 'guys, we are so happy that there is a group here that takes on the energy transition and if you have any questions, go to that group'"*. Another participant holds the opinion that the municipality could have supported Enschede Energie more in the communication towards residents. This participant mentions: *"I blame the municipality a lot more, they should have more strongly taken the lead, should have communicated more strongly outwards: 'you are right, we are going to research this'. What they did do, was a bit half baked"*.

4.4. Survey

To report the results of the survey, a structure is used based on the tested hypotheses. However, some items are included that did not directly measure a hypothesis, but did give some insight in the motivations of residents to accept solar farms. These are discussed in separate subchapters. It is noteworthy that not all participants answered all questions included in the survey, which leads to a varying N for different scales. Furthermore, some questions included the option 'I don't know', which was excluded from the correlation coefficient, leading to a lower N for scales that include such items. In this chapter, first the descriptive statistics for the dependent variable is described, to get a general impression of the level of acceptance among residents. After this, the expected consequences are discussed. In the subchapters following this, the hypotheses are tested by reporting correlation coefficients between the independent factors and the dependent factor. It is important to note that only a *correlation* is measured and that results found for this survey do not imply a *causation*. This is beyond the scope of this study, which only aims to understand public acceptance by finding factors that could be of influence.

4.4.1. Level of acceptance

The dependent variable, level of acceptance, is measured in two ways. First, the level of acceptance of all three solar farms together is measured by two items, which can be found in Appendix D. A Cronbach's Alpha of .942 was found which means the two items could be grouped into a scale that measures the construct of public acceptance. Besides this scale, three items were included in the survey that specifically measured the acceptance of one of the planned solar farms. The scale that measures the general acceptance of the solar farms used a scale of 1-5, in which 1 means the lowest possible level of acceptance and 5 the highest. The items for individual solar farms used a scale of 0-5, in which 0 means the lowest level of acceptance and 5 the highest. The results of the descriptive analysis are displayed in table 6.

Table 6.

Descriptive statistics for items that measure the level of acceptance

Variable	N	Mean	Std. Deviation
Acceptance scale	80	2.0250	1.51553
Acceptance level Kromhofsweg 10	71	1.85	1.917
Acceptance level Allemansveldweg 150	65	1.94	1.975
Acceptance level Holterhofweg 270	63	2.13	1.922

The acceptance scale shows a mean of 2.0250, which shows a level of acceptance that is below neutral (3). The means for the level of acceptance of the individual solar farms are below neutral (3) as well. The planned solar farm located at Holterhofweg 270 has the highest level of acceptance (M=2.13), followed by Allemansveldweg 150 (M=1.94) and lastly Kromhofsweg 10 (M=1.85). It should be noted that N varies for each variable.

4.4.2. Expected consequences

In the survey, participants were asked to rate the consequences they expected from the solar farms in order of importance. 9 possible expected consequences were included. The results of the descriptive analysis of these expected consequences is displayed in table 7. Table 7 shows that 79 participants answered this question (N=79). The consequence that was seen as most important is the disruption of the landscape (M=2.27, with a maximum score of 7). Affecting local biodiversity is the consequence that on average is seen as the second most important (M=3.33), followed by visual impact on local landscape (M=3.56) and reducing the amount of valuable farmland (M=4.30). The fifth most important consequence is combatting climate change (M=5.03), which is followed by reflecting sunlight, causing annoyance (5.91), generation of local sustainable energy (M=5.92), generation of cheap energy (M=7.28) and a possible decrease in value property, which is seen as the least important consequence (M=7.41).

Table 7.

Descriptive statistics of the expected consequences of the development of solar farms

Expected Consequence	N	Min	Max	Mean	Std. Deviation
Landscape disruption	79	1	7	2.27	1.722
Affecting local biodiversity	79	1	9	3.33	1.831
Visual impact on local landscape	79	1	8	3.56	1.421
Reducing the amount of valuable farmland	79	1	9	4,30	2.579
Combatting climate change	79	1	9	5.03	2.154
Reflecting sunlight, causing annoyance	79	2	9	5.91	1.650
Generation of local sustainable energy	79	1	9	5.92	2.062

Generation of cheap energy	79	1	9	7.28	1.881
Possible decrease in value of property	79	1	9	7.41	2.193

4.4.3. Organizational knowledge

This survey measured the knowledge of residents of the organization Enschede Energie through 3 items. The first item 'I know the cooperative Enschede Energie well' is measured on a 5 point scale, with 1 being the highest level of agreement and 5 the lowest. The second item 'Enschede Energie is part of the municipality of Enschede', is a reverse item to measure residents' knowledge. The third item is 'if I would want this, I would be able to become a member of Enschede Energie. Both items are measured on a 2 point scale, with 1 being 'I agree' and 2 'I disagree'. The option I don't know was included for the last two items in the survey but is excluded from the results, which explains the low N for these items. Table 8 shows that participants on average do not know Enschede Energy very well (M=3.12). The participants on average disagreed with the cooperative being part of municipality (M=1.68) and agreed that they could become a member if they wanted to (M=1.24).

Table 8.

Descriptive statistics of residents' knowledge of Enschede Energie

Item	N	Min	Max	Mean	Std. Deviation
I know the cooperative Enschede Energie well	73	1	5	3.12	1.364
Enschede Energie is part of the municipality of Enschede (reversed item)	44	1	2	1.68	.471
If I would want this, I would be able to become a member of Enschede Energie	42	1	2	1.24	.431

4.4.4. Independent variables: Descriptives

For each variable that is measured a scale is developed, except for the variable property devaluation, for which only a single item is used. For all variables, a descriptive analysis is done, which is displayed in table 9.

Table 9.

Descriptive statistics of the independent variables

Variable	N	Mean	Std. Deviation
Expected Property devaluation	80	3,24	1,553
NIMBY scale	79	3,0253	1,08500
Fairness scale	79	2,4051	1,28371
Trust scale	80	2,7187	1,33323
Landscape Disruption scale	82	4,2226	1,11389
Use of Farmland scale	81	4,0802	1,36120
Annoyance scale	82	3,9024	1,23588

Communication Strategy scale	48	2,7222	1,05484
Project outcomes scale	75	2,6800	1,31169
Project process scale	50	2,3450	1,16922
Organizational process scale	72	2,7685	1,10006

4.4.5. NIMBY

Initially, five items were included to measure NIMBY. A reliability analysis showed that these five items have a Cohen's Kappa of .587. After excluding the item 'I would only accept a solar farm near my home, if at other locations in Enschede solar farms would be developed as well', a Cohen's Kappa of .699 is found, which is (just) acceptable. All items that measure NIMBY can and the corresponding Cohen's Kappa if the item is deleted can be found in Appendix E. Therefore the scale is made up of 4 items. All items are measured on a five point scale, in which 5 means the highest level of agreement and 1 the lowest. Table 10 shows that NIMBY has a mean of M=3.0253, with a standard deviation of 1.08500, which means on average the level of NIMBY is neutral. 79 participants filled in the items included in the NIMBY scale. Concerning the relationship between NIMBY and the level of public acceptance, this study hypothesizes:

H2: *Personal cost-benefit analyses (NIMBY motives) have a negative correlation with the public acceptance of the development of solar farms.*

To test this hypothesis, a correlation coefficient is conducted. The results of this correlation coefficient are displayed in table 10. As is show, NIMBY has a significant ($p<0.05$) negative (B=-.957) correlation with public acceptance. Therefore, H2 is accepted.

Table 10.

Correlation Coefficient of NIMBY with public acceptance as the dependent variable

Variable	**Bèta**	**T**	**P**
(Constant)	4.845	13.889	.000
NIMBY scale	-.957	-8.43	.000*

* Significant

4.4.6. Trust

The independent variable trust is measured by two items, both measured on a five-point scale. The reliability analysis that was conducted for these items showed a Crobach's Alpha of .926, which is acceptable. Both items and Cronbach's Alpha if one of the items is deleted are displayed in Appendix I. This means a scale could be developed of these items. As is shown in table 10, the level of trust is somewhat low to neutral (M=2,7187), with a standard deviation of 1,33323. 80 participants filled in the items that are included in this scale. Concerning the relation between trust and the dependent variable of public acceptance, this study uses the following hypothesis:

H3: Level of trust in the developer has a positive correlation with residents' public acceptance of the development of solar farms.

To test this hypothesis, a correlation coefficient is conducted. The results of this analysis are displayed in table 11. Table 11 shows a positive (B=.733) significant (p=.000) correlation between trust and public acceptance, which means hypothesis 3 is accepted.

Table 11.

Correlation Coefficient of Trust with Public Acceptance as the Dependent Variable

Variable	Bèta	t	P
(Constant)	-.055	-.193	.848
Trust scale	.733	7.711	.000*

* Significant

4.4.7. Landscape disruption

Landscape disruption is measured by four items, all measured on a five-point scale. For these items, a reliability analysis was conducted. A Cronbach's Alpha of .880 was found, which would not improve by excluding any of the items. The items and Cronbach's Alpha if one of the items is deleted are displayed in Appendix F. Therefore, a scale is developed that measures landscape disruption. As shown in table 10 M=4,2226 , with a standard deviation of 1,11389. 82 participants filled in the items included in the landscape disruption scale. The results of the correlation coefficient are displayed in table 12. By conducting this correlation coefficient, H4 is tested:

H4: Perceived landscape disruption has a negative effect on residents' public acceptance of the development of solar farms.

Table 12 shows that there is a significant (p=.000) negative (B= -1.111) correlation between perceived landscape disruption and residents' public acceptance of solar farms. Therefore, H4 is accepted.

Table 12.

Correlation Coefficient of Landscape Disruption with public acceptance as the dependent variable

Variable	Bèta	t	P
(Constant)	6,623	20.250	.000
Landscape disruption scale	-1.111	-14.852	.000*

* Significant

4.4.8. Annoyance

The independent variable annoyance is measured by two items, both measured on a five-point scale. A reliability analysis was conducted, which showed a Cronbach's Alpha of .909, which means the two items could be combined into a scale that measures the level of annoyance. Both items and Cronbach's Alpha if the item is deleted are displayed in Appendix G. As is displayed in table 10, the level of annoyance caused by the development of solar farms is relatively high among participants (M=3,9024), with a standard deviation of 1.23588. 82 participants filled in the items included in the annoyance scale. To test hypothesis 5, a correlation coefficient is conducted. The results are displayed in table 13.

H5: Perceived annoyance has a negative correlation with residents' public acceptance of the development of solar farms.

Table 13.

Correlation Coefficient of Annoyance with public acceptance as the dependent variable

Variable	Bèta	T	P
(Constant)	5.488	16.245	.000
Annoyance scale	-.909	-11.061	.000*

* Significant

Table 13 shows that there is a significant (p=.000) negative (B= -.909) correlation between perceived annoyance and residents' public acceptance of solar farms. Therefore, H5 is accepted.

4.4.9. *Fairness*

The independent variable fairness is measured by two items, both measured on a five-point scale. For these items a reliability analysis was conducted, which showed a Cronbach's Alpha of .721, which is acceptable. Therefore, a scale is developed of these items. Both items and Cronbach's Alpha if one of the items is deleted are displayed in Appendix H. As is displayed in table 10, the level of perceived fairness is relatively low (M=2,4051), with a standard deviation of 1,28371. 79 participants filled in the items included in this scale. Concerning the relation between perceived fairness and the dependent variable of public acceptance, this study uses the following hypothesis:

H6: Level of fairness of procedures and outcomes has a positive correlation with residents' public acceptance of the development of solar farms.

To test this hypothesis, a correlation coefficient is conducted, of which the results are displayed in table 14. Table 14 shows a positive (B=.886) significant (p=.000) correlation between fairness and public acceptance, which means hypothesis 6 is accepted.

Table 14.

Correlation Coefficient of Fairness with Public Acceptance as the Dependent Variable

Variable	**Bèta**	**T**	**P**
(Constant)	-.211	-.955	.343
Fairness scale	.886	10.958	.000*

* Significant

4.4.10. *Communication Strategy*

The independent variable communication strategy is measured by three items, all measured on a five-point scale. The items included the option 'I don't know', which was excluded from the analysis. The reliability analysis that was conducted found a Cronbach's Alpha of .741, which is acceptable. The items and Cronbach's Alpha if an item is deleted are displayed in Appendix J. A scale was developed of these three items. As shown in table 10, the communication strategy was rated somewhat negative to neutral (M=2,7222), with a standard deviation of 1,05484. For this scale, N=48, which is relatively low and can be explained by the exclusion of values that indicated the 'I don't know' option. Concerning the relation between communication strategy and the dependent variable of public acceptance, this study uses the following hypothesis:

H7: A communication strategy that addresses the actual concerns of residents has a positive correlation with residents' public acceptance of the development of solar farms.

To test this hypothesis, a correlation coefficient is conducted. The results of this analysis are displayed in table 15. Table 15 shows a positive (B=.771) significant (p=.000) correlation between participants opinion about the used communication strategy and the level of public acceptance, which means hypothesis 7 is accepted.

Table 15.

Correlation Coefficient of the Communication Strategy with Public Acceptance as the Dependent Variable

Variable	Bèta	T	P
(Constant)	-.243	-.448	.656
Communication Strategy scale	. 771	4.195	.000*

* Significant

4.4.11. *Project Processes*

The independent variable project processes is measured by 5 items, all measured on a five-point scale. The items included the option 'I don't know', which was excluded from the analysis. The reliability analysis that was conducted resulted in a Cronbach's Alpha of .805. This is acceptable, but after excluding the item 'If I had more input concerning the decision making process surrounding the solar farms, I would be more likely to accept the development', Cronbach's Alpha improved to .845. Therefore, this items is excluded from the developed scale. All items and Cronbach's Alpha if an item is deleted are displayed in Appendix K. This scale measures the level of openness and perceived possibilities for participation during the project processes. Table 10 shows that participants rated the project processes relatively negatively (M=2,3450), with a standard deviation of 1,16922. For this scale N=50, which can be explained by the exclusion of values that indicated the 'I don't know' option. Concerning the relation between project processes and the level of public acceptance, this study uses the following hypotheses:

H8: Open and participatory project processes have a positive correlation with residents' public acceptance of the development of solar farms.

H9: Participatory processes that align with the expectations of participants have a positive correlation with residents' public acceptance of the development of solar farms.

To test these hypotheses, two correlation coefficients are conducted. The first analysis tests H8 by including the scale of items that measure project processes and the second analysis tests H9, by including the single item that measures the expectations of the participatory process: "the participatory process was how I expected it to be". The results of the first analysis (that tests H8) are displayed in table 16. Table 16 shows that there is a positive (B=.981) significant (p=.000) correlation between the project processes and the level of public acceptance. Therefore, hypothesis 8 is accepted. The results of the second analysis (that tests H9) are displayed in table 17. Table 17 shows that there is a positive (B=.563) significant (p=.000) correlation between project processes aligning with expectations and public acceptance. Therefore, hypothesis 9 is accepted.

Table 16.

Correlation Coefficient of the Project Processes with Public Acceptance as the Dependent Variable

Variable	Bèta	T	P
(Constant)	-.496	-.1.767	.084
Project processes scale	. 981	9.241	.000*

* Significant

Table 17.

Correlation Coefficient of the Expected Processes with Public Acceptance as the Dependent Variable

Variable	Bèta	T	P
(Constant)	.358	1.086	.282
Project processes aligning with expectations	. 563	4.891	.000*

* Significant

4.4.12. *Organizational Processes*

The independent variable organizational processes is measured by 3 items, each on a five-point scale. The reliability analysis that was conducted with these items showed that Cronbach's Alpha is .886 and does not improve by excluding items. This Cronbach's Alpha is acceptable and therefore a scale is developed, which measures the level of openness and perceived possibilities for participation within the organization Enschede Energie. All items and Cronbach's Alpha if an item is deleted are displayed in Appendix L. Table 10 shows that participants rated the organizational processes somewhat negatively to neutral (M=2,7685), with a standard deviation of 1,10006. 72 participants completed the items included in the scale. Concerning the relation between organizational processes and the level of public acceptance, this study uses the following hypotheses:

H11: Open and participatory organizational processes have a positive correlation with residents' public acceptance of the development of solar farms.

To test this hypothesis, a correlation coefficient is conducted. The results of this analysis are displayed in table 18. Table 18 shows that there is a positive (B=.935) significant (p=.000) correlation between the openness and possibilities for participation in the organizational processes on the level of public acceptance. Therefore, hypothesis 11 is accepted.

Table 18.

Correlation Coefficient of the Organizational Processes with Public Acceptance as the Dependent Variable

Variable	Bèta	T	P
(Constant)	-.727	-.2.175	.033
Organizational processes scale	. 935	8.375	.000*

* Significant

4.4.13. *Project/Organizational Outcomes*

The independent variable of project/organizational outcomes is measured by 3 items, each on a five-point scale. A reliability analysis of these items found a Cronbach's Alpha of .663, which is insufficient. When excluding the (reversed) item 'I think only the cooperative Enschede Energie will profit from the development of solar farms', Cronbach's Alpha increased to .836. Therefore, this item is excluded from the scale. All items and Cronbach's Alpha if an item is deleted are displayed in Appendix M. The developed scale measures the perceived localness and collectiveness of project outcomes. As displayed in table 10, the project outcomes are rated somewhat negatively by participants (M=2.6800), with a standard deviation of 1.31169. 75 participants completed the items included in this scale. Concerning the relation between project outcomes and the level of public acceptance, this study uses the following hypotheses:

H10: Local and collective project outcomes have a positive correlation with residents' public acceptance of the development of solar farms.

H12: Local and collective organizational outcomes have a positive correlation with residents' public acceptance of the development of solar farms.

To test these hypotheses, a correlation coefficinet is conducted. The results of this analysis are displayed in table 19. Table 19 shows that there is a positive (B=.591) significant (.000) correlation between project outcomes on the level of public acceptance. Therefore, hypotheses 10 and hypothesis 12 are accepted.

Table 19.

Correlation Coefficient of the Project Outcomes with Public Acceptance as the Dependent Variable

Variable	**Bèta**	**t**	**P**
(Constant)	.325	.981	.330
Project/ organizaitonal Outcomes scale	. 591	5.302	.000*

* Significant

4.4.14. *Use of Farmland*

Although no hypotheses are included in this study regarding the use of farmland for solar farms, this variable is included based on results found during interviews. The survey included two items that measured the level of disagreement regarding the use of farmland for solar farms. These items used a five-point scale. A reliability analysis was conducted, which found a Cronbach's Alpha of .954, which is acceptable. Therefore, a scale is developed of these two items. As displayed in table 10, on average, participants found that farmland should not be used for the development of solar farms (M=4.0802), with a standard deviation of 1.36120. 81 participants completed the items included in the scale. To find the relationship between participants' opinion on the use of farmland for solar farms and public acceptance, a correlation coefficient was conducted. The results of this analysis are displayed in table 20. It can be concluded that there is a negative (B=-.903) significant (p=.000) correlation between the level of disagreement regarding the use of farmland for solar farms and public acceptance.

Table 20.
Correlation Coefficient of the Use of Farmland for Solar Farms with Public Acceptance as the Dependent Variable

Variable	**Bèta**	**t**	**P**
(Constant)	5.599	20.623	.000
Level of Disagreement regarding the use of Farmland for Solar Farms scale	-. 903	-14.257	.000*

* Significant

4.4.15. *Expected Property Devaluation*

Another variable that is included based on held interviews is property devaluation. The survey included one item that measures this variable: 'I think my home would decline in value because of the development of a solar farm near me'. This item is measured on a five-point scale. As displayed in table 10, expected property devaluation has a somewhat high to neutral score (M=3.24), with a standard deviation of 1.553. 80 participants completed the item. To find the relationship between expected

property devaluation and public acceptance, a correlation coefficient is conducted. The results of this analysis are displayed in table 21. It can be concluded that there is a negative (B=-.339) significant (p=.001) correlation between expected property devaluation and public acceptance.

Table 21.
Correlation Coefficient of Expected Property Devaluation with Public Acceptance as the Dependent Variable

Variable	**Bèta**	**t**	**P**
(Constant)	3.026	8.345	.000
Expected Property Devaluation	-. 339	-3.351	.001*

* Significant

4.4.16. *Summary of Survey Results*

To summarize the found results from the analysis of the survey, the tested hypotheses and whether they are accepted are displayed in table 22. Furthermore, other tested variables are displayed in table 23. It is important to note that, although all hypotheses are accepted, this does not imply that there is a causal relation between the independent variables and the dependent variable. Only a correlation is measured.

Table 22.
Hypotheses and Acceptance

Hypothesis		**Accepted/not accepted**
H1	The general attitude of residents toward renewable energy has a positive correlation with residents' public acceptance of renewable energy projects.	N/A
H2	Personal cost-benefit analyses (NIMBY motives) have a negative correlation with residents' public acceptance of the development of solar farms.	Accepted
H3	Level of trust in the developer has a positive correlation with residents' public acceptance of the development of solar farms.	
H4	Perceived landscape disruption has a negative correlation with residents' public acceptance of the development of solar farms.	Accepted
H5	Perceived annoyance has a negative correlation with residents' public acceptance of the development of solar farms.	Accepted
H6	Level of fairness of procedures and outcomes has a positive correlation with residents' public acceptance of the development of solar farms.	Accepted
H7	A communication strategy that addresses the actual concerns of residents has a positive correlation with residents' public acceptance of the development of solar farms.	Accepted
H8	Open and participatory project processes have a positive correlation with residents' public acceptance of the development of solar farms.	Accepted

H9	Participatory processes that align with the expectations of participants have a positive correlation with residents' public acceptance.	Accepted
H10	Open and participatory organizational processes have a positive correlation with residents' public acceptance of the development of solar farms.	Accepted
H11	Local and collective project outcomes have a positive correlation with residents' public acceptance of the development of solar farms.	Accepted
H12	Local and collective organizational outcomes have a positive correlation with residents' public acceptance of the development of solar farms.	Accepted

Table 23.

Other found variables and their effect

Tested variable	Found effect
Use of farmland	A negative (B=-.903) significant (p=.000) correlation between the level of disagreement regarding the use of farmland for solar farms and public acceptance.
Property devaluation	A negative (B=-.339) significant (p=.001) correlation between expected property devaluation and public acceptance.

5. Discussion

In this chapter, the found results from the document study, interviews and surveys are discussed. Each found factor is discussed. Because of the used structure, factors found in the document study are sometimes worded differently than factors found in the interviews or surveys, although different terms refer to the same factor. This chapter aims to clarify and bring these different worded factors together. Furthermore, this chapter explains the findings by using the literature previously discussed in the theoretical framework Moreover, when no literature is available to explain findings, this study aims to find new explanations based on the gathered findings or the acquired knowledge on the subject by the researcher.

5.1.Level of Acceptance

Both in the held interviews and the surveys the results strongly indicate that the level of acceptance for the planned solar farms in Enschede is low. Furthermore, the high amount of signatures added to one of the notices of objection and the high amount of notices objection in itself also strongly point towards a low level of acceptance for the solar farms. This means the dependent variable of this study is found to be low. During the various methods, different factors were found that can explain this low level of acceptance.

5.2.General Attitude

The first factor that was hypothesized to influence the level of acceptance is the general attitude of residents towards sustainable energy. This factor was found to be of influence during the interviews held with stakeholders of Enschede Energie. Stakeholders concluded from their experiences that people who do not believe in climate change, also do not believe in the necessity of solar farms. These people can therefore be very difficult to convince. This is in line with findings of Poortinga et al (2005), who argue that acceptance of renewable energy projects is motivated by environmental concerns. If these environmental concerns are not there, the level of acceptance is logically low as a consequence. This relates to the Not In Anyone's Backyard argument as well, as described by Wolsink (2007). However, it could be argued that people with a negative general attitude towards solar farms could be convinced by personal benefits, such as favorable outcomes.

5.3.NIMBY (Personal Costs-Benefits)

It was found in the held interviews that NIMBY factors can either be related to a mostly irrational fear of change and not wanting something purely because it is new, but it can also be a very rational reason to oppose solar farms. This is because the development of solar farms could possibly devalue the homes of people living next to the development site. It was found that not all residents trust the energy cooperative Enschede Energie to compensate this potential lost property value. The surveys furthermore show that NIMBY has a very strong effect on the level of acceptance. This somewhat contrasting with findings of Wolsink (2007), who argues that opposing sustainable energy projects for selfish reasons is not very prevalent. According to him, NIMBY arguments often have underlying arguments, caused by the characteristics of energy project. Following the findings of the held interviews, it can be concluded that there is a percentage of residents who oppose the solar farms that do so out of purely NIMBY reasons. This finding fits with the findings of Groothuis and Miller (1994) and Easterling (1992), who argued that NIMBY factors do influence public acceptance strongly. During the held interviews, suggestions were also made that resistance to change differs in each region and Enschede lies in a region where this resistance is high. This suggestion is discussed in chapter 6.1.4, which compares the political climate of another case with that of Enschede. However, it can be argued that the many other factors that were found in this study have also led to this NIMBY attitude. In short: residents oppose solar farms near them because the costs for them strongly outweigh the benefits. Costs are not only monetary, but also refer to the perceived effects on other local factors, such as the view and flora and fauna.

5.4.Landscape Disruption, the Use of Farmland and Preferable Alternatives

The findings of this study strongly support the hypothesis that disruption of the local landscape negatively influences public acceptance. Despite efforts to fit the solar farms in the landscape by building wooden banks around them, residents perceive the solar farms to not fit in the outskirts of Enschede. This does not mean that the eventual realized landscape disruption will be found to be high. Pasqualetti (2001) found that after the development of windmills was completed, acceptance shifted positively, as the expectations of landscape disruption are often exaggerated compared to reality.

It is furthermore found that residents believe there are many preferable alternatives, such as solar panels on the roofs of large buildings, or at industrial areas instead. The responses of the municipality analyzed in the document study show that the municipality argues that the proposed alternatives by residents are not feasible. Still, residents believe that these alternatives are suitable, which leads to the conclusion that the reasons behind the choice for the location of the solar farms has not been communicated well to residents. What also weighs strongly, is that residents do not agree with the use of farmland for energy generation. This is because energy cooperatives rent farmland for the development of solar farms and pay prices that are relatively high. This leads to an increase in the price of farmland, which causes trouble for farmers living in the area.

The finding that perceived landscape disruption has a strong effect on the public acceptance of projects aligns well with previous research. Warren and McFadyen (2010) argued that visual impact of wind power projects is the one factor that dominates all when it comes to influencing acceptance. The finding of Nadaï and Van der Horst (2010) that the landscape of a country is part of its cultural process, is also strongly supported by this study. In the document study and interviews the typical landscape surrounding Enschede is mentioned often and can be seen as an important reason why change to the local landscape leads to this much opposition.

5.5.Annoyance

This study hypothesized that perceived annoyance caused by the development of solar farms would lead to a lower level of public acceptance. Although this was found to be the case in the results of the

held survey, different results were found during the interviews. The stakeholders that were interviewed argued that the annoyance caused by the development of solar farms would be negligible and would be limited to some occasional noise from construction work during some weeks. After the development of the solar farms would be concluded, the solar farms would barely produce any sound or other source of annoyance. There is a gap between the expected perceived annoyance by residents and the actual annoyance that is described by stakeholders. This gap shows that the annoyance caused by the development of the solar farms is not communicated clearly to residents. Furthermore, in the document study, annoyance from light reflection or noise from the solar farms is not used as an argument against their development, which indicates that this is not one of the main causes of low acceptance.

The hypothesis regarding annoyance was based on literature on the development of wind turbines. For sustainable energy projects that focus on wind turbines, perceived or expected annoyance is a cause for low acceptance. However, Wolsink and Sprengers (1993) found that annoyance is often used as an argument by people that are against wind turbines in general and is not based on actual annoyance caused by wind turbines. This could also be the case in this study: when asked whether residents expect annoyance they could be inclined to agree, as they are against solar farms in general. To conclude, it can be argued that annoyance is not a major cause for the low level of acceptance. Furthermore, the perceived annoyance is higher than actual annoyance that will be caused, which can be explained by a lack of communication.

5.6.Fairness and Trust

The found results support the hypothesized effects of perceived fairness and trust on the level of acceptance.. It was found that fairness of procedures and the trust in a cooperative are closely linked. When residents felt the procedures to be unfair this lowered their trust in Enschede Energie as an organization. These findings support the conclusions of Firestone et al (2012), who argued that a low perceived fairness causes a lower level of trust and vice versa. As Enschede Energie is a relatively new organization, which is not well known by residents yet, it can be argued that the fairness and handling of the first projects is of great importance for the trust in the organization. Furthermore, the results of the survey indicate that some residents think that Enschede Energie is part of the municipality of Enschede, in which case the cooperative receives the same trust as the municipality. The findings of this study are in line with those of Zoellner et al (2005), who found that trust has a positive relation with the level of public acceptance. The findings also follow Firestone et al (2012), who mention that procedural fairness is a good determinant for success of a project. To conclude, both factors have a relatively straightforward relation with the level of acceptance, which is in line with relevant literature.

5.7.Communication Strategy

This study found that a communication strategy that addresses the actual concerns of citizens has a positive effect on public acceptance. These results support the findings of Breukers and Wolsink (2007), who argue that developers often do not realize the true causes of opposition by residents, which causes them to communicate ineffectively. In the conducted case study, the perceived landscape disruption is very high and indicates that Enschede Energie did not manage to communicate why the landscape is in their point of view not disrupted by the development. Furthermore, residents expect a high level of annoyance, while the interviews indicate the actual annoyance which will be caused by the development to be very low. Again, it can be concluded that this gap between the expected situation and the real situation is caused by a lack of communication. This study found that residents of Enschede think there are many preferable alternatives for generating sustainable energy. Again, poor communication

underlies this, as the municipality has not managed to get across to residents that other alternatives are not suitable.

The interviews show that the cooperative did not manage to communicate clearly about the favorable outcomes of its projects. It was not clear for residents that they could become co-owner of the solar farms, nor was there clear communication about the planned fund to improve local neighborhoods. The communication strategy focused on the benefits for the environment and climate of the solar farms, but not on the aforementioned local benefits. The desired effect of these project outcomes on public acceptance can only take effect if these are communicated clearly to residents. This is an addition to the theory of Breukers and Wolsink (2007): not only should developers address the causes of opposition, they should also address factors that can cause support.

5.8.Project Processes and Organizational Processes

The findings of this study support the hypothesis that open and participatory project processes and organizational processes have a positive effect on the level of public acceptance. This is in line with the findings of Warren and McFadyen (2010). Especially the choice for a location for solar farms should involve residents. Enschede Energie had already chosen the locations for the solar farms, which led to residents feeling faced with a fait accompli. This relates strongly to the findings of Coenen (2009), who argued that a difference in expectations of the participatory process leads to a lower level of acceptance. In this case, residents expected a process with the problem definition as a starting point, but instead they were faced with concrete plans. The participatory options that were offered after this only concerned conditions of the solar farms, such as the boundary surrounding it, which was not sufficient to take away resistance. Following Breukers and Wolsink (2007), a higher level of participation could have made *conditional* supporters into supporters of the development. The organizational processes of Enschede Energie could also influence the level of public acceptance. The findings in the interviews show that the cooperative has relatively open and participatory processes. However, the cooperative is not well known by residents, which automatically leads to them not knowing about its processes. Again, there is a connection between the communication of the cooperative and the effects a favorable aspect can have. That residents are unsatisfied with the project processes could also indicate that they expected a higher level of participation. This gap between the expected participation and the realized participation could have led to a lower public acceptance, as is explained by Coenen (2009).

5.9. Project Outcomes

This study hypothesized that local and collective project outcomes have a positive effect on the level of public acceptance, which is confirmed by the findings from the surveys and interviews. Specific local and collective outcomes that can work according to the interviewed stakeholders are monetary benefits like a discount on the energy bill and non-monetary benefits, such as improvements in neighborhoods funded by a local environmental fund. Again, because these benefits were found to not be communicated clearly to residents, which explains the results from the survey. It can be argued that the perceived project outcomes are not perceived to be local and collective, because residents simply do not know about the project outcomes. These findings are in line with those of Walker and Devine-Wright (2008), who found that projects of which the outcomes are not shared locally, they are more locally divisive and controversial.

5.10. Role of the Municipality and the Energy Vision

The findings of this study indicate that a lack of a clear vision by the municipality on the development of sustainable energy projects in the city of Enschede lead to a lower level of public acceptance of the projects. These projects are seen as haphazard, as it is not clear what the long term vision of the municipality is and how these projects fit in this vision, which causes resistance to the plans. In the document study, various residents argue that a clear policy should first be formed in which the energy

vision is recorded in writing. The findings indicate that, although the cooperative develops the solar farms, the municipality also carries an important responsibility. Residents tend to look to their municipality for a long term vision on renewable energy, a responsibility that the developer does not have. There is also a strong connection with the 'preferable alternatives' argument: if the municipality clearly explained in its long term vision why certain alternatives are chosen, residents could better understand these choices.

Besides a long term vision, the collaboration between the energy cooperative and the municipality is of importance as well. According to the findings in the interviews, public acceptance could improve if a municipality fully backs the developer of a renewable energy project. If residents understand the municipality is on board with the plans for development, they might be more likely to trust the cooperative, which in turn leads to a higher public acceptance.

6. Best Practices

In order to form recommendations for improving residents' public acceptance of the development of solar farms, this study uses a case in Nijmegen, the Netherlands, to draw best practices from. This chapter describes the case, which is focused on the development of solar farms and wind turbines by the cooperative WindPowerNijmegen. After the case is described, best practices are discussed, which are found through interviews with board members of the cooperative. This chapter answers research question 3: *What best practices regarding improving public acceptance for solar farms can be learned from energy cooperative WindPowerNijmegen?*

6.1. Case Description

In this subchapter, the case of WindPowerNijmegen is described. This case is used to find best practices for the development of renewable energy projects. This subchapter is structured similar as subchapter 4.1. This is done, so both cases can easily be compared. The case description is made based on interviews with board members and a member of the supervisory board of WindPowerNijmegen, as well as online sources.

6.1.1. Cooperative set-up and members

WindPowerNijmegen is set up differently than Enschede Energie with regards to its membership. According to board member S. Debie (personal communication, March 12, 2020) at WindPowerNijmegen, residents have to buy shares in one of the projects (or a general share) in order to become a member of the cooperative. General shares were created for residents that wanted to become a member, but at that time could not because there were no shares left to give out from the projects. These members are first in line to receive a project share, once new projects start. Currently, WindPowerNijmegen has 1000 members, of which about 90 are active in one of several committees or working groups. All members can vote during general meetings and bring up new discussion points.

6.1.2. Projects

At the end of 2016, WindPowerNijmegen finished the development of Windpark Nijmegen-Betuwe. This park consists of four wind turbines, which generate energy for 7000 households each year. This project was partly financed by 1013 members of the cooperative, that invested 2 million euros[18]. An investment firm invested the remaining amount. The park is located alongside the highway, next to an

[18] https://www.windparknijmegenbetuwe.nl/windpark/

industrial area. WindPowerNijmegen is expanding the park with a solar farm (De Grift), which is located beneath the windmills. This solar farm will exist of 17.000 solar panels, which is enough to supply energy to another 1245 households each year, which amounts to 4.4 GWh.

6.1.3. Local Landscape

As mentioned, the wind turbines and the solar farm that is to be developed, are located besides a major highway and an industrial area. Moreover, farmland is located near the wind park. The landscape is very flat and open and the windmills are clearly visible.

6.1.4. Political Climate of Nijmegen

In the most recent election in Nijmegen, the Green Left party was found to be the largest at 67 of 86 polling stations in Nijmegen and reached 23.5 % of the total votes. The (progressive) Democratic Party D66 came in second, with the Labour Party as the third party. To conclude: three relatively progressive and green parties were the three largest of the city, which forms a large contrast with Enschede, that has a much more divided local council.

6.2. Found Best Practices

In this chapter, found best practices from interviews with board members and a supervisory board member of cooperative WindPowerNijmegen are discussed. 18 best practices are discussed during the interviews, of which the most prevalent are discussed in this chapter.

6.2.1. Environmental Fund

The best practice that was mentioned most often is the use of an environmental fund to finance local projects. One of the board members of WindPowerNijmegen mentions *"There has been a lot of contact with that neighborhood. A fund has been created with the yields so the neighborhood gets money for the liveability of their neighborhood"*. This fund works well in improving the acceptance of residents, because, according to one of the board members of the cooperative: *"not only the burden, but also some benefits end up at residents that have objections and who live in the direct environment"*. It is noteworthy that the fund is not managed by the cooperative, but by residents in the neighborhood where the energy project is located themselves. This could lead to a higher level of trust in residents. One of the participants further explains the effect this fund had on the level of acceptance: *"Well, eventually you see that the acceptance of the windmills, of the wind park, has become higher because of this* [the fund]*. And the resistance lower, because they have some advantage from it"*.

6.2.2. Collaboration with the Municipality

Another best practice that is mentioned various times by the participants is the collaboration of WindPowerNijmegen with the municipality of Nijmegen. Clear differences were identified by one stakeholder who is involved in both Nijmegen and Enschede: *"well, in fact, the then councilor, years ago, Jan van de Weert of the Green Left party, supported the initiative* [..] *But that is someone in politics who has a lot influence and can have a lot of impact in that discussion. And he stood strongly behind it* [in Nijmegen]*. And that strong signal, also from the province, that has not been there in the last five, six years* [in Enschede]". Furthermore, this participants described the difference in level of support between both municipalities as a *"very important factor"* in explaining the differences between the two cases. Board members of WindPowerNijmegen explain explain that the municipality gave priority for sustainable initiatives in the public tender of their power consumption, which guarantees clients for all generated power. In an earlier stage, the municipality helped out as well, by buying the land where the

windmills could be developed. Such strong support of a municipality could send a more positive message to residents, which could lead to a higher level of acceptance.

6.2.3. *Showing Finished Projects*

Another best practice WindPowerNijmegen included in its procedures, is showing projects that are already finished. A board member of the cooperative mentions: *"we are a few years further now and you see that some residents have made an improvement. The consequences of the windmills are not as bad as expected, at least in the perception of residents"*. According to this participants the *"complaints are negligible",* whereas at the beginning of the project residents feared *"drop shadow, the tin work, the noise and the red lights at night"*. The interviewed member of the supervisory board in both Enschede and Nijmegen also mentions that *"in Nijmegen they can of course fall back on a project that is already finished"*.

6.2.4. *Choice of Location*

Another best practice that can be drawn from the case in Nijmegen is the choice of location, which impacted public acceptance positively. For the wind park, residents saw it as less of a disruption of the landscape because it was combined with an existing industrial area. The landscape was already 'disrupted' and residents were more likely to accept a further change. One of the participants explains this in the following way: *"they started with a wind park, that is an interesting one. The wind park is located next to the A15* [a Dutch highway] *and to the north of the Betuwelijn* [a Dutch railway]*, so you combine the infrastructure".* The solar farm is in turn located beneath the windmills. Regarding this, the interviewed member of the supervisory board of the cooperative mentions: *"So humans are also a little bit creatures of habit, like, even if you were against it, this stands there, whether you like it or not. So if they put the rest of the misery also at the foot of those wind turbines, maybe it has to be this way"*. To conclude, when a new project is developed at a location where other projects are already realized, residents are more likely to accept it.

6.2.5. A recognized leader

Another best practice that is mentioned by a member of the supervisory board in WindPowerNijmegen, is the choice for a leader that is recognized locally as an authority figure. This stakeholder mentions the following: *"yes, I think it always helps if you have someone standing in front of which everyone think: 'yes, that is someone who knows what he's talking about'".* Furthermore, they mention: "*people should recognize, if it's 'the green guru', I don't know, but let's put it this way, in Enschede there is at least no green guru".* The participant explains that in Enschede, the board and staff members are very capable of leading a cooperative, but lack authority regarding environmental issues. In Nijmegen someone used to lead the cooperative that did have this authority, which could have helped with the acceptance of its projects.

6.2.6. Other

Besides the aforementioned main best practices, some other practices were mentioned. As these practices were not mentioned often (only once or twice) and by the participants not mentioned to be important factors, they are grouped in this subchapter. One of the board members mentioned that it is important to show enthusiasm as a board member. Furthermore, it is mentioned that Nijmegen is a progressive municipality, which leads to more support for renewable energy projects. In the project process, participants mentioned that it is important to make the plans concrete, because this leads to new members and investors and therefore more support. A last best practice was to analyze the causes for objection and to adjust the used communication strategy to these causes.

7. Conclusions, Implications and Recommendations

This study used a triangulation of methods to find which factors correlate with the public acceptance of the development of solar farms by energy cooperatives. By combining results from a literature review, a document study, interviews with stakeholders, surveys and best practices from a case study in Nijmegen, the research question can be answered. This chapter discusses the most important conclusions, which answer each research question of this study. Furthermore, by discussing recommendations based on these conclusions, it answers sub question 4:

SQ4: What solutions can increase local residents' public acceptance of the development of solar farms?

First, conclusions of the first three research questions are discussed.

7.1. Conclusions

This study aimed to understand residents' public acceptance of solar farms. Therefore, a wide range of factors is extracted from relevant literature. As very limited literature focused specifically on solar farms, literature concerning other renewable energy technologies was used. Based on this, hypotheses were proposed and tested by a variety of methods. This study did not aim to find causal relationships, as this falls outside of the scope of this research. Rather, this study aimed to find factors and test their correlation with residents' public acceptance. In this chapter, a conclusion for every sub-question is described, after which a general conclusion is given, which answers the main research question. After this, recommendations to improve residents' public acceptance are described.

7.1.1. Academic Literature

The first research question this study aimed to answer is:

Which factors that influence public acceptance of residents of the development of sustainable energy projects can be found in academic literature?

In relevant literature, a wide range of factors was found. Public acceptance was roughly divided into four types: 1) residents that do not accept the development of solar farms anywhere, which is categorized as "Not in Anyone's Backyard", 2) residents that do accept solar farms, but not in their backyard, because of a personal cost-benefit analysis, 3) residents that base their acceptance on the location of a project and 4) residents that base their acceptance on the fairness of a project and their trust in the developer. It was found that developers of a project could improve public acceptance by focusing on the underlying factors of the different types of acceptance. Developers can use local and collective project outcomes to improve public acceptance based on personal cost benefit analyses, as well as public acceptance based on fairness and trust. Furthermore, a communication strategy focused on actual concerns of citizens could improve public acceptance of residents that base their acceptance on the location of a project. Through such a communication strategy, developers could take away worries regarding landscape disruption, such as the impact on the view of residents, as well as the effect on flora and fauna. Open and participatory project processes and organizational processes could improve public acceptance based on fairness and trust, as decision are often viewed as more fair if the opportunity to participate is presented. Furthermore, it could lead to a more agreeable location, or less landscape disruption and therefore improve public acceptance of residents that base their acceptance on the location of a project.

7.1.2. Case study 1: Enschede, the Netherlands

The developed hypotheses based on the literature review were tested in a case study in Enschede, the Netherlands. A triangulation of methods was used to answer sub question 2:

Which factors correlate with the public acceptance of local residents of solar farms in Enschede, the Netherlands?

The used triangulation included a document study, focused on filed notices of objection, interviews with stakeholders and a survey among residents. Each method disclosed additional information and can therefore be viewed as essential for this study.

Although several factors were found to influence the public acceptance of solar farms in this case study, several main factors can be designated. The chosen location is found to be of a very strong influence on public acceptance in this case study. Residents were found to not accept the choice of location for the solar farms for four main reasons: 1) a perceived disruption of the traditional landscape, which holds cultural value, 2) a perceived negative visual impact of the solar farms, 3) perceived damage to flora and fauna and 4) the use of farmland for the purpose of energy generation. Besides the resistance the chosen location generates, this study found that a lack of clear vision and effective communication also had a negative effect on public acceptance. Furthermore, it was found that an open and participatory process leads to a higher level of public acceptance, as well as open and participatory organizational processes. This study concludes that, for participation to have a positive influence, residents need to be able to participate in decision making regarding the issues they find most pressing. A different form of participation than was expected, such as less influence or other subjects, can lead to a lower level of public acceptance. Local and collective project outcomes were found to also be able to positively influence public acceptance. In order to do so, clear communication about the future outcomes needs to be present. This study concludes that a lack of general acceptance for solar farms (not in anyone's backyard) and NIMBY motives affect public acceptance as well. Lastly, it is concluded that the collaboration between a developer and the local municipality can affect public acceptance as well.

7.1.3. Case study 2: Nijmegen, the Netherlands

A second case study in the Netherlands is included in this study to find best practices regarding the development of renewable energy projects. This case study is used to answer the following sub question:

What best practices regarding improving public acceptance of solar farms can be learned from energy cooperative WindPowerNijmegen?

Several best practices were found. This study concludes that a local environmental fund, managed by residents from a neighborhood where a renewable energy project is developed, is a good way of providing local and collective project outcomes. Furthermore, good collaboration with the local municipality is concluded to be beneficial in generating public acceptance. Showing finished project is concluded to be able to take away unnecessary worries of citizens regarding the visual impact and the impact on the local landscape of upcoming projects. Therefore this is categorized as a best practice. It was found in this case study that choosing a location which is already used as an industrial terrain improves public acceptance compared to locations in other areas, such as farmland or nature. Lastly, it is concluded from this case study that a recognized leader who is an authority in their field of knowledge can improve public acceptance.

7.1.4. The main research question

The main research question of this study is:

Which factors influence residents' public acceptance of the development of solar farms by energy cooperatives?

Several factors were found, which were categorized into project factors and citizen factors. It is noteworthy that for all found factors in the literature a correlation with the dependent variable, public acceptance, was found. This means that the relevant literature, which was mostly focused on other sustainable energy projects, is very relevant for solar farms as well. This study confirms that citizens factors such as NIMBY, general attitude towards sustainable energy and trust correlate with the public acceptance of solar farms as well. This study furthermore shows that project characteristics found in the literature to correlate with other sustainable energy projects such as wind turbines correlate with the public acceptance of solar farms. It can be concluded that although solar farms are very different from for instance wind turbines, the same factors, which are described in relevant literature, apply as well. Besides confirming existing literature, this study finds new factors too, which are recommended for further research. It was found that the local municipality plays an important role in the public acceptance of solar farms. This is because, if an energy cooperative is not well known in its municipality, residents find it hard to distinguish between the municipality and the energy cooperative. Furthermore, the municipality can help the developer financially and with communication, which can increase the chances of the development of a solar farm to succeed. Another new factor that was not described in relevant literature is the use of farmland. Solar farms take up a lot of space and are often located on farmland. This study concludes that this can lead to discontent in farmers, because they perceive the loss of farmland to be a threat to their profession. Therefore they aim for available alternatives that do not take up farmland, such as collective solar panels on roofs of buildings. This study shows that there are very conflicting interests at stake regarding the designation of the available land, which is a finding that is not discussed in relevant literature.

To conclude, this study confirmed that factors which correlate with public acceptance of sustainable energy projects, correlate with the public acceptance of solar farms as well. New findings were found as well that are especially relevant for solar farms, for which further research is recommended.

7.2.Recommendations

The conclusions of this study lead to several concrete recommendations for the developer in the case study in Enschede, the Netherlands, the cooperative Enschede Energie.

Firstly, this study found that the picked location plays a crucial role in determining the public acceptance for a renewable energy project. Currently, locations are chosen based on the land that is offered by land owners, which causes the location to be picked at random, purely based on land owners that are willing to offer their land for rent. This study recommends to involve the neighborhood from the beginning and discuss the possibilities regarding the use of land. By involving residents, the difficulties in picking the optimal location become more insightful, which can lead to more understanding for the picked location, especially if residents can participate themselves. Residents should be made aware of the advantages and disadvantages of different locations, so they can participate in an informed way. Furthermore, the process of participation requires careful planning and managing of expectations. Expectations of residents and the developer should be aligned.

To pick an optimal location in regards to public acceptance, the cooperative should take into account 4 factors: 1) the perceived disruption of the traditional landscape, which holds cultural value, 2) the perceived negative visual impact of the solar farms, 3) perceived damage to flora and fauna and 4) the current purpose of the land (if used as farmland, this could have a negative effect).

After the most suitable location is picked, this study recommends clear communication on why this location is chosen over possible alternatives. If residents understand *why* a solar farm will be sited near them, they are more likely to accept this. Collaboration with the municipality of Enschede in communicating this is likely to further improve public acceptance. The used communication strategy should be used to bridge the gap between *expected* landscape disruption and the *expected* annoyance caused by the project and the actual situation. Simulations and 3D models can provide insight in what

the actual realized projects will look like. Showing finished projects by other developers with similar characteristics to residents can also bridge the aforementioned gap.

Furthermore, this study recommends to focus on local and collective project outcomes in the communication towards residents. Ways of profiting from the development of solar farms should become clear to residents. Moreover, other ways of giving back profits to local communities should be specified and discussed before the development of projects. Following the case study in Nijmegen, the Netherlands, a foundation of local residents could be founded, who can manage the fund themselves. This way, there is assurance for local residents that the benefits of the projects will actually be used for things that benefit the local community.

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At WindPowerNijmegen, residents have to buy shares in one of the projects (or a general share) in order to become a member of the cooperative (S. Debie, personal communication, March 12, 2020)

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Appendix A

Conceptual interview questions for the boards members of Enschede Energie and WindpowerNijmegen regarding the type and focus of communication towards residents

Factor	Interview questions
Public Acceptance	• Why do you think some residents of Enschede do not accept the development of a solar farm near them?
General attitude	• What do you think of the residents of Enschede their general attitude towards sustainable energy and the energy transition?
Personal Cost-Benefit Analysis	• Which personal cost-benefit factors play a role in residents' level of acceptance? Why these?
Landscape annoyance	• Do you think the solar farm fits in the local landscape? Why/why not? • How do you think residents perceive the level of fit of the solar farm within the local landscape?
Annoyance	• Do you think residents will experience hindrance/annoyance from the (development of the) solar farm?
Fairness	• Do you think the procedures of Enschede Energie in developing the solar farm have been fair? Do you think residents perceived this as fair?
Trust	• Do you think residents trust Enschede Energie? Why/why not?
Communication strategy (content)	• What aspects of the solar farm did you focus on when communicating your plans to residents? Why did you choose those aspects? • How did the residents respond to various aspects? • How do you think the focus of your communication relates to the concerns of residents? • More specifically, how did you respond to concerns regarding possible disruption of the local landscape, if there were any? • How did you respond to other concerns (annoyance, loss of farmland, etc.) if there were any?
Project process	• Can you describe the full project process for me? How did it go from the beginning of the project until now? • How much influence did residents have regarding the placement of solar farms? Did they influence whether it was placed or not? Did they influence the location of placement? • In what ways can residents participate in decision making regarding this project? • How many residents did you speak to regarding this project? Why not more/less? • Who could/could not participate in the decision making process? • Did you take (counter) arguments of citizens into account? Why/why not? • What was the goal of the used participatory process? Do you think the participants expected the same goal? (expectations)

Organizational process	• How much influence do residents have regarding the organizational direction? • How can residents participate in the organizational decision making? • How many residents are currently able to participate in organizational decision making?
Project outcome	• To what extent are benefits of the project shared locally? • In what ways are benefits shared? • Who benefits from this project? Why (only) these people? • Where will the energy be used?
Organizational outcome	• To what extent are the benefits of the entire organization shared locally? • In what ways are these benefits shared? • Who benefits from the existence of the organization? • Who uses the energy that is generated by the organization?

Appendix B

Conceptual interview questions for the residents in close proximity of one of the projects of Enschede Energie.

Factor	**Interview questions**
Public acceptance	• Do you accept the development of a solar farm near you? Why/why not? • Would you accept the placement of a solar farm at any location? If yes, what kind of location would be acceptable?
Local factors	• Do you think the solar farm fits in the local landscape? Why/why not? • Do you think the development of the solar farm will cause annoyance? Why/why not? • What are other factors, if any, that have caused your level of acceptance?
Fairness/trust	• Do you think the procedures of Enschede Energie in developing this solar farm have been fair? Why/why not? • Do you trust Enschede Energie? Why/why not?
Communication strategy (content)	• What aspects of the solar farm did Enschede Energie focus on when communicating its plans to you? • Did this communication address your concerns, if any, regarding the development of the solar farm? • How did you respond to their communication?
Project process	• How much influence did you have regarding the placement of solar farms? Could you influence whether it was placed or not? Could you influence the location of placement? • In what ways could you participate in decision making regarding this project? • Who could/could not participate in the decision making process? • Did Enschede Energie take (counter) arguments of you into account? Why/why not?

	• Would you be less opposed (if you are) to the solar farm if you would have been able to participate more in the project process? Why/Why not? • Was the participatory process shaped the way you expected it to be? (goals/ strategic or operational decision, etc.)
Organizational process	• Do you feel like you can influence the organizational process of Enschede Energie? • Could you participate in the organizational decision making of Enschede Energie? If so, how?
Project outcome	• To what extent do you think the benefits of the project will be shared locally? • How do you think benefits of the project will be shared? • Who benefits from this project? Why (only) these people? • Where do you think the generated energy will be used? • Would you be less opposed to this project if benefits were shared more locally? Why/why not?
Organizational outcome	• To what extent do you think the benefits of the entire organization are shared locally? • In what ways do you think these benefits are shared? • Who benefits from the existence of the organization according to you? • Who do you think uses the energy that is generated by the organization?

Appendix C

Conceptual interview questions for consultant (Gerrit Meutstege) in the field of sustainability for local farmers in Enschede.

Factor	**Interview questions**
Public acceptance	• Do you think residents in close proximity to development sites accept the development of the solar farms? Why/why not? • Do you think the location matters to farmers, or would they be opposed to solar farms in any location? • If not, what kind of location would be acceptable?
Local factors	• Do local residents think the solar farm fits in the local landscape? Why/why not? • Do you think the development of the solar farm will cause annoyance? Why/why not? • What are other factors, if any, that influence residents' level of acceptance of the development of solar farms?
Fairness/trust	• Do you think the procedures of Enschede Energie in developing this solar farm have been fair to local residents? Why/why not? • Do you think local residents have perceived the procedures to be fair? • Do you think local residents trust Enschede Energie? Why/why not?

Communication strategy (content)	• What aspects of the solar farm did Enschede Energie focus on when communicating its plans to local residents? • Did this communication address the concerns of residents, if any, regarding the development of the solar farm? • How did residents respond to their communication?
Project process	• How much influence did residents have regarding the placement of solar farms? Could they influence whether it was placed or not? Could they influence the location of placement? • In what ways could residents participate in decision making regarding this project? • Who could/could not participate in the decision making process? • Did Enschede Energie take (counter) arguments of residents into account? Why/why not? • Do you think residents would be less opposed (if they are) to the solar farm if they would have been able to participate more in the project process? Why/Why not? • Do you think the participatory process shaped the way residents expected it to be? (goals/ strategic or operational decision, etc.)
Organizational process	• Do you feel like residents can influence the organizational process of Enschede Energie? • Can residents participate in the organizational decision making of Enschede Energie? If so, how?
Project outcome	• To what extent do you think the benefits of the project will be perceive by residents to be shared locally? • How do you think residents perceive that benefits of the project will be shared? • Who do you think residents perceive to benefit from this project? Why (only) these people? • Where do you think residents perceive that the generated energy will be used? • Do you think residents would be less opposed to this project if benefits were shared more locally? Why/why not?
Organizational outcome	• To what extent do you think residents perceive the benefits of the entire organization to be shared locally? • In what ways do you think residents perceive these benefits to be shared? • Who do you think residents perceive to benefit from the existence of the organization according to you? • Who do you think residents perceive to use the energy that is generated by the organization?

Appendix D

Items measuring public acceptance and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted

I accept that a solar farm will be developed (relatively) close to my home.	2,03	2,506	,891	.
It's a good idea to develop solar farms at the mentioned locations.	2,03	2,354	,891	.

Appendix E

Items measuring NIMBY and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I don't accept that a solar farm is developed close to my home because others wouldn't either.	10,92	11,404	,602	,549	,368
It would be stupid to accept the development of a solar farm close to my home.	10,27	11,300	,574	,591	,381
I would only accept a solar farm near my home if at other locations in Enschede solar farms would be developed as well.	12,10	18,836	-,044	,081	,699
We have to bear the costs for the development of the solar farm, at other locations they would not accept this.	11,62	14,726	,310	,126	,549
Solar farms cause costs and it is unlikely that there will be benefits.	10,99	14,346	,321	,132	,543

Appendix F

Items measuring landscape disruption and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I expect that the local landscape will be disrupted because of the development of solar farms at the mentioned locations.	12,50	11,290	,838	,704	,810
I think that the solar farms at the mentioned locations fit well in the surrounding landscape (reversed).	12,62	11,448	,719	,534	,856
I think that solar farms at the mentioned locations will have a negative visual effect.	12,76	11,372	,709	,549	,860
I think it's important that the landscape of Enschede remains the way it is.	12,79	12,339	,709	,525	,859

Appendix G

Items measuring annoyance and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I think the solar farms will cause annoyance for residents.	3,85	1,657	,833	.
I think the solar farms will reflect light, which causes annoyance for residents.	3,95	1,677	,833	.

Appendix H

Items measuring fairness and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I think the development of solar farms at the mentioned locations is fair.	2,77	2,281	,566	.
The development of solar farms at the mentioned locations is in conflict with my views on fairness.	2,04	1,934	,566	.

Appendix I

Items measuring trust and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I trust Enschede Energie.	2,59	1,891	,862	.
I belief Enschede Energie will act in my best interest.	2,85	1,927	,862	.

Appendix J

Items measuring communication strategy and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
The communication from Enschede Energie focused on things surrounding the development of solar farms which I worried about.	6,70	11,719	,490	,248	,738
Enschede Energie communicated clearly about the development of solar farms.	7,27	10,282	,577	,361	,642

There were communication issues surrounding the development of the solar farms. (reversed)	7,24	8,981	,639	,416	,564

Appendix K

Items measuring project processes and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
The decision making process surrounding the development of the solar farms at the mentioned locations had a high degree of openness.	13,76	30,296	,598	,471	,766
The possibilities to participate in the decision making process were sufficient.	13,28	26,617	,719	,577	,724
I think Enschede Energie listened to the input of residents concerning the development of solar farms at the mentioned locations.	13,66	26,747	,748	,577	,714
The participatory process surrounding the development of the solar farms was how I expected it to be.	13,20	29,013	,621	,434	,758
If I had more input concerning the decision making process surrounding the solar farms, I would have accepted the development more.	12,26	38,577	,268	,107	,845

Appendix L

Items measuring organizational processes and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Enschede Energie is an organization with an open decision making process.	5,63	5,224	,814	,808
Enschede Energie is an organization in which a high level of participation from residents is possible.	5,42	5,092	,787	,829
I think Enschede Energie listens to the input of residents of Enschede.	5,57	5,037	,736	,877

Appendix M

Items measuring project/organizational outcomes and Cronbach's Alpha if the item is deleted

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I think the benefits of the solar farms will be divided locally.	5,27	4,982	,556	,518	,450
I think the benefits of the solar farms will be shared collectively.	5,19	4,694	,663	,545	,297
I think only cooperative Enschede Energie will profit from the development of solar farms. (reversed)	5,36	6,882	,250	,087	,836