Solar fields in the Dutch province of Drenthe

Factors for social acceptance for renewable energy projects

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Abstract

As climate change continues, the Netherlands is undergoing an energy transition, with the Dutch province of Drenthe experiencing a rapid development of solar fields in the last decade. However, this growth has faced increasing criticism, suggesting that social acceptance for these projects is low. This raises the question of how the growth of solar energy can continue despite decreasing acceptance. This study employs a combination of theory, interviews, and surveys to identify which governance arrangements and factors promote social acceptance of solar energy in Drenthe. The factors influencing acceptance are categorized into three themes: *Trust from locals*, which includes leadership, past experiences with similar projects, and procedural fairness; *Distributional Fairness*, which covers local ownership and compensation. And *Landscape Integration*, which involves smart land use and location characteristics. These factors interact and overlap to shape the overall degree of acceptance. The results indicate that locals are more accepting of solar fields if they provide both aesthetic and economic benefits. This often means that the previous land use was considered unattractive or ecologically insignificant, such as areas along infrastructure, brownfields, or brackish land. There is also a strong preference for rooftop solar panels, but current legislation and the absence of policy have prolonged the planning process. A policy dilemma arises for policymakers, who must choose between clearly defining and mandating local ownership or keeping it flexible to attract market parties. Policymakers must learn from these planning experiences to mitigate future rejection of similar projects.

Keywords: Solar energy, social acceptance, trust, landscape integration, multi-land use, regional energy, energy governance.

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NIMBY – Not In My Back Yard

RES – Regionale Energie Strategie

OER - Programma Opwek Energy op Rijksvastgoed'

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1 Introduction

Climate change is, and will be for a while, quite a relevant topic to talk about. The Paris Climate Agreements made it so that national governments have set out targets for them to reach. In the Netherlands it was decided to divide these goals to lower government layers, like the provincial to create their own environmental goals, which results in a plethora of environmental policies and green energy projects that are more space specific. According to Hoppe and Miedema (2020) such practices are positive in theory, as that would mean that local governments could do what they can within their own needs and capabilities.

What can be noticed, is that large scale renewable energy projects often get a form of resistance from locals, as they feel that they only get the burden and barely any benefits from the projects. On the other hand, local projects, where neighbouring inhabitants have a stake in the development or ownership, may offer the benefits for the locals. However, in practice this may result in an undesired effect that can be described as a patchwork of local projects that may not have the preferred energy output. Next to that, they may form a nuisance for those across the jurisdictional border that stems from one of the downsides of green energy. Green energy is less spatially efficient that conventional methods of energy production. Solar fields and wind parks need significantly more space to reach the same output of, for example, a coal powerplant. This demand for space puts considerable pressure on the already scarce space in the Netherlands. Whereas coal power production is often located further away from the people, greener alternatives often are located in close proximity. Therefore, solar energy makes considerable changes to the energy landscape (Enscherink et al., 2022).

This problem is not new to the Netherlands. In the 17th century, people in the Netherlands complained that the windmills used for water management were ruining the Dutch landscape. Now in the present day, so do the people now with wind turbines and solar fields in rural landscapes. The reason for using rural areas specifically for renewable energy, is because these areas simply have the space for it. However, according to Clausen and Rudolph (2020) locals may not always receive benefits from locally produced renewable energy. Thus, just because there is space for renewable energy project, does not mean that the development of such projects happens without necessary critiques.

A middle ground solution between local and 'national' or large-scale energy projects seems like something that may combine both worlds. This would mean planning on the regional level. A form of regional energy planning can be seen in the Dutch province of Drenthe. According to the Dutch program for regional energy transition or '*Nationaal Programma Regionale Energie Transitie*' the province regards itself as a region, which focusses on their own development of green energy (RES, 2023). To achieve their goals with this strategy, Drenthe takes on the role of a facilitator for its municipalities that have set up guidelines for what to include in a solar field, including for example extra nature and multi-functional land use. The municipalities in turn each look for places for solar- or wind projects (province of Drenthe, 2020).

These solar fields are often local initiatives where the local municipality collaborates with landowners for the placement and with commercial stakeholders for the finances, knowledge, and experience. As a result of this policy, this province has experienced a noticeable growth of solar fields on agricultural land, where initially the ownership was in the hands of the commercial stakeholders and the landowners. In the last decade, Drenthe has seen the planning and development of thirty solar field projects, all ranging from fully operational to still in the need for planning permits (rtvDrenthe, 2023).

With these developments in mind, it would be simple to think that the inhabitants of this province are enthusiastic about solar fields. However, with recent developments, a shift in attitude can be sensed towards solar field projects. In the last few years, newspaper articles tend to be more negative about

the arrival of new solar fields. With headlines that state that solar fields are not a great thing on their own, and thus need to be better integrated into the landscape (Langeler, 2023). At the same time, a new park was denied planning permission in Hoogeveen, because it did not meet the municipalities demand for nature (Buit, 2023). Such developments are interesting, especially considering the number of solar fields that are already developed in the province. Somewhere along the way, the willingness or acceptance towards such projects in Drenthe has flattened, as placement and nature guidelines become stricter.

According to Hoppe and Miedema (2020) available literature about regional level energy transition is scarce, which creates a knowledge gap. Therefore, they have suggested for future research on energy transitions in different regions in the Netherlands to map out the challenges and how to overcome them. The knowledge gab within sustainable energy projects on a regional level explains the presence of certain challenges within the planning process. As mentioned above, solar energy may cause different forms of friction from locals. It therefore can be noted that acceptance of renewable energy projects may not be self-explanatory, as can be seen in the Dutch province of Drenthe. Not all projects are evenly accepted, which raises the question as to why that is. Somewhere within the planning processes or the governance are factors that either foster or obviates acceptance from locals. Therefore, this study aims to gain an improved understanding on the challenges associated with decentralized governance, by looking into what factors could drive social acceptance of local changes in the energy landscape. The experiences and perceptions of public officials, energy producers and involved residents that are part of either decentralized governments or collaborations regarding governance of sustainable transitions at the regional level will add to this as well.

As Van Engelenburg and Maas (2018) argue, there is little overlap between theory and practice regarding energy transition on the regional level. At the same time Hoppe and Miedema (2020) have mentioned that follow up studies with multiple cases are needed to build on the theory regarding energy projects on a regional level. The lessons learned from this study may be valuable for public stakeholders within the energy transition, like other governments that try to undertake a similar approach within their district or as collaboration between other areas. It may allow for a better understanding as to why some projects have success in their collaborations, while others do not. Since these additions to the knowledge about social acceptance would allow for an improved support for government agents to work with, that may result in a smoother transition process. Therefore, this research adds to the understanding of the process of regional energy transition and rural development, especially on the acceptance of new renewable energy projects. To do that, this research will find out *which governance arrangements and factors for social acceptance are successful in the development of solar energy in Drenthe.* By looking at why the development of solar energy fields in Drenthe so quickly, how stakeholders collaborate on the development of solar energy and which factors influence the social acceptance of these solar fields.

1.1 Reading guide

The next chapter will delve deeper into the solar energy policy for the Netherlands, and especially Drenthe. To better understand what factors for social acceptance for renewable energy means, a comparison will be made with three different countries to give a form of context to the development of localized energy policy. After that, in chapter three, theory will be discussed for factors of social acceptance to renewable energy project. Chapter four is the methodology, with chapter five being the results. Chapter six will house the discussion, where the research questions will be answered, and a reflection will be given. Chapter 7 contains the references. The appendix 1 will house the survey, and appendix 2 the survey results.

2 Policies on localized energy initiatives

Energy transition is a delicate process without a standard method that guarantees success. Similar practices may result in vastly different outcomes, because of path dependency. An energy transition can thus be seen as a story a place experiences, with each story having their own set of plotlines, characters, motivations, and writers. It builds a place-specific context. To highlight this idea chapter will discuss how three different western European countries have managed solar energy projects. After that, the Netherlands and more specifically, Drenthe will be discussed, and compared to the other countries.

2.1 Lessons from abroad

The countries are Germany, Denmark, and the United Kingdom, have similar climates, levels of sunlight, culture and (in)formal institutions (Yildiz et al., 2014). By using the specific examples of three similar countries, on climate, culture and institutions, the difficulties of the solar energy transition will be showcased.

2.1.1 Denmark

Solar energy is not so much seen as a strong option for renewable energy in Denmark. Currently, the share for solar energy in Denmark is around 3,6% which is used for supporting heat grids or datacentres, with current legislation focusing mostly on private solar panels on rooftops ((Behzadi & Arabkooshar, 2020; Formolli et al., 2021). The Danish focusses more on wind energy, which met with a strong usage of bottom-up movements from the government and local actors that were able to activate the local populace in the energy transition (Mey & Dieseldorf, 2017; Gorroño-Albizu et al., 2019). This has allowed for community wind ownership to grow from the seventies' onwards toward the late 90's. In the 80's Danish wind policy allowed locals to buy shares of windfarms that were in proximity of their homes. As these shares made the locals co-owners, it allowed them to be able to participate in the decision-making process. One of the main reasons for these policies, was because of both the oil crises of the 70's and the hesitation towards nuclear power in the 80's. it made the Danish government aware of being vulnerable for external factors, which created a focus for more energy independence in the form of renewable energy (Gorroño-Albizu et al., 2019). In the 2000's, the Danish government changed their motivations for the renewable energy transition. Now it was motivated by climate change, which made them follow up on a role of being a 'green pioneer.' To do that, they wanted to focus on efficiency and green energy output, which changed their approach from community-based bottom up toward top-down large-scale wind farms. Because of this change in motivation, solar energy has seen little attention in regards of regional or local based actions.

2.1.2 Germany

Even though Germany's national policy is still highly reliant on coal mining, Germany still offers several examples of local energy initiatives in the form of energy cooperatives (Kalkbrenner & Roosen, 2016). These cooperatives focus on regional energy transitions (Schmid et al, 2020) The result of this are several villages being mostly reliant on locally renewable energy (Mahzoumi, 2019). These cooperatives work together with municipalities, partly because municipalities are unable to fulfil due to capacity and knowledge constraints or because of bureaucratic limitations (Roesler & Hassler, 2019; Schmid et al, 2020). This way it allows for the energy cooperatives to become more of a partner of the municipality, instead of a client within the municipality, by bundling the legislative, financial and knowledge powers these two stakeholders. The idea for this approach is to develop initiatives from the bottom up with the help of both social entrepreneurs and public assets. To make such ambitions possible, locals must be on board for that. Therefore, energy cooperatives have made efforts in their

design to boost local acceptance within their local areas (Mahzoumi, 2019). Nevertheless, from this, both energy cooperatives and municipalities are bound by legislation to further expand on their renewable energy ambitions.

2.1.3 The United Kingdom

Like with Germany, the UK focusses on local small-scale and collective initiatives for renewables as well (Mahzoumi, 2019). In 2002 the UK introduced a 'Renewable Obligation', which was intended to create demand for new plans for renewable energy (Iskandarova et al., 2021). In 2014 they started to develop an official community energy strategy, which focuses on the added benefits of community-led energy projects, namely the energy transition, rural development and strengthening of communities. The locals within these renewable energy communities have a high degree of ownership, control and collectively benefit from the outcomes (Mirzania et al., 2019). However, this changed with more recent governments, with a more centralized approach for their energy production, with cost-efficiency and energy output over community development. Under the term austerity, community-based renewable energy is on a downward trend since 2016. Community-based renewable energy projects try to keep themselves alive. However, they often lack knowledge and experience. And without necessary government support, many projects seem to fail (Iskandarova et al., 2021). According to Mirzania et al. (2019), the UK government has shot themselves in the foot by reducing support for community renewable initiatives. Iskandarova et al. (2021) may confirm that, as their study point out a great stagnation in solar power deployment since the start of 2017. As a sidenote, the Scottish government did continue with investing in local energy initiatives. However, these were focused on energy from wind, which Scotland has in abundance. With this, the Scottish government showed active participation and willingness for the energy transition (Clausen and Rudolph, 2020).

2.1.4 Afterthoughts

Lessons from these three countries can be summed up as following. What is needed for local energy initiatives to come off the ground and stay attractive is a proactive government that facilitates an environment where locals have the power to develop their own plans. With that, financial incentives are needed to get started. Furthermore, collaborations between different kind of partners are necessary to make use of all their strengths, be it knowledge, experience and or capital. Now it is time to look at how the Netherlands, and eventually the province of Drenthe has conducted its solar energy strategies.

2.2 The Netherlands

On the 6th of July 2023, the Dutch minister of energy has delivered a letter to the Dutch parliament in which he explains the current situation regarding solar energy in the Netherlands. He opens his message by stating that Dutch solar energy looks sunny. It turns out the growth of solar-pv panels has never been this high than last year. Further in the letter, it was mentioned that the Dutch government is willing to set aside 225 million euros for the instalment of solar panels on buildings, monuments, and other kinds of structures (Ministerie EZK, 2023). However, with the quick growth, concerns were raised about the placement of solar panels.

Agricultural land is the main reason for these concerns, as people claim it as a loss of economic opportunities. Differentiating between locations creates nuance for projects, so that not every solar energy projects would be associated with the least favourable location. Thus, the minister made a ranking for solar panel placement to stimulate, normalise and facilitate future projects: 1 Rooftops, 2. sites or objects in build-up areas, 3. sites or objects in rural areas, 4. agricultural and nature areas. The

minister agrees with the notion that spatial quality is necessary for proper implementation of solar panels.

Spatial quality would add to the attractiveness of such projects, which is important for both gaining support from locals. An example for locations three is building on former water- or sand collection basins. In 2022, approximately 230 MW was generated by such projects. These locations hold barely any significant ecological value, therefore converting these to energy production facilities seems to generate considerable approval by the public. At the same time, programs exist which focus on the establishment of solar panels on state property. The program 'Programma Opwek Energy op Rijksvastgoed' (OER) focusses to facilitate and stimulate intermunicipal collaboration and explores the possibility for energy on state property. In Drenthe, there are some projects going on that fall under this strategy (OER, 2023). The Z*onneroute N37* or solar route N37 is a plan that is about the N37 highway from Hoogeveen towards Klazienaveen, close to the German border. Its planning area lies in multiple municipalities which allows for the collaboration strategy.

2.3 Drenthe

Now, the solar energy development in Drenthe will be discussed. Inhabitants may develop their own solar fields if those plans meet these requirements (GS Drenthe, 2021). Thus, the province of Drenthe is acting as a facilitator with a 'yes, but only if.' *(`Ja, mits…`)* attitude towards sustainable energy projects. however, a facilitation role does not guarantee acceptance. According to the regional news company RTV Drenthe (2023) a voting questionnaire of the provincial elections (Kieskompas editie 2023) claims that 60 percent of the inhabitants of Drenthe being against the usage of agricultural land for solar parks. Therefore, the requirements to develop solar fields focus on multi-usage, added value for the local area, respecting height differences and natural qualities and enough distance between existing infrastructure or buildings.

Furthermore, new plans must include a participation report where it is noted that A) sufficient efforts have been made to include locals who are otherwise not involved in the plan. This means locals, not just the local landowners of the planning area should be taken into account, for example with the idea of defining local ownership; B) locals are able to participate in the planning process and/or financially participate; C) enough transfer of knowledge has been made to get both the initiators and locals on the same knowledge level; D) the locals have had enough time to think about all the information before making decisions during negotiations; and E) that the results and agreements from these negotiations are communicated sufficiently.

An example of participation, the A37 solar route can be brought up again, because people neighbouring the solar route could receive a 50 percent stake in the project. This means that the locals will be co-owners of the project. One spokesperson said they reasoned the profits would otherwise go to commercial external parties, so a 50/50 co-ownership can only be regarded as beneficial for them, as it is believed that this will booster local support (Rtv Drenthe, 2023). With these rules for ensuring both the integration and maintenance of the provincial landscape, as well as citizen participation within these local projects, the province of Drenthe has set up itself in a facilitating role. This method is a decentralised governance approach that fosters space-specific approaches with a strong degree of public support, however it does come with several downsides.

For starters, the electrical grid is unable to cope with the growth of the green energy. Also, when solar energy production is at its peak, the usage is at its lowest (RTV Drenthe, 2022). This is called net congestion. the effect of this is that some solar fields are not connected to the grid and are unable to return their generated energy towards grid, rendering them useless (Provincie Drenthe, 2023). The province has provided a list of workable solutions to optimize local generation and to lower the risk of

congestion, which mostly focus on lowering the peaks of usage, like rearranging solar panels in a different way, as well as exploring the possibility of sharing energy with neighbours (Provincie Drenthe, 2022). This struggle is nationally occurring, and solutions are temporary to soften the problem of grid congestion instead of solving it (RTV Drenthe, 2022). The province did try to slow down new solar energy projects by discontinuing a subsidy for residential solar panels, however this stop is municipality specific, so some municipalities in Drenthe still allow it (Provincie Drenthe, 2019). Municipalities are more careful now to allow further development of new fields. Examples of this can be seen in media outlets. Recently a request to develop a large solar project of around forty-seven hectares has been denied on the grounds that it is both too big and too close to Natura 2000 areas (RTV Drenthe, 2023). At the same time, a small number of solar panels around the town of Hoogeveen was denied by the municipality, which were too close to residential buildings. Larger plans got a preference by the municipality because of the potential in green energy production (DvhN, 2022). Although they do not offer objective explanation of the situation, it does show growing discontent with the development of new solar fields.

2.4 Comparing thoughts

What can be seen from how which plans get denied and which are still being developed, is that municipalities in the province have the power to influence production of solar energy. They try to maintain a grip on an otherwise uncontrolled growth on solar fields. This put a halt to projects that were not considered sufficient in either size or ecological benefits. Larger projects, however, seem to be favourable for development, which is comparable with developments that were shown in the UK. The thought about co-ownership is similar to the early developments in local ownership that can be seen with the ownership of wind turbines in Denmark. It also contrasts the UK, where investments for solar energy were halted in the last decade. Drenthe, including several of its municipalities, is still actively investing in solar energy, especially with the large-scale development of the solar route. This, combined with the local ownership of 50 percent as an aspiration like that in Germany, would potentially allow for an increased degree of social acceptance for solar field projects. However, what a degree of social acceptance means will be discussed in the theoretical framework.

3 Theoretical framework

In the previous chapter, we looked at how neighbouring countries, with similar institutional arrangements handle regional based community projects for sustainable energy. From that chapter efforts for the development of solar energy are paired with centralizing and up-scaling the production of solar energy, which hinders community-led approaches. However, these community-led approaches do continue to exist as a viable alternative for the growth of solar energy. A condition for this is that it can only be a viable option, if there are institutions in place to sustain them, from the government. This chapter will delve deeper into the literature to further explore this by looking at energy governance and energy transition on a regional level. In the end, a set of factors for the acceptance for solar energy fields can be listed.

3.1 Ambiguity of scale

Firstly, the terms local and regional will be defined. In this research, the terms local and regional will be used frequently. However, there are different ways in which you can consider something local and regional. Van Engelenburg & Maas (2018) argue that even though a region may be defined as a coherent geographical area, the boundary between local and regional is blurred. Clausen and Rudolph (2020) take note on this unclarity by coining the term *ambiguity of scale*, which they describe that there is no objective way to consider something local or regional. In addition, their definition of what is regional is that it can differ massively in size and jurisdictional boundaries between different geographical places. For example, local in the Netherlands would either mean close to a village or town, while regional encompasses at least one or more municipalities.

Furthermore, these geographical scales can be interpreted culturally and juridically. Juridically speaking, regional energy transition can be considered as a process to build up an integrated energy policy between multiple entities at the local level (Van Engelenburg & Maas, 2018). While it is regional, as the name suggest, it can have local implementations as well. For example, it would allow for strategic collaborations between municipalities towards a collective goal. Looking for more localized options to achieve those collective goals is something that can be seen in practice. Drenthe has its policy for reaching national environmental goals implemented as a regional energy strategy, or RES, where its goal is split among the municipalities to allow for more freedom for renewable energy projects.

However, this comes with the challenge of dividing tasks between stakeholders from solar energy projects (Hoppe and miedema, 2020). Wu et al. (2020), Hoppe and Miedema (2020) and Van Engelenbrug and Maas (2018) all argue that concurrence between stakeholders within a regional energy transition is needed. Hoppe and Miedema (2020) point out that such constructive collaboration between stakeholders on the regional level may be difficult to implement, as local government agents may not be willing to ´give away' power to other parties. Additionally, a conflict of interest can occur when more parties are involved, especially if the different parties operate at either spatial levels, be it local or regional. The reason for this is lack of trust. This does not mean distrust or animosity; it can also stem from a case of unfamiliarity between parties. A clear form of leadership may improve that familiarity, since that would give the parties something in common that may work as a mediator to guide the parties to their preferred outcomes (Horlings & Padt, 2013). therefore, a regional energy transition works when there is a clear form of leadership that helps the different parties or stakeholders to stay focused on the energy goals of said region (van Engelenburg & Maas, 2018)

3.2 Community

The localised plans may stem from a community-led initiative. However, what does community actually mean? An energy project within a community may not be considered a 'community-led' initiative in practice. Like the idea of what can be considered 'local' or 'regional', the term 'community' pertains a blurry definition as well. According to Walker and Devine-Wright (2007) there is not a clear definition of what community means. Like with local and regional before, people interpret this word differently as well. As a result, they created a model for community-projects, which offers a way to categorize projects as to how locals participate in the planning process and how open the participation process is (Creamer et al. 2019). These different ways are visualized in their model (figure 1) below.

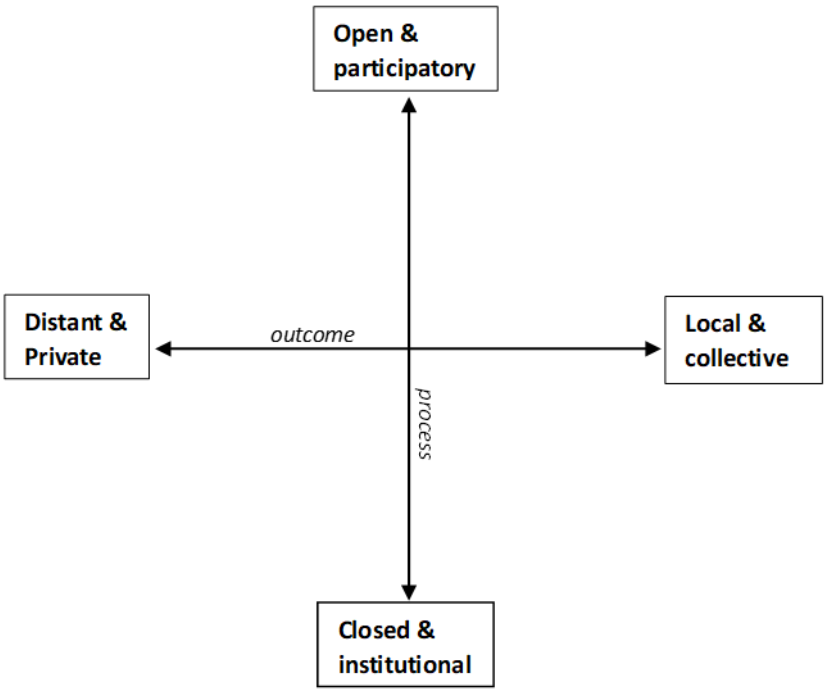


Figure 1 Understanding of community renewable energy in relation to project process and outcome dimensions. Walker & Devine-Wright, 2007

As can be seen in the model, the x-axis is explaining the outcome, which can be either distant and private or local and collective. The y- axis explains the process, which is divided into open and participatory versus closed and institutional. One of the critiques for large scale renewable energy projects is that it would be too distant and private, and closed and institutional, which places this type of project in the bottom-left corner of Figure 1 (Walker & Devine-Wright, 2007). Distant in this case can mean both spatially and institutionally distant, or out of touch with the locality of the project, meaning that the developers have less motivation in reaching for local interests. As such, distant parties can be from a higher government layer that in turn would allow for external commercial parties to develop these projects. Thus, the bottom-left corner can be seen as the ultimate form of top-down planning.

At the other side of the model, there is *open & participatory* and *Local & collective*. This side of the model can be considered more in line with bottom-up approaches. By sitting in the top-right corner, it means that participating in projects are reserved for people who are considered part of the community or locality. Still, Walker and Devine-Wright (2007) make the distinction between community-led project, be it from locally based companies and expertise; or if the project makes use

of community buildings, like churches; or if the ownership of the projects will be owned and maintained by locals. An example of the latter would be a renewable energy park that is developed, funded, and maintained by an energy cooperative. These are founded with the idea for localities to collectively provide renewable energy. The cooperatives would fulfil the role of the public interest within the development of plans and thus offer a gateway for locals to participate in the planning process as an entity (Schmid et al., 2020).

It was argued earlier that energy planning on a regional level would require clear leadership to build trust and make sure interests of different stakeholders are met. However, in practice this may not always be the case. According to Frantzeskaki et al. (2013) a trend is going on in the west with governments taking a step back in the planning of community energy projects. What is meant by this, is that the government would allow for more legislative liberty for development, while also not actively steering the development. The reasoning for this would be the result of an environment that facilitates community-led initiatives by making legislation more lenient. However, this facilitating role may not always fully result in 'community-led initiatives'. Locals often do not have the financial capacity or the knowledge to develop such projects. Which is why the help of companies specialising in solar power are often needed in to fill the gap for knowledge, skills and the capital to develop the solar fields. A downside to this planning arrangement is that private parties might ignore or wash over public interest in the area and fully focus on the profitability of the projects. (Avalino et al., 2014).

In Drenthe, the current provincial policy, the RES 1.0, indicates that the province takes on a similar role as described by Avalino et al. (2014). From the literature and policy documents a division of roles between stakeholders can be noticed. The Government provides an environment that fosters development of those solar fields. Private companies can come in and develop those fields, while the local interests may be fulfilled when either the energy cooperatives of said localities are brought into the planning process, or if the private stakeholders are reaching out to the locals themselves. When that happens, the stakeholders aim to reach a form of social acceptance to reduce hindrances during the development process. The next part will delve deeper into what that may entice.

3.3 Social acceptance

Social (or public) acceptance of energy projects is a key factor for a regions' energy transition. According to Enserink et al. (2022), the degree of social acceptance can be defined as active or passive response towards new plans both positively and negatively by locals. It can therefore act both as a catalysator and as an obstacle for the energy transition within a region. Carley et al. (2020) sees a strong growth in social support or social acceptance studies within the energy sector in recent years. Results from their study indicate that, in general, people are more positive than negative about most types of energy infrastructure. People generally understand the necessity of renewable energy, and thus are more favourable towards it. However, although solar energy seems to be more well received than for example wind energy, solar fields receive less focus in studies regarding social acceptance than for wind energy.

According to Hai (2019) there are several degrees of what can be considered social acceptance. Each of these degrees are based on different attitudes and actions. The highest form of social acceptance is actual adoption, or active acceptance. It means that locals not only have a positive attitude towards a new plan, but they also make use of these plans as well. In contrast, Hai (2019) also mentions passive acceptance. This degree consists of people who have a positive attitude towards a plan, but do not make use of these plans. However, it can also include ones who may be positive or negative-minded but are just unaware of the plans. Such passive response may as well be called ignorance, or

indifference when they do have knowledge of the plans. The next degree is rejection, which means the unwillingness to accept plans for whatever factor that may be, but are not actively fighting against them. However, there can be even a case where these people are actively fighting against new plans, instead of just saying no. That brings it to the final degree, that of opposition. These are actively unwilling towards accepting new plans. This has happened in Drenthe as well with the construction of wind farms Drentse Monden-Oostermoer in the north-east, which received fierce resistance from the locals (RVO, 2023).

3.3.1 When do people accept?

Huijts et al. (2012) recognize three types of acceptance regarding the development of new sustainable energy. Namely consumer, citizen, and socio-political acceptance. Consumer acceptance encompasses the willingness of people to opt for more sustainable options regarding energy, like buying and installing solar panels on your roof. Citizen's acceptance means the level of neutral or positive response towards new sustainable energy plans in proximity to the citizens in question. If these citizens look further than what happens in their proximity regarding such plans, like on the regional, national or international scale, then you may speak of socio-political acceptance.

When looking at a more psychological way, it has to do with peoples inner values (Perlaviciute et al., 2018). According to Huijs et al. (2012), the degree of acceptance is influenced by whether distinguished criteria are met. These values can be split up into three different categories: rational, normative and emotional values. To start, rational values tend to have different names in literature. For example, Huijs et al (2012) refers to these values as gain values. These values consist of a rational consideration of the costs, benefits and risks of the options. These costs may be straightforward monetary costs. If the development of new solar parks seems to be on the expensive side, especially with the aforementioned challenge of grid congestion that plays into the consideration of citizens whether they believe further developments is still feasible.

The second one, normative, has rationality as well, but mostly takes the benefits in consideration. This includes people who are mostly driven by current social or personal norms. For example, people choosing energy options that are the best for the environment. People who are driven by their normative goals might feel that it is their moral obligation to accepts sustainable energy projects. Energy types each bring their own set of benefits and drawbacks. According to Carley et al. (2020), most times drawbacks seem not to be a defining factor for solar energy support. What these drawbacks specifically entail are not mentioned, however. It can be understood as the combination of factors that can have a negative impact in people's lives, be it in the physical sense, like the local landscape, or in the economic sense. Therefore, it is important to note that such moral obligation is heavily influenced with the perception that certain sustainable options, like solar fields, will actually be beneficial towards the sustainable energy goals.

The last one is emotional. It is normal for people to base their behaviour and attitude on what kind of emotions new plans or technologies bring them. The attitudes are based on what affects are the expected feelings that happen when the development of new plans is announced (Huijs et al., 2012). These feelings can be positive, like happiness, pride, satisfaction, or negative, like fear, anger, or unfairness. According to Perlaviciute et al. (2018), the form of emotion that will be triggered by the development of a new energy project is dependent on how the abovementioned rational and normative values are affected. This means that a new energy project can trigger all these values at once. The emotional response is then dependent on how people may perceive the new plans. The term 'Perceive' is the main point of this part about emotion. These can be process related, about what they think of people who are involved in the project, different stakeholders and how they feel that they are treated during the process. At the same time, it can be more in the physical sense, as in that

people react to the sudden change in their surroundings; or to keep it more in line with the rest of the text, their perceived local landscape. Such sudden changes may cause a collective sense of injustice, which may turn into a form of NIMBY response.

3.4 Factors that go beyond NIMBY

Not in my backyard, or NIMBY, as it known, is the concept that people do not want to have things built next to them. According to Carley et al. (2020), NIMBY has a plethora of different explanations, which is the result of the wide array of research designs that make use of the concept. To make it clear what NIMBY entails, Carley et al. (2020) uses the definition of NIMBY noted by Wolsink (2006). This definition is a two-parter that embodies a form of hypocrisy, that there is acceptance of a project type in general but there is a rejection and resistance towards such specific projects locally. Thus, they define classic NIMBY as people supporting certain projects, the ideals behind it, but not when such projects are being planned in their locality. Carlisle et al. (2015) describes NIMBY as a protectionist attitude, combined with acts of resistance by locals, which are against 'unwelcome developments' is their local area. This definition however does not share all the weight of the definition set by Wolsink (2006), which states that the locals do show favourable attitudes towards the type of technology, in this case solar energy, but not when solar projects are built next to them. Carlisle et al. (2015) acknowledges the shortcoming of that definition, by stating that NIMBY does not offer proper explanation for opposition by locals purely based on distance.

They continue this, by pointing out that scholars tend to move away from the simplistic explanation of NIMBY, with concept already being heavily challenged already since the early 2000's. Carley et al. (2020) do the same. it is difficult to make a generalization about whether NIMBYism is a driving factor for public support, as most results regarding such topics come from studies that are about a singular form of renewable energy. They do try t to distinguish whether the critiques from such projects are about the specific type of renewable energy or that the critiques are from renewable energy projects close to people's backyard in general. It is now generally agreed that acceptance of renewable energy projects is less of a matter in regards of proximity but required by meeting a set of conditions. Therefore, it would not be in line with the NIMBY definition set by Wolsink (2006)

Surprisingly from Carley et al. (2020), results regarding NIMBY can vary quite strong across different studies. Although they make a nuanced use of the classic definition of the concept NIMBY, they do notice consistent evidence between differences in attitudes regarding energy types and their proximity towards those facilities. Nevertheless, these studies use distance as a defining factor for shifts in attitudes, which may explain the simplistic confirmation of NIMBY. They noted that the proximity of energy infrastructure could both foster positive and negative attitudes towards energy projects. This highlights the development of recent literature regarding NIMBY, where the concept continues to be seen as insufficient. The term may discredit criticism that have stronger foundations than proximity, for example procedural wrongdoings. As a result, local resistance may sometimes be wrongfully labelled as NIMBY. There is a greater number of factors at play as to why people may not accept certain plans close to their homes. According to Pasqualetti & Stremke (2018), the spatial inefficiency of renewable energy projects, like those solar fields, have a considerable impact on the local landscape for the people that live in proximity of it. Wind turbines are often unwanted by locals for their noise, shadow and how their size influence the landscape.

For solar panels, this is slightly different. Individual panels are smaller in size; however, the situation changes when you fully build up a meadow, then the size of the whole project can be a considerable impact on one's landscape. Nonetheless, they do not produce a large shadow span and barely produce

any noise like wind turbines do. Overall, it does require a large surface area to be build up, which influences the local acceptance of such projects, especially if those parks will be built on farmland, as some consider that destruction of its economic potential (RTV Drenthe, 2023). Even with the current attitude towards such projects on farmland, public acceptance for these kinds of projects still seems a feasible challenge as the number of fields indicate. In the following section, we will look at other factors that may foster acceptance for solar projects.

3.4.1 Knowledge, experience and time

From the previous sections, it became apparent that emotions can have a strong influence on the attitudes people may have towards a new project. One of the driving forces of these emotions can be people's perception. In this part of the theoretical framework, several different factors that have some part to play in that perception will be discussed.

According to Perlaviciute et al. (2018), project developers tend to make general assumptions on how to deal with the emotional response, and resistance by locals for new energy projects. It is often believed that locals will change their minds and be in favour of new projects being build next to them, if they get a better understanding of the costs, risks, and benefits of renewable energy. Hai (2019) notes this assumption as well. In his study he concludes that the willingness to accept or adopt new energy can be increased if adequate information is exchanged on the costs, risks, and benefits of new plans. He further suggests that informing on business models or support schemes might have an additional added value to the degree of acceptance. Although this study is about the adoption of individual or very local solar panel installations, it can still be used for the argument that people who live close to a newly proposed solar field may have a stronger willingness to accept it if certain support schemes or business models were discussed with them. However, the actual change in their spatial environment is often ignored with this approach. This may be due to what Silverman et al. (2019) claim as a difference in place-making processes. Locals would base their place making on normative and moral dimensions, while developers are more pragmatic and economically driven, or in their own words; "divorced from the socio-economic landscape of people and place". This quotation can be seen as an absence of citizen acceptance towards these types of developers (Huijts et al., 2012). Not understanding that locals may have more concerns than the risks, costs and benefits a project may bring, may lead to developers writing local concerns off as NIMBY responses.

These factors have a conditioning influence in the willingness to accept. As mentioned previously, Hai (2019) argues that people perceived certain technologies as less scary when they have more knowledge about them. Huijs et al. (2012) note that as well in their studies. They claim the attitude regarding plans can change over time with the increase in knowledge about the subject. In their example about hydrogen, they conclude that the perceived risk decreases, and the willingness to accept new technologies increases after gaining more knowledge. However, this is different with solar energy, as the dangers of hydrogen are exceptionally higher. For solar there are no such risks. Locals would experience hinder because of landscape degradation. External parties can come in and change their local surroundings. In addition, because of the challenge in finding suitable places, renewable energy projects may have the chance to be placed in an area that is close to jurisdictional boundaries. Locals who live in a different area, thus not being part of a possible financial support scheme, can experience hinder of projects without compensation. It can be said that they are vulnerable for externalities (Gross, 2020).

Therefore, introducing forms of land use that were not previously present in the area may have to be done with strong consideration towards the people who live there. According to Gross (2020), clear

information about the choices that have been made regarding a renewable energy project coincides with a more positive reception towards it. For this, developers would have to take active responsibility informing locals about certain decisions being made. In short, transparency is key (Horlings & Padt, 2011). Silverman et al. (2019) agrees with that. They go further and highlight the necessity of including motivated locals into the planning process. In practice this may be an energy cooperative that acts as a local stakeholder in the development process. It would allow for collective local strength, and place-specific integration for the projects.

One of the points that has been mentioned throughout this chapter is influence on perceived landscape. Renewable energy projects have the chance to cause a change in someone's perceived landscape, which may lead to hesitation towards accepting it (Carlisle et al., 2015). However, not every type of renewable energy faces the same degree of resistance (Carlisle et al., 2015). Enserink et al. (2022) argue that there is a strong relation between landscape design and social acceptance. For example, one of the often mentioned upsides of solar is its lesser visibility compared to wind turbines. Solar panels require less height, they can easily be muffled away behind taller objects. Still, space is needed for sustainable energy projects. finding suitable space however is often quite a challenge, as locating such projects may cause resistance from locals (Carley et al., 2020). Because of this, Gross (2020) offers a number of recommendations for suitable locations for renewable energy projects like degraded land, or brownfields, and building them on rooftops. Renewable energy would in that case be seen as an addition to a preexisting eyesore, and therefore regarded as a positive development.

Nevertheless, according to Huijs et al. (2012) time is a factor of importance as well. In several studies it was found that the willingness to accept new plans by locals went up as time goes by. In a sense, they experienced living with it once certain plans are already developed, installed and even operational. So, a better term for time would be experience. Hai (2019) agrees with this, and concluded that the willingness to accept and adopt new solar energy panels increases as time goes by. Although these studies were mostly about panels for personal use, like placing it on people's own house, it does seem that attitudes were affected more positively because of peer effects. This also had a decreasing effect in the decision time for purchasing new installations.

Because of this, Hai (2019) distinguishes two phases where these factors can be at play, namely the pre- and post-adoption stages. A different example for this distinction in stages can also show the negative consequences of experience. Nkoana (2018) mentions this by stating that local leaders in South Africa were concerned with adopting new forms of energy sources. Planned outages due to mismanagement of the electrical grid, made it so the use of electricity became too expensive and unreliable, which made locals weary of the potential of renewable energy. At the same time, a concern arose that the local produced electricity was used for the entire grid, and not just for the locals that lived next to these sites. So, these experiences with the planning processes of energy projects have an impact on locals' willingness to accept, however this can also be blamed on the lack of knowledge about the subject and lack in trust towards the lacking leadership.

3.4.2 Trust and reliable leadership

Horlings and Padt (2011) argued about trust between stakeholders on a regional level, especially with different government layers involved. Each has challenges regarding hierarchy, competition, and self-governance, with sometimes unclarity of the different responsibilities and tasks (Hoppe & Miedema, 2020). In their case studies it became clear that different stakeholders were having difficulties to develop trust between the other parties, because it was unclear who was responsible for what. Therefore, according to Horlings and Padt (2011), clear leadership that can keep all parties involved

on the same path during an energy transition is necessary to develop proper sustainable strategies. However, they follow up on it by stating that there is more to leadership than just the leader. Without the support of the community, a motivated leader may not achieve anything.

Huijs et al. (2012) agree and argue that new sustainable technologies or plans are not the only things that influences social acceptance. It is also influenced by those that initiate or develop these plans. This all is done with the degree of trust, and the perception on procedural fairness and distributive fairness. According to Huijs et al. (2012) there is not really an exact definition of trust. However, they themselves define it as:

"*Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another*" (Rousseau et al.1998; as mentioned in Huijs et al., 2012)

A high degree of trust influences the perceived risks and benefits of projects and in turn could increase the level of social acceptance (Huijs et al., 2012). Another example from Nkoana (2018,) highlights the difficulties regarding trust. The rural areas where the solar fields of said study are located are often in the hands of farmers, traditional leaders and or municipalities. Which creates the situation where community lead initiatives are only feasible if those landowners are willing to allow it. Since the landowners were not seen as trustworthy enough by the locals, such community projects did not take off. A lesson from this, is that securing landownership for community-led energy initiatives would be helpful get trust in a project.

Another method for gaining trust would be to show active interest in the region. According to Horlings and Padt (2011), regions could invest in new forms of sustainability by developing green innovations based on regional and local qualities and assets. O'Neil (2020) goes even further, suggesting that renewable energy plans should be integrated in their local landscape, both physically and socially. Integrating plans on a social level means that locals would have a strong connection with the renewable energy plans. Either they would receive benefits from these plans, either monetary wise, ownership or directly being able to make use of the energy that is produced there. Physically on the other hand means complementing the existing landscape characteristics. It should reduce the amount of landscape disruption, maintaining the areas' character. Carlisle et al. (2015) agrees and list factors that may be beneficial for a local community. These factors are in line with the community model of Walker and Devine-Wright (2007). They mention the usage of local knowledge and services on the short term. Long-term factors include investing in the locals themselves, either by developing infrastructure there or allow for schooling the locals to be able to work in the energy sector.

3.4.3 Distributive vs procedural fairness

Social acceptance may be influenced by whether people who are affected by projects have been considered treated 'fairly'. Huijs et al. (2012) mentions two types of fairness, procedural fairness, and distributive fairness. Procedural fairness considers how people affected by a plan are treated during the whole development process. The degree of procedural fairness is dependent to some extend on how it is perceived. Procedures can be objectively tested whether everyone is treated fairly, however people can still perceive the process unfairly. In contrast, locals affected by a new plan that are not involved in the process per se, still may think of being treated fairly if they perceive it as such (Huijts et al., 2019). According to Perlaviciute (2018), a proactive attitude by the developers towards people's implications for an energy project already improves the perceived fairness during the planning process. It can offer a solution to respond to people's emotions or values. By carefully asking

beforehand what kind of emotions they get when these projects are developed, an assessment can be made which variables may trigger a positive emotional response. Ideally, this would result in a set of characteristics in which a plan can be adjusted to acceptable standards. An example of this is the usage of landscape architects to integrate solar fields into the local and historical landscape. Landscape architects may continue to have a larger role with the energy transition of a region if that means that social acceptance will increase with a better integration into the local landscape (Enserink et al., 2022).

Distributive fairness on the other hand, assumes that the costs and benefits are distributed evenly relative to what is considered fair for the locals. Jorgensen (2020) states that many attempts at conducting different strategies in providing compensation for sustainable energy projects have been tried. For example, Clausen and Rudolph (2020) analysed community renewable energy and rural development by looking at the history of Danish wind energy. This started in the 1970's with small-scale local wind parks. In later decades, namely with the rise of liberalisation and privatisation and as a cost-efficiency measure, these wind parks were transformed in size and intensity. Wind turbines were either added or upgraded to larger variants, these wind parks were managed more centralized. As a result, the locals got a steep decline in revenues, democratic input and blamed the process for the decline in rural communities. As a saving measure, compensation was introduced with four options: namely compensation for loss of property values due to wind turbines; support funding for the development of local wind farm projects; payments per wind turbine to the municipality to boost recreational values and the possibility of 20% co-ownership when living close to a wind farm.

Such measurements may trigger even more negative responses, as it can open discussions of who gets what and when. This was eventually the case. Although this measure was introduced, it did not solve any resistance from the rural communities, as the compensation package was only feasible for those that could afford them. It resulted in a compensation distribution deemed unfair. For now, the Danish windfarms seem to mostly favour the more financially able, instead of the rural community as a whole. This caused a disparity between locals, as the majority is still left out of the planning process. As a result, Huijs et al. (2012) conclude that this factor is especially relevant for social acceptance of locals when the decisions of implementing a plan in their local place is done by people who are not local to the area or are not part of the community. What can be concluded from those attempts is that wavering locals with compensation is a delicate process. Top-down compensation may lead to a feeling of being paid-off or bribed, which does not help in the perception of fairness at all (Perlaviciute et al., 2018; Clausen & Rudolph, 2020). Therefore, Jorgensen (2020) states that transparency from the administrative body that oversees the compensation was necessary, which requires trust from locals towards the ones overseeing it. Because it is important to be transparent about the compensation, it falls under distributive fairness.

3.5 Conceptual model

In essence, social acceptance is like the model below. As can be seen, the combinations of the three different values that were mentioned by Huijs et al. (2012) form the basis to how strongly solar fields will be accepted.

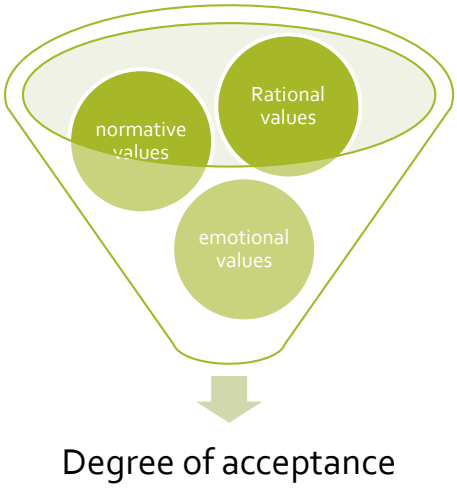


Figure 2 Basic conceptual model for acceptance, based on Huijs et al. (2012); author, 2023.

However, this model is too basic to provide any proper explanation. Other factors that are discussed must be brought into the model as well to be able to fit into the context of Drenthe. The model below gives a broader view of different factors for acceptance for solar fields.

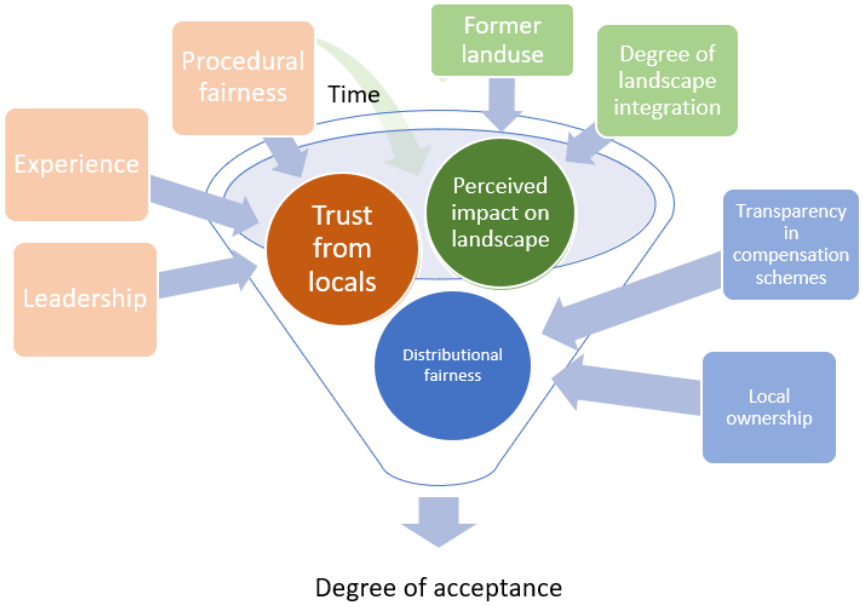


Figure 3 Conceptual model for social acceptance of solar fields in Drenthe; author, 2023

The model (figure 3) provides a clear overview from what has been discussed in this chapter. The degree of acceptance relies on whether those three factors are met. Trust from locals consists of leadership, experience, and procedural fairness. Proactive leadership is argued to be a large factor for building trust. However, past experiences with similar projects have an impact on how projects may

be perceived, as well as the leadership, or management of that project. Procedural fairness, as in how the locals perceive as being treated in the planning procedure, is of influence as well.

In the literature, as well as policy documents, one of the biggest critiques of solar panels were that they would require a lot of space and are generally seen as unappealing in the landscape. therefore, efforts for integrating these in the local landscape are already being made is shown as a factor for social acceptance. This idea can be combined with what became clear in the second chapter. There is a difference in the way people may react on what the previous land use of an area was. With projects located on agricultural land starting to become a controversial topic, as well as the policy plans for building on government property, like the solar route N37 as well as the OER project (2023). What else to note, is that time is of influence as well. As the factor is called perceived impact on landscape, the perception may change over time. For some this can mean that their attitudes change over time, because they got used to the sight of the solar fields. However, time can also be related back to the hinder of people's landscape perception, which can lead to calls for compensation.

Distributional fairness, coloured blue in Figure 3, means that the locals will receive what they believe is attributed to them. From chapter 2, the idea of local ownership has been discussed. From that, it is an ongoing discussion as to how to properly create means for compensation, either in the form of ownership or other kind of schemes. Either way, to properly organize a compensation scheme would require transparency in who will get what when.

Considering the shape of the modal, the degree of acceptance is a composition of the factors that are presented above. The idea is that the dosage of each factor influences degree of acceptance for solar fields.

4 Methodology

This chapter describes the research methods being used in this research. The date consists of both qualitative and quantitative methods. This research aims to delve deeper into how processes for developing solar fields in Drenthe has influenced the degree of acceptance for this type of energy production. To do this, an understanding of the *story* of these projects would offer the best source of information. A full-on quantitative approach would not be suitable for this research. Because the questions that are often being asked within a quantitative approach may be too general, which would potentially leave out key points within a *story* of a solar field project. To get this kind of holistic picture, the governance triangle of Lemos and Agrawal (2006) will be used as a basis for finding and categorizing respondents. This triangle consists of the government, private (commercial) and civilian sides.
The research consists of a literature review (chapters 2 and 3) for the basis of theory, expert interviews that shed light on the policy and developments side of solar fields as well as a questionnaire meant to provide insights from locals in Drenthe. All these parts will be elaborated on further in this chapter.

4.1 Literature review

Even though the province of Drenthe is the study area of this thesis, it is still relevant to look outside of their areas to get a better understanding of this topic. The literature review has two parts, namely Lessons from abroad and the Netherlands as a whole (chapter 2) and the theoretical framework (chapter 3).
Conducting the literature review in these two parts has several reasons. By first looking broadly at how the energy transition based on solar has panned out for different countries, a 'first draft' of a perspective can be made. This will allow for a viewpoint into what may be of influence, which can be delved deeper into in the next chapter. In additions, current provincial policy documents for solar energy are being used as sources. In a sense, the chapters 2 and 3 served as a division between context and policy documents on the one hand, and more abstract theory on the other. In the end, both these chapters have come together in the conceptual model (*figure 3, chapter 3)* which can be reviewed with the help of the interviews.

4.2 Interviews

To get a deeper knowledge into the process of energy transition for this specific province, Drenthe, a qualitative research approach is ought to be most suitable option. To form a basis for this qualitative research, semi-structured interviews are chosen as a method of data collection. The reason for this is that semi-structured interviews offer a form of flexibility. The reason this flexibility is important, is because of the heterogeneity of the possible interview candidates. These candidates only have a few things in common, which is the fact that they are involved in the energy transition of Drenthe and are part of a planning process of a solar field project. However, the reason as to why they are involved may be completely different. By making the interviews fully structured, insights within the planning process from the interviewees different perspectives may be missed, because of a predestined interview framework. This is, however, not a fully structured interview guide, as the framework will only include key talking points or questions, which shall be used depending on where how the conversations will go. With a fully structured interview guide, flexibility in conversation topics may be obstructed. It is necessary that the interviewees can tell a story on how projects, in their eyes, have

been developed. By keeping the questions broad, and by keeping the interview only structured enough to keep the interviewees on topic, I believe the best possible insights of these solar field projects may be discussed.

The interview questions are being based on the hypotheses that resulted from lessons from abroad chapter as well as the theoretical framework. During the interviews, handwritten notes will be kept making sure important information is being pinpointed. In addition, to make sure the whole interview can be reviewed, and that no important information can be lost, the interviews will be recorded. More about this will be discussed in the section for ethical considerations.

4.2.1 The interview candidates

Considering the research is the province of Drenthe, especially the rural areas where solar fields are found, it is only logical to start looking at what kind of stakeholders are involved in the development of these solar fields. Different parties consist of the government, with both the provincial and municipal layers playing distinct roles; private developers or companies; local energy cooperations. This differentiation is inspired by the governance triangle of Lemos & Agrawal (2006), as it provides the perspectives from the three main parties; government, civilian and commercial parties, to create a proper picture of the whole situation.

Here is an overview of the interviewees and their relevance to this research:

Table 1 Overview of interviewees; author, 2023

Interviewee	Function	Type	Organisation	Abbreviation
1	- Former Alderman for sustainable energy programs - Former program manager Energy Transition	Government	- Municipality - Province	G1
2	Board Member	Civilian	Energy Cooperative	C1
3	Communications responsible	Private	Private company	P1
4	Project director renewable energy	Government	Province	G2

4.3 Questionnaire

Local citizens who are not involved in the planning process of these field will be covered in the form of a questionnaire. The questionnaire will be used to create a general stance of inhabitants of Drenthe and is based on the factors presented in the conceptual model. This model has been created with the idea that the consisting factors each play a role in the degree of social acceptance for solar fields. Hypotheses of this research would therefore be the reasoning behind why these factors are relevant. Semi-structured interviews only cover the arguments of the sides of the government actors, solar field developers, and a representative of an energy cooperative. Focussing on the public with just semi-structured interviews may show a struggle of how to select who is the local in this question. It may

allow for selective sampling of who to interview by the researcher. Next to that, the content of the interviews may be prone to biases from the interviewee and even unrepresentative for the entire public side. Therefore, to give more empirical substance to this research, a questionnaire will be conducted for citizens who live in Drenthe in addition to the interviews. The questionnaire and the results can be found in Dutch in the appendices.

4.4 Data analysis

The semi-structured interviews that are being conducted will have to be analysed. All the relevant information for answering the research questions must be retrieved from the interviews. The interviews will be transcribed and coded. Coding is the systematic identifying, labelling, and organizing of a piece of text, and will be done in Atlas.ti.

The coding labels are based on the literature review. These results are a list of factors that do influence whether solar field projects in the province of Drenthe are accepted. The interviews are supposed to be able to shed light to the way the solar fields are being developed and regarded. Why people chose for these types of energy production, and how they are supported. For the most part the coding was done *in vivo*, which means that most codes were added during het coding process.

This method is a form of descriptive research, which means that the questionnaire is meant to describe the population. It consists mostly of statements with answers based on the Likert-scale from fully disagree to fully agree. The results will be put next to the contents of the interviews. The last question is there to provide further comments and can be used as a qualitative answer if the answer is seeming insightful.

4.5 Ethical considerations

It is important to consider ethics when conducting data collection. With interviews, you rely on the participants to share their experiences and opinions in confidence. The interviews will be recorded. Due to privacy reasons, this is only possible if the interviewee has given their permission to do so. At the beginning of the interview, the question to give consent to recording the interview will be given, to which the interviewee may or may not agree to. This is not only done because of reasons for safeguarding privacy. It is also important to make sure the interviewees have a feeling of trust towards the interviewer. Because without trust, the interviewee may not be willing to share information they might find too sensible to just share with anyone.

The recording will be done via an App on the interviewer's phone. The recordings of these interviews will be titled in the trance of *Lastname-intv-date.* These recordings will only be used for transcribing the interview and will be held onto until the very end of writing this thesis. After which they will be deleted. If the interviewee does not give consent to record the interview, then the interviewer will have to make use of written notes.

For the questionnaire, the only piece of personal information that will be asked is the place of residence. This is to highlight that they are from Drenthe, Other personal information is not relevant since the theory did not go into these personal characteristics either.

5 Results

In this chapter the findings of the interviews and the survey will be presented. This will be done in the structure that follows the conceptual model presented in the theoretical framework (*chapter 3)*. This chapter is structured according to the factors of the conceptual model: *trust from locals, perceived impact on landscape* and *Distributional fairness*, with the subfactors acting as subsections. The interviewees will be referred to by their letter/number combination mentioned in Table 1 of the Methodology chapter 4. The survey questions will be referred to according to their corresponding numbers in *appendix 1.*

5.1 Trust from locals

In this section, the relevant results for the factor 'trust from locals' will be discussed. This is done by highlighting the relevant parts from the interviews and survey questions coincide with these relevant interview parts. The subsections are divided in the subfactors *experience*, *leadership* and *procedural fairness*. Each of these subsections will be divided in other parts to highlight the different ways these factors can be interpreted.

5.1.1 Experience

This subsection focusses on the results for the factor 'Experience'. Firstly, the relevant parts from the interviews will be discussed, after which the results from the survey questions that are relevant to the factor experience will be used to build on the results of the interviews. The factor *experience* came forward in the interviews and survey in three different parts, namely the reception of previous projects, differences in pre- and post-implementation and learning from these experiences.

Reception of projects

The interviews of G1, G2 and C1 discussed how the reception of previous projects influences the acceptance of current projects. All gave the example of wind energy, with interviewee G1 explaining that the growth of solar energy in Drenthe was due to heated discussions surrounding wind energy projects. The wind park Drentse Monden-Oostermoer served as an example for this, with G2 referred to the project Drentse Monden-Oostermoer as trauma-inducing, which was met with protests, arrests and a national coordination mandate *(rijkscoordinatieregeling).* Interviewee C1, who is a board member of a local energy cooperative explained that this event limited the options for wind energy in his locality:

"The province (of Drenthe) never really acted outright like 'we are now setting our attention to solar.' What actually played a role was its history with wind (energy)". G1

"*We really did plenty of explorations, also with wind, but that was rather pointless because of the controversy that was caused in the north-east of Drenthe*" C1

The reception of these projects has caused such a severe reaction that the possibility for wind parks were severely reduced. According to G1 the trauma also caused the development of renewable energy shift to be more locally based. Which will be further covered in the subsection for the factor leadership.

Pre- and post-implementation

Experience also means the change in pre- and post- implementation of a project. Survey questions 3, 4 and 5 will be used to present this, as well as the interview of P1. As a commercial party for solar field development, P1 agrees that opinions can change in pre- and post-implementation of a project:

"So, what you can see is that before (implementation), because it is still something unknown/uncertain, that they start to worry about the plans; like what will happen? And after the project has been realized properly in the landscape, you see that people are generally accepting towards it." P1

"This is the case, at least with us, as we have measured that with 'Natuur & Milieu', those have done research with locals from our solar park, and they gave us a passing mark." P1

From question 3, the result is that prior to the development of solar fields in Drenthe, opinions were neutral (17) or very negative (15).

From the answers to question 4, respondents viewed the growth of solar fields in Drenthe negatively. Out of fifty-one respondents, 26 perceived it negatively, while only 13 perceived it positively.

With question 5 respondents were asked if their opinions had shifted positively post-implementation. From this, nineteen respondents disagreed, 11 respondents slightly disagreed, and 14 remained neutral in their responses.

Learning from experiences

From a policy maker and developers' perspective, learning from experiences to foster acceptance is something that has been discussed for the most part in the interview of G2. G2 mentioned that it is important that learning from experiences from projects, both positive and negative is important for creating future energy projects and policy. To do that, G2 argued that monitoring and documenting the development process thoroughly is needed. However, G2 admits that these practices are lacking at times.

"We work a lot with guidelines, but for the final design and implementation and what kind of arrangements we settled for in the region about the whole spatial arena, those should be documented and monitored properly. Because seeing bad examples is horrible publicity and you can see that such arrangements have been made at some (well received) parks but eventually nothing will come of that (documenting), which offers room for a lot of improvement." G2

G2 did remark that they have learned from the experience of Drentse Monden-Oostermoer. In an example of the Eemshaven, in the province of Groningen, G2 argued that due to their experience from Drenthe allowed for a different planning process with more participation for locals.

"I have compared it to what happened in the Peat-colonies (Drentse Monden-Oostermoer), and the situation here is peanuts compared to that. You must organize the area process and participation properly beforehand. We learned that lesson well. But if you look at how the Eemshaven is developed [..] those mills that stood there are not realized much differently, it is just that there are less people living around there."

From these three different ways, the factor shows to be relevant for fostering social acceptance for solar fields. How locals receive certain projects have influence on the possibility of said projects in the future. Although for now the reception of solar fields is negative both pre- and post-implementation, the interviews still gave examples showing there is more nuance to it. Eventually for policy makers it is important to learn from the outcomes of projects to avoid similar mistakes in the future. Well-

received projects come with specific arrangements that help with fostering acceptance, which influence the experience of locals during the development process.

5.1.2 Leadership

This subsection focusses on the results for the factor *Leadership*. The relevant parts from the interviews and survey question 7 will be presented. The factor leadership can be divided in three parts. The relegation of leadership, maintaining a cohesive vision on energy policy and taking the leadership role.

Relegating leadership

The factor leadership can be understood as who has the leadership role and when to relegate it. In the interviews this came forward in both the regional energy strategy and making (in)formal agreements with different stakeholders.

In the regional energy strategy (RES 1.0) the provincial government has relegated its leadership role for renewable energy to the municipalities. According to G1, they wanted renewable energy projects to be developed more locally. The interviewees argue that this is a consequence of the experiences of the wind park project of Drentse Monden-Oostermoer that was mentioned in the experience subsection.

"*... with renewable energy, the municipality is almost always the first to decide, which means the role of the province is secondary for the most times, although that differs per province. [... ...] The province of Drenthe has always wanted to keep the municipalities behind the steering wheel.*"

The municipality in turn looks at even more locally based parties. C1 argued that the energy cooperatives should fulfil the role of local actors. The municipality approaches both them and commercial developers for realizing projects, which comes with discussions about local ownership.

"*At a certain point, the municipality chose a number of developers. And thus, approached us to see if we could participate in that (project), while we, of course, said, we will do it, but only with 50% ownership sharing.*"

According to C1, the municipality approaches local parties, in this case the energy cooperatives, to help develop plans in order to keep the local aspect for projects. Although not all municipalities do that, as C1 explained further that their case is unique.

"*A formal cooperation agreement was also really concluded between the cooperative and the municipality. The municipality also made a budget available for this, so that we can do other projects with energy coaches and thermal scans and energetic neighbourhoods. We also collaborated in all those kinds of projects with the budget provided by the municipality, and that is unique, also in Drenthe.*"

Cohesive policy

Maintaining a cohesive policy for energy can help with people understanding the vision of the ones with leadership. The survey indicates that this is not the case for Drenthe. From question 7, out of the fifty-one respondents, 18 do not believe there is cohesive policy for solar energy, whilst 31 responded being neutral on the matter.

G1 gave an explanation how that may be. When the RES 1.0 was developed, the municipalities had to create their own strategies to reach their goals. The municipalities made use of existing plans and

policies that were waiting for permit validation. These plans existed because commercial developers were quick to make deals with farmers for future developments, including solar field.

With this, the number of solar fields increased quickly in a few years. As a reaction to this development, the municipality started to take steps in creating policies that limited the possible locations of solar fields.

"Every municipality had already some existing plans for solar energy, and some still had plans for wind [..] but most had policies, plans and space for solar (energy). That was categorized and then they concluded that 'If we do what the municipality already provided the space for, then we are already there!'" G1

"And where I wanted to go with this, is that I worked for (municipality of) Hoogeveen, which has a lot of solar parks now [...] That went fairly easy. The municipality noticed... well it went the other way. It was that even before the municipality had policy, there were already farmers with connections to Powerfield and such companies, who wanted to realise solar fields here in Hoogeveen". G1

Taking the leadership role

As G1 explains, commercial developers were quick to take on the development of solar fields. This resulted in local concerns about unhindered growth of these solar fields. The municipality started to take these concerns upon them self in order to change policy that limited the possible locations of solar fields.

"What you could see is that this led to the questions (from locals), also in Hoogeveen, if this is what we want. Because now lots of considerably large parks will arrive this way"

"It originated from people who said things like well, does this mean that project developers from different countries can do that without.... Yes, it came from people from the bottom up [....] yes exactly, (it came from locals), and it quickly got taken over by the municipal counsel and this arrived eventually in the provincial level."

The factor for leadership effects acceptance as a method of relegating the role when possible and steering policy when necessary. with the concerns about unhindered solar field development, cohesive policy is needed to reduce the uncertainty of locals.

5.1.3 procedural fairness

This section will discuss the factor for procedural fairness. Results from the survey questions 6, 8 and 9 and the relevant interview contents will be used to discuss this factor. This will be done in two parts: the necessity of communication and the feeling of representation.

Communication

From a government perspective, G2 argued that the clear communication and negotiation with locals is important in order to create both a trustworthy image and a smooth-running planning process. To acknowledge public concerns and act on them is therefore crucial according to G2. An example for this was a scenario where a campsite wished greenery was planted to mask the solar fields and highway, because the view lowers the sites appeal, and thus possibly reducing business.

"*For acceptance of a project it is important that you acknowledge the situation, even if it is only a minor part of the whole project. It isn't minor for those locals and ignoring it will reduce the acceptance of solar energy. So, you have to keep conversations about the implementation of the project with the locals. That is important, maybe even more important than the distribution of the gains.*"

Moreso, G1 admits that a good strategy for local involvement to increase the social acceptance and local participation of renewable energy projects would be to involve a local energy cooperative within the planning process as an equal partner. According to C1, local involvement should happen during the earliest moments in the planning process. This argument is strengthened by survey question 8, as a majority (17 slightly agree, and eight fully agree and 10 neutral) think it is important that locals should be involved in the process as early as possible.

For commercial parties, P1 emphasized in the interview that clear and effective communication with locals is imperative to address their concerns and ensure their understanding of the project's implications. However, it also means that you cannot please everyone.

"*Well, you cannot fully convince everyone. It can be that of the thirty neighbours, two are not pleased with the plans.*"

"*That does not change the fact that we have to act with consideration in order to continue the energy transition accordingly with enough support, or let's say acceptance for these solar fields. If you do not communicate properly, you make mistakes.*"

Representation

Another part of procedural fairness that came forward in the results is the sense of feeling represented. C1 argued that partnerships with a locally known party, the energy cooperative, would have a positive effect on acceptance. However, results from question 9 indicates that the majority disagrees with that statement (18 fully, and 15 slightly).

C1 recalled a project where the energy cooperative got into conflict with non-affiliated locals when presenting plans for a nearby solar field. Here, the cooperative collaborated with two developers and landowners. When the precise planning area had been established, locals were invited for an information night.

This however resulted in locals protesting the project. They felt that the energy cooperative did not represent the region as a whole. Local cooperative energy cooperative consists of active citizens that want to work on their local energy transition. This, however, is not all locals, as there are a lot of locals not affiliated with the energy cooperative and are as interested in the energy transition as the members of the cooperative.

"*The locals felt like being overrun and had organized their own platform and have lobbied extensively in the municipal politics.*"

What did influence the opinion of the locals that protested the plans of C1, was the possibility to suggest amendments to the plans and continuous communication.

"*We applied for a building permit, and it got approved. Although there have been around 300 to 400 amendments have been submitted by various residents, with some 4 to 5 times. So yes, as a cooperative, we deeply regret that we have ended up with opposing each other like this. We still maintained an area of 130 hectares, and we have reduced that to 70 hectares of solar and incorporating the rest as nature.*"

"And this is the stage we are now in. we have recently received a green light for development, which we will start soon. And with that, new rounds of conversations with locals will have to be organized as well."

The factor for procedural fairness can be seen here. Whilst continuously communicating with locals, and implementing their concerns, the sense of representation can be strengthened.

5.2 Perceived impact on landscape

This section will discuss the relevant results for the perceived impact on the landscape by solar fields. This is done by highlighting the relevant parts from the interviews and survey questions 10 to 15. The subsections are divided in the subfactors from the conceptual model, namely *degree of landscape integration*, *previous forms of land use* and *Time*. Each of these subsections will be divided in other parts to highlight the different ways these factors can be interpreted.

5.2.1 Degree of landscape integration

The degree of landscape integration has been described as fitting the solar fields properly in the landscape. As solar fields are spatially inefficient and stand out in the landscape, smarter methods to reduce these two critiques of solar fields will be presented here. To maintain oversight, this section will be divided in four parts: *contours of the landscape, double functions, infrastructure and rooftops.*

Contours of the landscape

Current policy in Drenthe prescribes how solar panels have to be built in the landscape. P1 explained that they, as a commercial developer, are obligated to follow provincial guidelines in how to integrate solar panels properly.

"*You have to deal with a permit process of course, right? For that we work together with landscape architects who can read the landscape properly, and will work on proper landscape integration, so to say. So, the contours of the landscape where the solar field would be placed" P1.*

This is both for acceptance and practical reasons. According to G2, there are different kinds of interventions when it comes to adding greenery along solar fields. G2 argues that clear communication is needed for these interventions to both make these effective for the solar fields as well as to address local concerns. This is due to reduce the change of possible local objections.

"*In conversations there were proposals being made to keep a strip (of greenery), as well as for the policy framework for participation to conduct conversations with people whose land borders the plot or those whose view is obstructed by its design (or layout). This is a big deal." G2*

"It also depends, let's say on which side of the highway you live, right? If you live on the north side, that will not matter much for shadow-creation when you plant a tree line there. On the southern side the possibilities differ, as you have to play with lower greenery as shields. However, in general, the solar panels would be installed rather lower, so it would not bother most people. However, if some trees or bricolage would be removed, that would make a difference, because then people would see both the solar panels and the highway." G2

Question 10 of the survey asks whether the addition of extra greenery around solar fields is beneficial on acceptance of solar fields. It shows there is a strong majority of respondents that agrees with that (32 of 51slightly to fully agreeing); with twelve being neutral and only 7 disagreeing.

To build on this, in question 11 the respondents were asked whether they think green strips along solar fields have strong benefits to nature. This question got its answers almost evenly distributed but still a small majority of 22 agrees, with 16 disagreeing, 13 being neutral.

P1 argued in favour of the added benefits of biodiversity. He gave an example of a solar park in Exloo, where they extensively added flora around the solar panels. The area would experience minimal human interaction, due to its remote location. Because of this, the area would have a secondary function of a quiet nature site.

"What is often said is the contradiction between solar parks. That it's anti-nature or anti-biodiversity. Well, the opposite is true: a solar park is precisely a place where you can bring biodiversity and nature back entirely. For example, we did that in Exloo, where you add herbaceous mixtures and see animals return that you've never seen before."

Double functions

P1 argues that integrating solar panels into the landscape involves smart land use, where solar fields serve dual purposes to enhance spatial efficiency. This would with fulfilling energy demand whilst not sacrificing land.

"We are specialists in dual-purpose functions, so what we really do is create a lot of dual-purpose functions. This means, for example, placing floating parks on sand extraction lakes. So, where you have dual purposes, meaning you don't allocate land for it, so to speak. We do solar carports, solar roofs, what do you call it... above fruit, etc. Right, so we have a lot of dual-purpose functions." P1

"And of course, our main focus is naturally those dual-purpose functions, as I mentioned. Yes, and they are naturally very much in demand socially." P1

Survey question 14 asked the respondents about how dual functions helps acceptance. A combined majority of twenty-five agreed, with 16 remaining neutral.

Survey question 15 specifically asked about the perceived economic benefit of these functions. Eight agreed, 17 slightly agreed and 12 were neutral, and 10 slightly disagreed about the economic benefits.

Interviewees G1 and G2 expressed doubts about the economic benefits of combining agriculture with solar fields, specifically using sheep as an example:

"I don't see much.... [possibilities]... well you won't really make money with those sheep. They will only serve as lawnmowers. I don't know any good examples of combinations of agricultural areas and solar fields where agricultural usage works really well." - G1

"Yeah, there are some sheep walking through the panels, to keep the grass short, and could you count that as multi usage of space? Probably yes. ... It does work for the acceptance though. For the biodiversity not much, it depends what kind of targets you want to reach, but there is more needed than that." – G2

Infrastructure integration

In the final remarks, survey respondents suggested placing solar panels on infrastructure. P1 explained why constructing solar panels around infrastructure is favourable:

"That they are located at those junctions is why it is so good, because those are often locations where you can't make any use of at all."

G1 and G2 provided an example of dual functions around infrastructure with the A37 Solar Route:

"And that is something most people agree with, as in 'those embankments that lay there, that is something good for land use' I think. In Hoogeveen we even managed to use these solar panels as a sound barrier, which reduces noise from the roads considerably. So, this way I see a future for solar (energy), but I think the end is near for solar fields." – G1

"People in that neighbourhood, say like it is not a proper noise barrier, it is not the same, however it does have a noise cancelling function, and the support for it there is quite high as a result." – G2

Sun on Rooftops

Solar panels on rooftops have been mentioned as well. However, C1 argued that this option has a lot of challenges when it comes to construction costs and ownership.

"it will be quite a challenge to find and cover all the rooftops (on farms). Piece by piece, they are all small parts, and each has its own issues. Ownership, the roof's load-bearing capacity, insurance, location, and finding people in the area to request subsidies."

Additionally, C1 highlighted that a vast number of old barns in the Netherlands have rooftops with asbestos. The cost of removing asbestos is prohibitive for the cooperative to manage on its own, and with current provincial or municipal policies, there is not a clear institutional framework present for the planning process to run in a feasible manner.

"We have also tried to combine that, removing all the asbestos and installing solar panels and letting an entire village benefit from it. Well, then the Asbestos Act was postponed again by our government and that means that we will not let that project go ahead."

5.2.2 Previous forms of land use

This section will cover the results that cover whether the , the focus will be on solar fields where the location and previous land use have been of influence in the degree of acceptance. The questions 12 and 13 will be presented with relevant parts of the interviews.

Question 12 asked whether peoples opinion on a solar field depends on a specific location, especially if that location serves a nature or economic function. In practical terms, whether peoples support for a solar field is influenced if it is planned to be built on agricultural land or on or next to a natural area. Most respondents either slightly agree (22), or fully agree (13) that their support is influenced by these circumstances.

To come around with this, question 13 asked whether the support of respondents on a solar fields project would be influenced when the former land use was considered less desirable. The results show a majority with 12 agree, 14 slightly agree and 13 neutral.

The interviews showed several examples of solar fields with unattractive locations. The solar field of Exloo, as mentioned by P1 in the previous section, was constructed on unworkable land. The ground was of a certain peat soil, which the land owner had no use for, which negates the critique of the park obstructing valuable agricultural

"*And I also think it's good to, well, try to avoid solar parks on good agricultural land as much as possible, but you have many different grades of soil, right? You also have a lot of oxidizing peat soils, especially in Drenthe. For example, in Exloo, we realized a solar park on oxidizing peat soil. The farmer there does nothing with it, and this way, he can still create an alternative revenue model".*

P1 also mentioned the solar field *Zonnepark Oranjepoort*, which was crowned the 'most local solar park of the Netherlands'. One reason for this is that it included a knowledge centre, so that locals can engage in solar energy. Other reasons why this park was received well was because the park was placed on an old industrial site, which as a former land use was generally deemed unappealing by locals.

"*We notice that in Emmen the solar park is well received. For sure, because it is properly fitted in on an old brownfield.*"

A similar project on a brownfield with a knowledge centre was mentioned by G2. Here the local energy cooperative of Assen created an 'energy garden' with the option for children to learn about energy. Lecturing children about the benefits of renewable energy, and increasing children awareness on the energy transition.

"Yes, and I also think that it's not always the solution. It was originally intended as an industrial site, so it was quickly accepted there."

G2 and C1 pointed towards a third solar field on an industrial site. This is an old gas storage facility in Langeloo, owned by the Dutch national gas cooperation (NAM). The cooperative of C1 has been able to realize a solar field project there that has been received well. According to G2, the location did have an effect on the locals.

"*That's often heard when explorations are conducted. People suggest locations, and in their minds, it's already an energy location, so it's fine for it to remain an energy location, even if it's just as much in rural areas. So, that's also quite interesting, yes.*"

Overall, these examples hint that acceptance for solar fields can depend on their specific location and former land use, especially whether that location had a nature or economic use beforehand.

5.2.3 Time

This section will discuss the factor of Time. In the interviews the topic of time was mostly discussed with G2 and C1. The survey question relevant here is question 5, which is also relevant for experience. It shows that the respondents' opinion did not change positively overtime due to them getting used to the presence of a solar field in the landscape.

P1 did argue that the solar fields have a live expectancy of around 30 to 40 years, and thus they are temporary. For acceptance, this did not influence much, because that time is still long for locals. The factor time came forward in the interviews of G2 and C1 in a way that had more to do with momentum in the planning process.

The situation that C1 described in *procedural fairness* is relevant to the factor *Time* as locals felt that the process when too fast. In C1 words: "*They felt overrun…"*

In contrast, G2 highlighted how time can be leveraged for acceptance, citing the A37 solar route project where government-controlled development speed ensured detailed tenders for private partners.

"We could refer to that because those project developers, they're all fast movers and they don't have five years to wait until the environment gets it together."

G2 also emphasized the importance of aligning public interests and private investment timelines to enhance acceptance from both the locals and the developers. To do that, G2 argues that the government would support public actors and preparing them for local participation.

"So, as governments, we've also said, 'Well, let's invest now. So that the community can organize itself, gather knowledge, so that they can have that conversation with developers later on, and come well-prepared. [.....] That's a whole communication process that still needs to happen, so as governments, we're going to finance that. If we then realize sufficient overarching frameworks are set up and working, we take a few steps back. Eventually at some point, they'll start generating revenue from the project, and then they should be able to stand on their own legs."

5.3 Distributive fairness

In this section the factors for distributive fairness will be presented. It concerns itself with the sense of fairness for people to receive benefits from renewable energy projects. The factor *Local ownership* and the factor *Transparency in compensation schemes* will be presented from the contents of the interviews and the results from survey questions 16, 17 and 18.

5.3.1 Local ownership

This subsection will present how the factor local ownership came forward in the interviews and survey. To keep oversight, this section will cover the following structure. Firstly, how local ownership is developed. Secondly how this form of local ownership works in practice. Thirdly is how the government is able to push for local ownership, including a project with full local ownership as an example.

Developing local ownership policy

In the interviews different ways of why local ownership may foster local acceptance has been discussed. In several final remarks of the survey, the respondents show concerns of external developers reaping rewards, and a wish for locals to receive the gains from the projects. G1 gave further examples of local ownership from wind turbines in the province of Overijssel, where these windmills are owned by the local energy cooperative.

"*Only after all the existing buildings are equipped with solar panels, you should look for alternatives. This helps for more participation and acceptance. Next to that, the financial gains would be distributed and will not fall into the hands of (foreign) investors." Survey respondent.*

"*An example for wind parks where people are now enthusiastic about are the windmills in Nieuwleusen […] those are owned by the energy cooperative of Nieuwleusen, and they receive the gains from that. Let's say every time the mills rotate, the people of Nieuwleusen will get a bit richer. That way people will look differently towards such projects than, let's say, if they knew the gains would end up at a developer or private wind farmer." G1*

Nevertheless, the interviewees argued that creating local ownership has been a challenge, G1 described it as ´juridically tricky´. According to C1, the reason for this trickiness is because of the different parties that are involved or affected by the project area.

"*When it comes to participation, it is really difficult, because the interests are all clearly different. This means that you in the council continuously have to manoeuvre between three parties: the energy cooperative on location, the developer you need, and the locals who may or may not benefit or suffer from it."*

Because of this manoeuvring, the province had included in the RES 1.0 the aim of 50 percent local ownership, with 20 percent as a bottom line. The province of Drenthe did not mandate a clear definition of local ownership or participation. According to G2, this is because the province has delegated the task of creating renewable energy projects to the municipality, which includes the matter of local ownership as well.

"Yes, and it was a big realisation, especially in Hoogeveen in the municipal council that you cannot just mention in your policy plans that you want to aim for 50 percent ownership and expect that that will organize itself in practice. More is needed for that." G2

"It is important that it (local ownership) is defined by the municipality. They can do that or even the province could take on that role. But we (province) have made a guideline participation, so we don't prescribe it, but provide a 'you could do it this way'." G2

Local ownership in practice

In the interviews, there were opposing viewpoints about the aim for local ownership. G2 remarked with an example of the a37 Solar Route, that defining what local ownership is within a policy framework is necessary in order to make sure that the aim of 50 percent local ownership is met.

"You must define really well wat you mean with local here, because it (a37 solar route) is an exceptionally large project. Here we have chosen for, because of the climate accords, an aim for 50 percent ownership. Well, an aim, so softly said 'well, we tried, and sorry it didn't work', thus we set a minimum of 20 percent. However, that still caused a lot of discussion, with people saying that it was too little."

From the commercial side, P1 takes the aim of 50 percent ownership loosely. Stating that not every locality wants ownership and that it is better for acceptance to provide locals with other means of compensation or direct investment in community buildings if they wished to.

"There is an aim for 50 percent local ownership. So, it is not an obligation, but an aspiration. And we see in practice that every project has its own way of participation (or ownership)."

From the local level, C1 showed frustration with the aim of 50 percent ownership, calling the 20 percent bottom line as not enough.

"I know the situation in Drenthe well. And everywhere there is a different interpretation of participation and area funds and ownership. And sometimes it is defined differently and sometimes completely ignored when it comes to 50 percent participation."

C1 continued talking about a project collaborating with three different parties of developers and landowners. Eventually conflicts arose with one of the developers about defining 50 percent ownership.

"They said that people could sign up with them, the locals. They then could take part and will receive dividends. They claimed that was 50 percent participation as well."

Eventually these landowners got separated from the project to develop solar panels on their land alone. The other parties continued collaborating, but the open interpretation and aspiration continued to be troublesome.

"And here you have the same troubles with 'how do you explain participation? How do you interpret 50 percent?' Because even here in Zuidvelden, the two developers say '50 percent is an aim, and 20 percent in the minimum' so here they are playing with the numbers as well".

Government owned land

Nevertheless, the interviews mentioned cases where either the fifty or even 100 percent ownership was possible. The a37 Solar Route has a framework where this aim is included as well. What is interesting to note, is that according to C1 local ownership is easier to achieve because the land is mostly government owned already.

"*Well, the a37 situation is different, because it is state owned property, right? It goes along the highway, which is property of the water boards and the state.*"

The government can work with tenders where private developers can work on the conditions set out by the government, including local ownership. These tenders were mentioned already in the section for factor *Time*.

"*An important condition for the tender will be local ownership and how they want to implement that and work together with the region. We have put in the minimum (20 percent) that is obligatory in the policy framework, which we can refer to anyway.*"

Even though here the minimum of 20 percent persists, C1 mentioned projects with full ownership, for example the gas storage site Norg. The project was mentioned already with the factor of *former land use*, as it was located on an industrial site. The project site was already owned by the government, which provided the ownership to the local energy cooperative.

"*We have a similar situation here in Langelo (Norg). [..] We (energy cooperative) received the area from the Dutch gas cooperation. This means that developing it was easier because we did not have to lease it. This means we have 100 percent ownership".*

This is a unique case according to C1 because it is a combination of both full local ownership and an undesirable former land use. Local ownership still is difficult to implement. However, from the examples of the Solar route and Norg, the government plays an important role in realizing local ownership. However, G2 still showed limits to local ownership.

"*We always hope it is more than 20 percent, but that requires a lot of capital from the local area. With high interest rates, which can grow even more, makes borrowing money less economical. That is just local ownership we are talking about; acceptance is wider than that of course.*" – *G2*

5.3.2 Transparency in compensation schemes

This section will discuss the factor for transparency in compensation schemes. This factor relates to compensation that are not related to ownership. The following paragraphs will discuss the results of the interviews and the results of questions 16, 17 and 18. The section will be divided in three parts, compensation in general, local investments and lastly the area funds, which is a method for local investment that was discussed frequently.

Compensation

Compensation was discussed in the interviews in different ways. In survey questions 17 and 18 respondents were asked how they felt about the idea of compensation in itself. It differs from local ownership. Both G2 and P1 said that locals are not always able or interested in managing the ownership for energy projects. P1 put emphasis on investing in local needs and how communicating compensation schemes have a positive effect on the planning process.

"...the locals should want to invest in 50 percent local ownership as well. And that is not always the case, as some just do not want to do that, don't find it interesting or do not have the means to do so." - P1

Question 17 asked whether the possibility of different forms of compensation would help with acceptance. 3 fully agreed, 14 slightly agreed and 16 remained neutral. Also 10 slightly and 8 fully disagreed with the question.

Question 18 asked whether people became more positive towards a project if they knew others were allowed to receive compensation. Two fully agreed, 9 slightly agreed. Twenty-two answered neutral, 12 slightly disagreed and 6 fully disagreed.

P1 suggests that direct investment in local community properties has a significant impact on the acceptance of a project.

"Participation is incredibly important to create a support base and acceptance for the energy transition. And we participate with that in different ways, not only the 50 percent local ownership, but different forms of local participation and activities. [...] activities where you can create acceptance in an area that are the best in line with local needs. I think that is the most important, and not necessarily 50 percent ownership." P1.

Local investment

A form of participation creation that was discussed in the interviews was that of investing in local community amenities. G1 explained how in the early stages of solar field development, developers had a direct approach for discussing compensation. After that, local demands grew, which led to more investment in local amenities.

"*They would ask, "Okay, what are your objections?" and then, simply put, they would go around with small gifts like mirrors and beads, so to speak. People could then get a solar panel set for their own roof to smooth over their objections a bit." G1*

P1 argued that short-term investments in the region help raise awareness of potential compensation options. C1 shared this view. Both interviewees did this by making community building more sustainable, and both have noticed a rise in acceptance for projects as a result.

"*We have regularly made sport clubs more sustainable. We have made swimming pools more sustainable, also a community centre. We have built extra playground equipment. So, there are a lot of ways to implement this. We have an area fund where people can make use off also to create extra nature for example, but well, the locals can decide that, often together with the municipality. "P1*

In survey question 16, the respondents were asked whether direct investments in local amenities by solar field developers help with social acceptance of these projects. 6 fully agreed, 21 slightly agreed. 14 remained neutral while only 10 slightly or fully disagreed in total.

Area funds

In the interviews area funds have been mentioned as a method to manage the compensation and direct investments in local amenities. According to G1, this started due to the former direct approach by developers in discussing compensation was deemed not enough. Therefore, developers opted for community investments. Likewise, G2 mentioned that area funds have increasingly become more attractive for energy cooperatives instead of local ownership, because of the willingness of locals and the difficulty to organize the funds necessary.

"A step was sometimes something like a community fund where a developer would say, "Well, if you give such an amount per year to a village or community interests, isn't that enough?" G1

"Local ownership everywhere? I don't know about that. We do see, because it is so difficult to realise, that a lot of cooperatives opt out and focus on area funds. They made their choice with that, which is important. I don't know if that is the holy grail for energy, we will see. The localities and locals must decide that. But yes, participation is a cost-benefit story." G2

Both C1 and G2 showed concerns for the area fund on the long term. Managing the area fund is something that locals must do themselves as well, creating responsibilities with similar drawbacks as local ownership.

"The annoying thing is that with an area fund the local populace must organize themselves properly. There have to be people who stand up and say that they want to be in the board of the cooperative, or association, who will divide that money. […] that is a lot of work which should not be underestimated, and a region may not always be well organized for that. Perhaps the government could take on the role to support them".

G2 further remarked that communal interests only go so far, and at some point, a limit is reached in what can be made sustainable. What would happen then, would be the question of what to do with the leftover funds:

"*And then at some moment, when all the houses have been made sustainable, and the communal garden is finalized, then what will you do with all that money?"*

This chapter presented the results of both the interviews and the survey. All the factors from the conceptual model have been presented separately. Therefore, the next chapter will link these results with theory to from a discussion to come to a final answer on the research question.

6 Discussion

This study aimed to research the process of regional energy transition and rural development by finding out what factors influences the degree of social acceptance for solar fields. Solar fields have seen a strong growth in the province of Drenthe, which also resulted in large criticism and rejection of these types of projects. From theory, factors are gathered and summarized in a conceptual model, which can form the basis on which policy makers and developers to create their planning processes for future projects. With the help of interviews from the developing side of the solar fields and a survey targeting locals in Drenthe, results of these factors have been gathered and presented in the results chapter. In this chapter these results will be discussed further in order to draw conclusion on the effect of the factors on acceptance. Afterwards, limitations will be discussed, and recommendations provided. Lastly, in the final section the conclusions regarding the research question will be given.

6.1 Factors

6.1.1 Experience

The factor experience has shown to be in line with theory. The wind park Drentse-Monden Oostermoer was a dramatic process where the local community heavily protested the development that finally resulted in a mandate from the national government. The development process was thus institutionally closed off and the outcome distant and private (Walker & Devine-Wright, 2007). The interviewees agreed on the necessity of learning from these experiences in order to negate similar outcomes with future projects. Therefore, the province relegated the process more locally, with the municipality obtaining sustainable energy goals that they themselves had to reach.

The differences between the pre- and post-implementation phases have been discussed in theory. Hai (2019) suggests that individuals may alter their attitudes toward projects once they are completed, particularly if the implementation process is perceived positively by the public. P1 highlighted this by stating that their company does indeed experience changes in acceptance after a project is completed. However, survey results indicated that people's attitudes do not necessarily change between the pre- and post-implementation stages. Despite these findings, differences in attitudes pre- and post-implementation can be process related. The factors for acceptance work together to form a degree of acceptance. This means that the survey results do not invalidate P1's observations. It shows how the factors together are of influence instead of the factor experience alone.

Lastly, learning from past projects which are both negatively and positively received is related to the factor experience from a policy makers perspective. G2's example of the Eemshaven shows that they are continuously learning from planning processes. Even for solar fields, this is true, with G1 commenting on the fact that the creation of local ownership policies is a learning curve. Learning from experiences therefore would help shaping future planning strategies that aim fostering trust towards the developers.

6.1.2 Leadership

The role of leadership in development of renewable energy projects was discussed in Chapter 2, with a comparison of different countries providing a broader context. In Denmark, the focus shifted from energy independence to increasing the share of renewable energy, transitioning from small-scale local renewables to larger-scale projects. In the United Kingdom, the steady increase in localized

renewable energy projects was disrupted by the introduction of austerity measures. In Germany, the government established strong legal boundaries that limited the actions of both municipalities and energy cooperatives.

Leadership has also significantly influenced the development of solar energy in Drenthe. Following the outcome of the wind park Drentse Monden-Oostermoer, there was a growing sentiment within Drenthe that energy policies should be more localized. This led to a shift from top-down projects to bottom-up approaches aimed at achieving sustainable energy goals. Initially, the municipality prioritized meeting provincial sustainability targets over local needs. However, as highlighted by G1, municipalities began changing their attitudes, managing to uphold the provincial goal of maintaining renewable energy projects by addressing community concerns.

These developments underscore the pivotal role of leadership, particularly in the initial stages of solar field development in Drenthe. Although initial efforts to foster local acceptance were limited, delegating leadership to the municipality was seen by the provincial government as a means to achieve this goal. Leadership involves trusting someone enough to grant them operating power, and the municipality demonstrated this through a collaboration agreement with the energy cooperative of C1. Such agreements indicate a sufficient level of trust between leaders to work together towards sustainability goals. Leadership involves trust and granting operational power to the responsible parties. The municipality demonstrated leadership through a collaboration agreement with the energy cooperative of C1, indicating sufficient trust to work together toward sustainability goals. However, C1's assertion that their case is unique highlights the differences between municipalities in energy policy. This explains why survey respondents were indifferent or agreed on the lack of a cohesive solar energy policy in Drenthe.

6.1.3 procedural fairness

In the interviews and the survey, the factor for procedural fairness had shown to include two major parts, namely clear communication from the developers towards the locals, as well as the sense of feeling representation from the locals. Silverman et al (2019) argued the necessity of including motivated locals in the process, but from the survey results, locally known developers have little influence in strengthening the degree of acceptance. In addition, the interview of C1 showed that motivated local stakeholders do not guarantee acceptance. In C1's anecdote, locals felt overrun and protested the plans. The locals did not feel represented by their local energy cooperative. Only after communication efforts and adjusting the plans by locals' amendments could the project see further progress.

At the same time, Perlaviciute et al (2018) argued that a proactive attitude from developers-reaching out to locals before the development of a project has a significant influence in people's perception regarding procedural fairness. The survey results strongly indicated that, with the majority agreeing with the statement of Perlaviciute et al (2018). G2 mentioned in the example of the tenders (factor *time)* that they would make sure that locals were informed pre-development to allow proper opinion shaping for the proposed plans. This relates both to Perlaviciute et al (2018) and Horlings & Padt (2011) as they mentioned transparency in communication is important. The situations of both C1 and G2 indicates that motivated actors do not immediately mean a sufficient degree of acceptance. Proper communication, allowing time for locals to think and following up on the local concerns regarding the project will add to the sense of procedural fairness among locals.

6.1.4 Degree of landscape integration

The factor for degree of landscape integration has shown to be relevant in influencing the degree of acceptance. As Enserink et al. (2022) argued, landscape design is important for social acceptance.

With the majority of respondents agreeing that solar fields should have some form of greenery surrounding it. The same can be said from combining solar panels with other functions. Even though the interviewees showed their doubts about the economic benefits of the double functions, the perception of added benefits do seem to help fostering acceptance. It negates the main problem of spatial inefficiency that solar fields are infamous for.

Building solar panels along infrastructure, especially with secondary functions included, proved to be successful for acceptance. The problems however, is the question of local ownership, which is especially noticeable with solar panels on rooftops. Nevertheless, considering most infrastructure is state property, realizing solar panels along infrastructure proofs less of a challenge in stakeholder negotiations.

Rooftops were mentioned in both the final remarks and interviews. However, according to C1, it opens further challenges on the basis of costs and ownership. Although C1 noted that their cooperative does have projects involving rooftop solar panels, they indicated that current policies, or absence of policies, make it difficult to implement many projects. C1 would have to discuss with the owners of the barns, which will be the farmers. With that, projects of solar panels on rooftops depends on the willingness of the farmers (Nkoana (2018). Although this situation similar with solar field projects, C1 pointed out that rooftops face a lot more negotiation rounds with the farmers, because of the size differences between the two surfaces.

6.1.5 Previous forms of land use

The interviewees gave several examples of projects that were received well by the public that can be traced back to their previous land use. It differs from the last point of the factor landscape integration, where the solar panels are in a smaller number integrated on existing structures. From the results, it seems that het most suitable locations for people to accept solar panels are in line with Gross (2020), namely degraded land, brownfields, rooftops and along infrastructure. From the cases presented in the interviews, it shows that brown fields or degraded lands offer little attractive utilities or benefits to the landscape.

Degraded land offers little to no ecological or economic functions. Floating solar fields on extraction sides would provide the area with a proper function, while the example of Exloo shows that degraded land can offer ecological ambitions as well. Brownfields and solar fields tend to be perceived both as energy and industrial land use. From the interviews, this caused a general acceptance of the arrival of solar fields. From that, it can be reasoned that a solar field would offer land use proposition that is at least as unattractive as the former land use, but with the positive addition of renewable energy.

6.1.6 Time

Both Hai (2019) and Huijs et al (2012) argued that *time* affects acceptance of solar panels. Initially their studies focused on solar panels for personal use, not solar fields. From the results, *time* did indeed not have much effect on the acceptance of solar fields. Instead, *time* worked as a form of building momentum in the planning process. For starters, although initially time was thought of as a factor for people getting used to solar fields being part of the landscape, time as a factor for acceptance worked differently. Anecdotes of G2 and C1 can be used to strengthen this. C1 said that the locals he represented in the cooperative were against a new solar park, because, in his words, they felt caught off guard, or overwhelmed, by the in their eye's sudden decision. As a result, the locals started to fight against the project. G2 took a different approach, stating that the residents along the planned solar panel strips were informed in advance and that in fact the strips are being built at their own pace. While C1 and G2's anecdotes demonstrate time's relevance, they also suggest its association with *procedural fairness* and *leadership* rather than solely landscape integration. From these two points,

one can reason that the factor time was effective for acceptance of the process, not of the finished product. By preparing and facilitating the locals in gaining knowledge, it could help them with building up concerns and receiving proper compensation. This way, time or timing is relevant in the planning process.

6.1.7 Local ownership

The factor of local ownership caused a lot of discussion in the interviews and survey. In the survey, the final remarks indicated that the respondents would rather see the locals benefitting from solar fields rather than developers. As Gross (2020) argued, locals have an aversion towards externalities that would disrupt their region. In the interview of G1, the example of Nieuwleusen provided a clear context for local ownership. G1 highlighted the locals were happy with the fact that they themselves benefitted from the wind parks, and not outside players. however, it also indicated an overlap of factors. One can further reason that the factor experience is relevant here, as the municipalities are still learning from the processes and outcomes of each renewable energy projects.

However, as was the case with the countries discussed in chapter 2 and the theory in chapter 3, the interviews showed that defining local ownership is still met with difficulties. It did mention that each project had local ownership or participation should aim for 50 percent, with 20 percent as a bottom line. But 50 percent was an aspiration not an obligation. The interviews of P1 and C1 showed opposite viewpoints on this definition of local ownership. According to P1, commercial parties prefer the aspiration, as it gives them more freedom to develop. In their words, the flexibility allows them to better address local needs, as they argued that every place has its own unique requirements. Therefore, local ownership is often not feasible or not preferred. In contrast, C1 argued that local ownership should be defined without the aspiration, but as an obligation. Local parties, who according to C1 have financial difficulties, and thus having to rely on commercial partners look at this aspiration negatively. They fear the commercial side to take advantage of their position within the projects. Although in the interviews it became clear that this fear can be negated with effective communication.

So, what can be seen from these opposing views is that land ownership is a bottleneck for local parties and local needs. What may help is for the government to take a proactive stance by buying up locations for solar fields themselves. C1 argued that one of their most successful and approved projects was the former gas storage facility. The land was already owned by the government, which meant that the mediation could already take place between the commercial company on the one hand, with locals and government together on the other. This creates a stronger negotiating position for local parties, which in turn can lead to a stronger focus on local needs.

6.1.8 Transparency in compensation schemes

As Clausen and Rudolph (2020) argued that different methods for compensation may trigger tensions about who gets what when. The survey indicates that people agree with the idea that discussing different forms of compensation will help with acceptance of a project. This gets turned around when asked whether they would view projects more positively when they knew the affected locals received compensation. From this, compensation is helpful for acceptance of the people who receive it, while it has limited effect on the ones who are not affected.

The compensation method of direct investment in community amenities was prominently mentioned in the interviews. The survey indicated that local investment would have a positive effect on acceptance. P1 showed preference to the area fund instead of working with ownership, and C1 did mentioned that their energy cooperative works with this method as well. This can confirm G2's argument that most energy cooperatives have shown to prefer the area fund as a measure for

compensation. However, G2 showed concerns with the area fund that is in line with the theory (Jorgensen, 2020; Perlaviciute et al., 2018; Clausen & Rudolph, 2020; Huijs et al., 2012). This is the concern of who will handle the funds of said area. Locals may not trust external parties to handle the area fund, which is why area funds are locally organized. However, it may trigger problems on the long run about what Clausen and Rudolph (2020) describe as who gets what when. The context of C1 that was mentioned in *procedural fairness* as well as *time* shows the possible risk, as local actors do not guarantee that other locals are in line with the decisions that are made. All in all, the results have shown that compensation, especially in the form of local investment has a positive effect on acceptance. However, for this, communication is important. Thus, local participation is necessary to make sure these investments are deemed sound by locals themselves.

With the factors being linked to the theory, it shows considerable overlap in building up a degree of acceptance. Most factors align with what was discussed in the theoretical framework. However, some factors have shown to work differently from the theoretical expectations. For instance, time being understood as a form of momentum rather than the passing of time. Taking these considerations into account, a conclusion can be drawn from this research.

6.2 Conclusion

This research aimed at contributing to the discussion of which factors influence the acceptance of renewable energy projects. For this, the case of solar field development in the Dutch province of Drenthe was selected. This province had seen a tremendous growth of solar fields in the last decade. However current discourse in support for these solar fields have been strongly negative. This was especially seen in both media and voting choice of Drenthe. However there were reports of solar fields who were well received. The combination of the growth of solar fields, the general decrease in acceptance as well as some parks being publicly well received begged the question why this growth came to be in the first place. To find out, this research is built on the question *Which governance arrangements and factors for social acceptance are successful in the development of solar energy in Drenthe?*

The experiences with wind energy made the province of Drenthe realize renewable energy policy was institutionally too far away from the locals. With the province relegating renewable energy to the municipalities, they in turn had to figure out how they would realize the energy goals. This made them revalidate plans that were waiting for approval. Developers took the leading hand, establishing agreements beforehand with landowners that allows for a position of advantage to develop the plans. It was not a predetermined choice of the province to focus on solar fields, but the choice of the developers and landowners. The development came before policy, which led to a strong unhindered growth where local policy had to catch up to.

In the development of solar energy, it is mostly the three main groups as mentioned by Lemos & Agrawal (2006), namely the government, the commercial and the citizens. The citizens in this question are either the energy cooperatives, or the landowners. The development was able to continue due efforts from these stakeholder groups to address local concerns. To prevent similar outcomes of Drentse Monden-Oostermoer, policy frameworks were developed that coincide with the factors for acceptance. Formal agreements for co-ownership and partnerships require a degree of trust between these stakeholders. This was a learning curve, as local ownership and participation grew from almost nothing, to small investments locally to local ownership manifested in the regional energy strategy. However, the open interpretation did allow for clashes between stakeholders about

the implementation. That, and the unfeasibility of organizing local ownership shows that currently some energy cooperatives focus on the area funds to manage compensation rather than ownership.

To summarize, successful governance and social acceptance of solar energy in Drenthe hinge on effective communication, proactive government involvement, local ownership considerations, and thoughtful site selection that respects both economic and aesthetic values. Next to that, dual functions have a strong preference, both in their ecologically and economically. Even when policy makers may have shown scepticism with the economic capabilities of secondary function, it negates the main critiques of solar fields being spatially inefficient. This coincides with solar fields being more accepted when built on undesirable 'brackish' land, or when the land use is not perceived to be changed, like the case of brownfields. Both government acquisition of land for renewables and centralized policies, especially for rooftop installations, could simplify the planning processes further to enhance acceptance and development. But nevertheless, to increase the likelihood for acceptance, communication and local cooperation is required.

6.2.1 Limitations

The results of this research must be considered within the specific context of Drenthe. While many components of the model are applicable to other provinces in the Netherlands, Drenthe stands out due to its relatively low population density and the significant number of solar fields. The findings on landscape integration are particularly relevant to Drenthe's distinctive landscape, which includes *esdorp*-landscapes, heathlands, and former peat colonies. Nevertheless, the conceptual model and its factors are designed to address renewable energy broadly, not just solar energy. Although interviewees highlighted that local ownership is a unique concern for renewable energy projects, similar requirements might apply to other types of projects in the future.

6.2.2 Recommendations

This study has provided context of government, commercial and civilian groups in the planning process of solar fields. The findings of this study can help with these three groups in understanding their different perspectives on the planning process. The survey finding on the other hand provide insights in the civilian groups that do not take part in the planning process but are affected by it.
Future research can delve deeper in the process and outcomes of the A37 Solar Route. This project will be a strong case study for regional energy transition in the form of intermunicipal collaboration of which the factors for acceptance can be developed further. Especially on the basis of local ownership on government owned land.
At the same time, the factors for social acceptance have a strong potential to be expended upon. In organizing the results in a coherent fashion, it became clear that the factors can be further split up in smaller subfactors in order to get a more holistic idea on shaping and understanding acceptance.

7 References

Avelino, F., Bosman, R., Frantzeskaki, N., Akerboom, S., Boontje, P., Hoffman, J., Wittmayer, J. (2014). The (self-)governance of community energy: Challenges & prospects (DRIFT practice brief no. PB 2014.01). Rotterdam, the Netherlands: Dutch Research Institute for Transitions.

Behzadi, A., & Arabkoohsar, A. (2020). Feasibility study of a smart building energy system comprising solar PV/T panels and a heat storage unit. *Energy*, *210*, 118528.

Buit, H. (2022) Hoogeveen zegt 'nee' tegen zonnepark langs A37 bij Hollandscheveld. 'Onvoldoende draagvlak bij omwonenden' Dagblad van het Noorden 08-12. Available at: https://dvhn.nl/drenthe/Raad-Hoogeveen-zegt-nee-tegen-zonnepark-28098315.html accessed 07-07-2023

Carley, S., Konisky, D. M., Atiq, Z., & Land, N. (2020). Energy infrastructure, NIMBYism, and public opinion: a systematic literature review of three decades of empirical survey literature. Environmental Research Letters, 15(9), 093007

Carlisle, J. E., Kane, S. L., Solan, D., Bowman, M., & Joe, J. C. (2015). Public attitudes regarding large-scale solar energy development in the US. Renewable and Sustainable Energy Reviews, 48, 835-847.

Clausen, L. T., & Rudolph, D. (2020). Renewable energy for sustainable rural development: Synergies and mismatches. Energy Policy, 138, 111289.

Creamer, E., Aiken, G. T., Van Veelen, B., Walker, G., & Devine-Wright, P. (2019). Community renewable energy: What does it do? Walker and Devine-Wright (2008) ten years on. *Energy Research & Social Science*, *57*, 101223.

Directoraat-generaal Klimaat en Energie (2023). Kamerbrief 2e Zonnebrief over ontwikkeling zonne-energie. Ministerie van Economische Zaken en Klimaat, Dutch Government. Available at: https://www.rijksoverheid.nl/documenten/kamerstukken/2023/07/06/kamerbrief-zonnebrief Accessed 25-08-2023.

Dutch Government (2023). Nationaal Plan Energiesysteem (concept). Ministerie van Economische Zaken en Klimaat. Available at: https://www.rvo.nl/onderwerpen/energiesysteem/nationaal-plan-energiesysteem Accessed 25-08-2023.

Energie op rijskgrond (2023), Meters maken met OER. Available at: https://magazines.rijksoverheid.nl/ienw/energieoprijksgrond/2022/01/meters-maken-met-oer Accessed: 25-08-2023.

Engelenburg, van B., & Maas, N. (2018). Regional Energy Transition (RET): How to improve the connection of praxis and theory. J. Technol. Archit. Environ. Behave, 1, 62-67.

Enserink, M., Van Etteger, R., Van den Brink, A. and Stremke, S., 2022. To support or oppose renewable energy projects? A systematic literature review on the factors influencing landscape design and social acceptance. *Energy Research & Social Science*, *91*, p.102740.

Formolli M, Lobaccaro G and Kanters J (2021). Solar Energy in the Nordic Built Environment: Challenges, Opportunities and Barriers *Energies* **14** 8410 Online: http://dx.doi.org/10.3390/en14248410

Frantzeskaki, N., Avelino, F., & Loorbach, D. (2013). Outliers or frontrunners? Exploring the (self-) governance of community-owned sustainable energy in Scotland and the Netherlands.

Gatzert, N., & Vogl, N. (2016). Evaluating investments in renewable energy under policy risks. *Energy Policy*, *95*, 238-252.

Gedeputeerde Staten Drenthe (2021) *beleidsregel Zon in Drenthe.* Available at: https://lokaleregelgeving.overheid.nl/CVDR645569/2#d214191924e75 Accessed 25-05-2023.

Gorroño-Albizu, L., Sperling, K., & Djørup, S. (2019). The past, present and uncertain future of community energy in Denmark: Critically reviewing and conceptualising citizen ownership. *Energy Research & Social Science*, *57*, 101231.

Gross, S. (2020). Renewables, land use, and local opposition in the United States. *Brookings: Washington, DC, USA*.

Hai, M.A, (2019) Rethinking the social acceptance of solar energy: Exploring "states of willingness" in Finland, Energy Research & Social Science, 51: 96-106]

Hoppe, T., & Miedema, M. (2020). A governance approach to regional energy transition: Meaning, conceptualization and practice. *Sustainability*, *12*(3), 915.

Horlings, I., & Padt, F. (2013). Leadership for sustainable regional development in rural areas: Bridging personal and institutional aspects. Sustainable Development, 21(6), 413-424.

Huijts, N. M., Molin, E. J., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and sustainable energy reviews*, *16*(1), 525-531.

Iskandarova, M., Dembek, A., Fraaije, M., Matthews, W., Stasik, A., Wittmayer, J. M., & Sovacool, B. K. (2021). Who finances renewable energy in Europe? Examining temporality, authority, and contestation in solar and wind subsidies in Poland, the Netherlands and the United Kingdom. *Energy Strategy Reviews*, *38*, 100730.

Jørgensen, M. L. (2020). Low carbon but corrupt? Bribery, inappropriateness and unfairness concerns in Danish energy policy. *Energy Research & Social Science*, *70*, 101663.

Kalkbrenner, B. J., & Roosen, J. (2016). Citizens' willingness to participate in local renewable energy projects: The role of community and trust in Germany. *Energy Research & Social Science*, *13*, 60-70.

Kieskompas Provinciale Statenverkiezingen editie 2023. Available at: https://www.kieskompas.nl/nl/tools/over-de-provincialestatenverkiezingen-2023/

Klomp, S. (2023) Drenten zijn meest tegen windmolens en zonnepanelen op weilanden. Rtv Drenthe 14-03 available at: https://www.rtvdrenthe.nl/nieuws/15426796/drenten-zijn-meest-tegen-windmolens-en-zonnepanelen-op-weilanden accessed 07-07-2023

Langeler (2023) Waarom lelijke zonneparken echt niet meer kunnen. 'Zo haalt Nederland klimaatdoelen nooit' Dagblad van het Noorden 27-03. Available at https://dvhn.nl/duurzaam/Waarom-zonneparken-echt-niet-meer-mogen-Zo-haalt-Nederland-klimaatdoelen-nooit-28324326.html accessed 07-07-2023

Lemos, M. C., Agrawal, A. (2006) Environmental governance. Annual Review of Environment and Natural Resources, 31 (3), pp. 297-325.

Mahzouni, A. (2019). The role of institutional entrepreneurship in emerging energy communities: The town of St. Peter in Germany. *Renewable and Sustainable Energy Reviews*, *107*, 297-308

Mey, F., & Diesendorf, M. (2018). Who owns an energy transition? Strategic action fields and community wind energy in Denmark. *Energy research & social science*, *35*, 108-117.

Mirzania, P., Ford, A., Andrews, D., Ofori, G., & Maidment, G. (2019). The impact of policy changes: The opportunities of Community Renewable Energy projects in the UK and the barriers they face. *Energy Policy*, *129*, 1282-1296.

Nkoana, E. M. (2018). Community acceptance challenges of renewable energy transition: A tale of two solar parks in Limpopo, South Africa. Journal of Energy in Southern Africa, 29(1), 34-40.

Pasqualetti, M. and Stremke, S., 2018. Energy landscapes in a crowded world: A first typology of origins and expressions. *Energy research & social science*, *36*, pp.94-105.

Perlaviciute, G., Steg, L., Contzen, N., Roeser, S., & Huijts, N. (2018). Emotional responses to energy projects: Insights for responsible decision making in a sustainable energy transition. *Sustainability*, *10*(7), 2526.

Provincie Drenthe (2023) *Drents actieprogramma netcongestie*. Netcongestie. Available at: https://www.provincie.drenthe.nl/onderwerpen/natuur-milieu/diversen/netcongestie/ accessed 29-05-2023.
Provincie Drenthe (2021) Subsidie Duurzaamheidslening hernieuwbare energie (Zonnelening) available at: https://www.provincie.drenthe.nl/@125740/subsidie-a/ accessed 07-07-2023.

Roesler, T., & Hassler, M. (2019). Creating niches–The role of policy for the implementation of bioenergy village cooperatives in Germany. *Energy Policy*, *124*, 95-101.

Rousseau DM, Sitkin SB, Burt RS, Camerer C. (1998). Not so different after all: a cross-discipline view of trust. Academy of Management Review, 23:393–404

Rtv Drenthe (2023) 'Omwonenden zonnepark a37 worden 50 procent eigenaar' 08-03 available at: https://www.rtvdrenthe.nl/nieuws/15410323/omwonenden-zonnepark-a37-worden-50-procent-eigenaar Accessed 25-05-2023 accessed 07-07-2023.

RTV Drenthe (2023) Uitbreiding elektriciteitsnet Drenthe loopt vertraging op, 22-02 available at: https://www.rtvdrenthe.nl/nieuws/15375892/uitbreiding-elektriciteitsnet-drenthe-loopt-vertraging-op accessed 07-07-2023

Rijksdienst Voor Ondernemend Nederland (2023) *Windpark Drentse Monden-Oostermoer* 17-08 available at: https://www.rvo.nl/onderwerpen/bureau-energieprojecten/lopende-projecten/windpark-dm-en-om accessed 25-11-2023.

Schmid, B., Meister, T., Klagge, B., & Seidl, I. (2020). Energy Cooperatives and Municipalities in Local Energy Governance Arrangements in Switzerland and Germany. *The Journal of Environment & Development*, *29*(1), 123–146. https://doi.org/10.1177/1070496519886013

Silverman, R. M., Taylor Jr, H. L., Yin, L., Miller, C., & Buggs, P. (2019). Place making as a form of place taking: Residential displacement and grassroots resistance to institutional encroachment in Buffalo, New York. *Journal of Place Management and Development*, *12*(4), 566-580.

Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? *Energy policy*, *36*(2), 497-500.

Wolsink M 2006 Invalid theory impedes our understanding: a critique on the persistence of the language of NIMBY Trans. Inst. Br. Geographers 31 85–91

Wu, J., Zuidema, C., & De Roo, G. (2022). Collaborative efforts on energy transition in urban China: Institutional enabling and constraining conditions. Renewable and Sustainable Energy Reviews, 168, 112873.

Yildiz, Ö., Rommel, J., Debor, S., Holstenkamp, L., Mey, F., Müller, J. R., ... & Rognli, J. (2015). Renewable energy cooperatives as gatekeepers or facilitators? Recent developments in Germany and a multidisciplinary research agenda. *Energy Research & Social Science*, *6*, 59-73.

Appendix 1: Survey in Dutch

Zonnevelden in het algemeen

Wat is uw woonplaats?

Open

Is er dicht bij uw woonplaats een zonneveld gelegen?

Open/short answer

Hoe kijkt u aan tegen het toenemende aantal grote zonnevelden in Drenthe?

Erg negatief – negatief – Neutraal – positief - erg positief

Wat was uw mening over zonnevelden voordat er een bij u in de buurt kwam?

Erg negatief – negatief – Neutraal – positief - erg positief

Geef aan met oneens/eens: Mijn mening over zonnevelden is positief veranderd omdat ik gewend ben geraakt aan de aanwezigheid ervan.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Vertrouwen van de lokale bevolking.

Geef aan met oneens/eens: Voor mij is het belangrijk om benaderd te worden of betrokken te zijn bij de ontwikkeling van een mogelijk naburig zonneveld.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Op dit moment is er duidelijk en samenhangend beleid betreft zonnevelden in Drenthe.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: zo vroeg mogelijke communicatie vanuit de ontwikkelaars over de komst van een zonneveld zal leiden tot een grotere acceptatie bij omwonenden.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Ik sta meer open voor de komst van nieuwe zonnevelden in mijn regio als deze ontwikkeld worden door een al bekende ontwikkelaar.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Landschapsintegratie

Geef aan met oneens/eens: Het toevoegen van extra groene stroken rondom zonneparken zal het draagvlak verbeteren omdat de panelen beter beschut zijn.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Het toevoegen van extra groene stroken rondom zonneparken biedt volgens mij een sterke meerwaarde voor de natuur.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Acceptatie voor zonnevelden hangt samen met hun specifieke locatie, zeker als die locatie al een natuurlijk of economisch gunstige bestemming heeft gehad.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Als de locatie eerder geen gunstige bestemming/bedoeling had, zou ik positiever kijken naar de ontwikkeling van een zonneveld op die locatie.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Ik denk dat ik meer voorstander zou zijn van zonnevelden als ze een tweede functie hebben, zoals het combineren met landbouw, of het laten lopen van dieren (bijv. schapen) tussen de panelen.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Dubbele functies zoals het combineren met landbouw, of het laten lopen van dieren (bijv. schapen) tussen de panelen, zal meer draagvlak creëren vanwege de mogelijke economische meerwaarde ervan.
Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Verdelingsmogelijkheden

Geef aan met oneens/eens: Directe investeringen in lokale voorzieningen door de ontwikkelaars van de zonnevelden zijn voor mij goede methodes om lokaal draagvlak te creëren.

Bijvoorbeeld het verduurzamen van gemeenschappelijke gebouwen, het financieren van speeltoestellen, etc.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Ik zou de bouw van een naburig zonneveld sneller accepteren als ik weet van de aanwezigheid van verschillende mogelijkheden voor compensatie.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

Geef aan met oneens/eens: Als ik meer inzicht heb in wat andere mensen die in de buurt van het project wonen aan compensatie kunnen ontvangen, dan beïnvloedt dat mijn standpunt over het project positief.

Helemaal mee oneens – oneens – neutraal – mee eens – helemaal mee eens

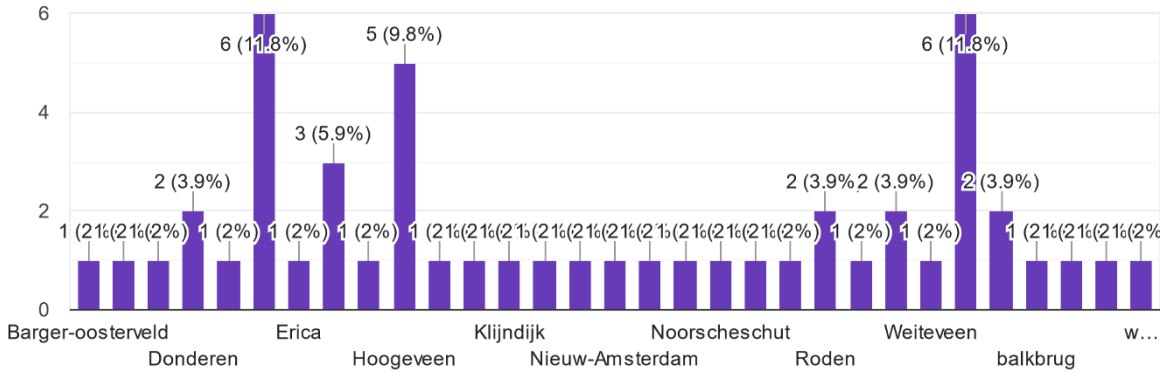
Heeft u nog opmerkingen?

Open

Appendix 2: Survey Results

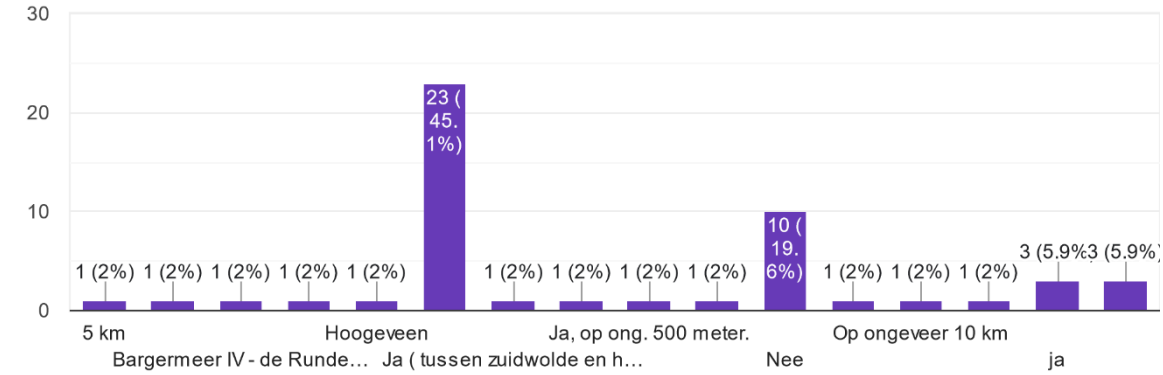
Wat is uw woonplaats?

51 responses



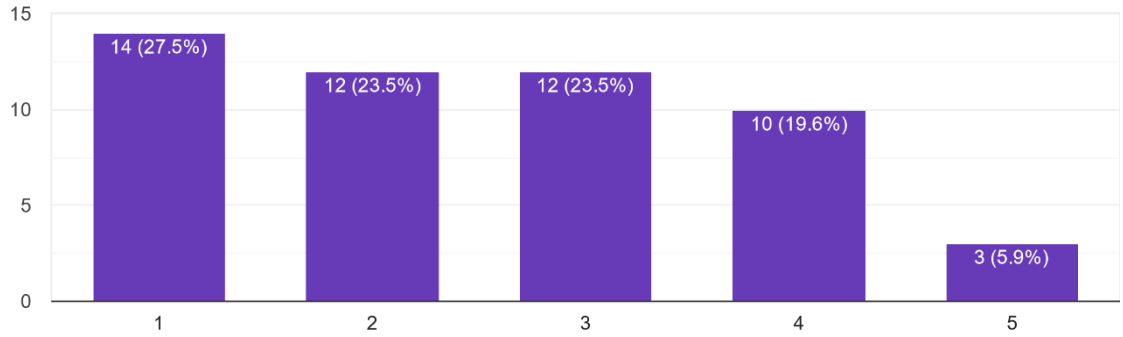
Is er dicht bij uw woonplaats een zonneveld gelegen?

51 responses



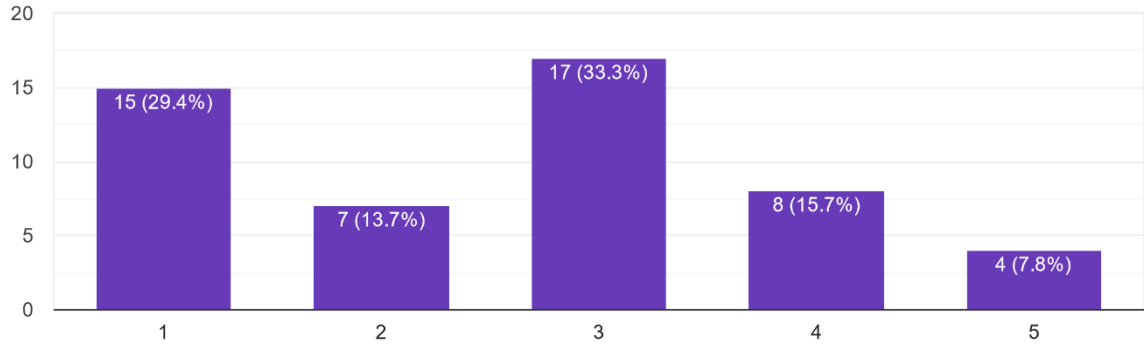
Hoe kijkt u aan tegen het toenemende aantal grote zonnevelden in Drenthe?

51 responses



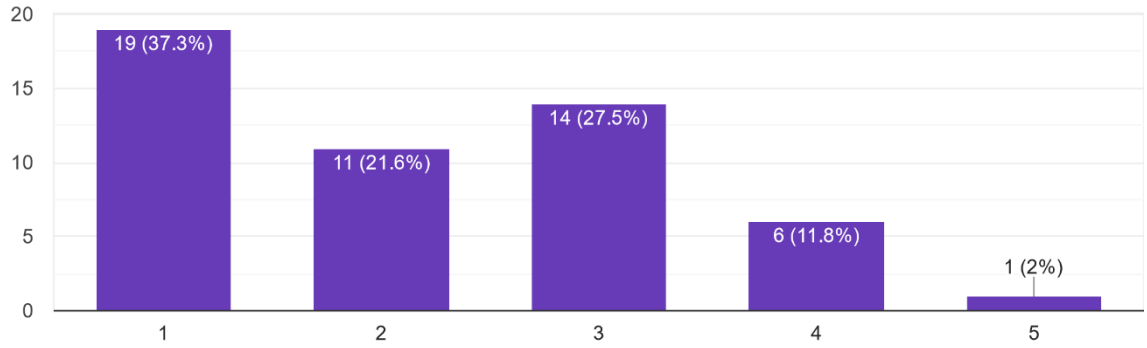
Wat was uw mening over zonnevelden voordat er een bij u in de buurt kwam?

51 responses



Geef aan met oneens/eens: Mijn mening over zonnevelden is positief veranderd omdat ik gewend ben geraakt aan de aanwezigheid ervan

51 responses



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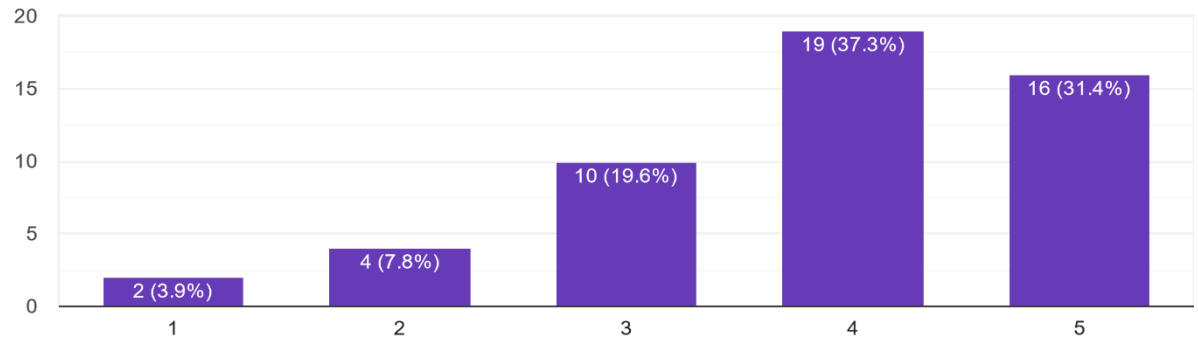
51 responses



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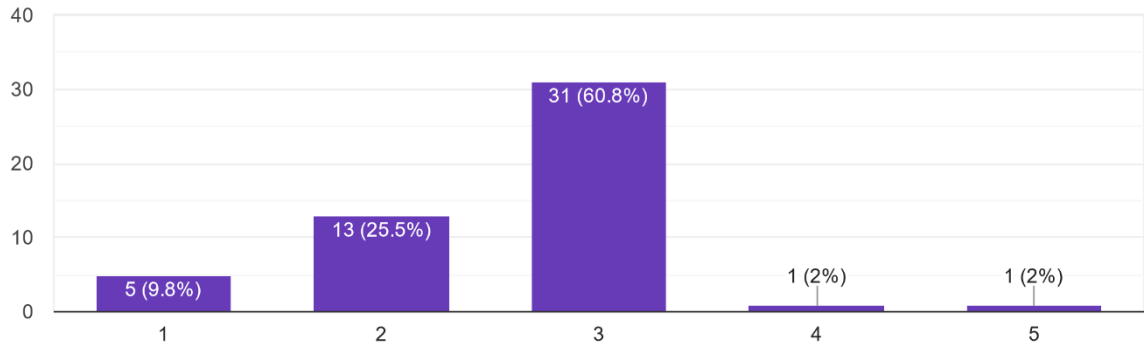
51 responses



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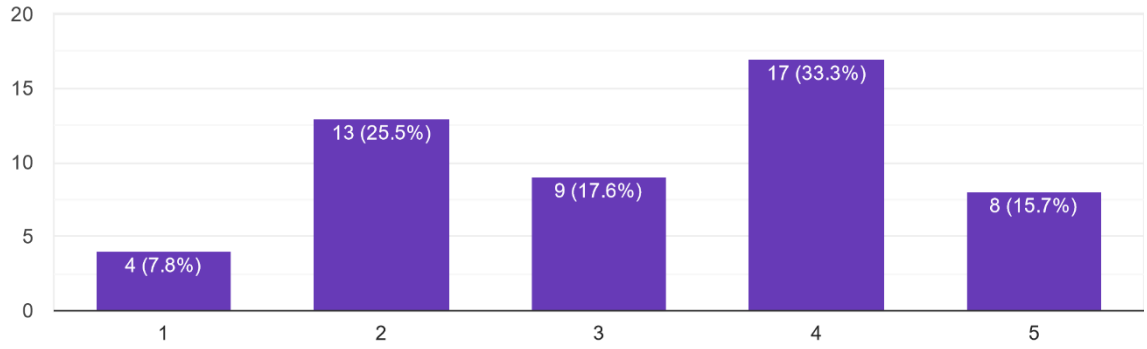
51 responses



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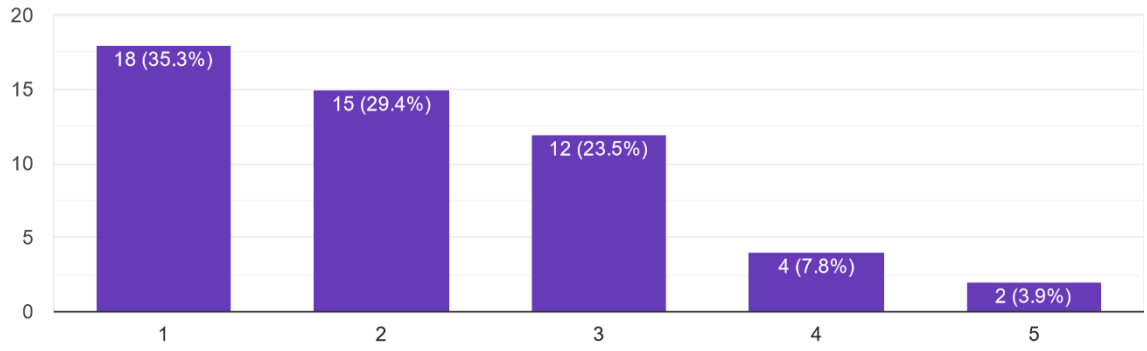
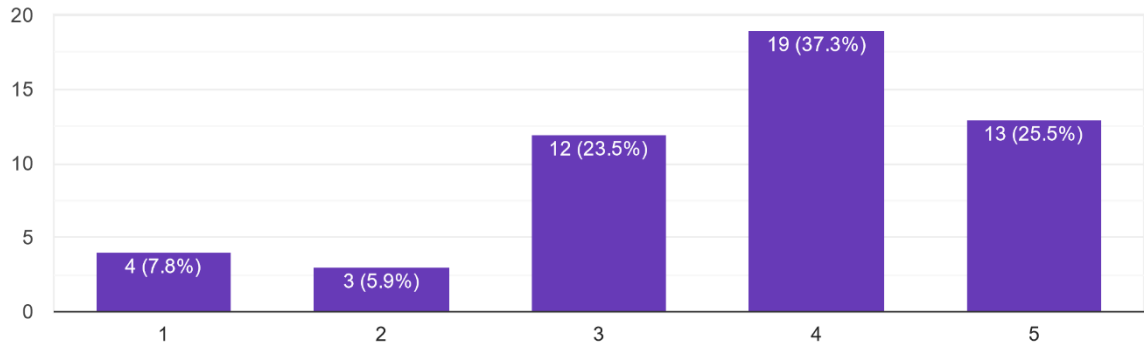
51 responses



Geef aan met oneens/eens: Het toevoegen van extra groene stroken rondom zonneparken zal het draagvlak verbeteren omdat de panelen beter beschut zijn.

51 responses



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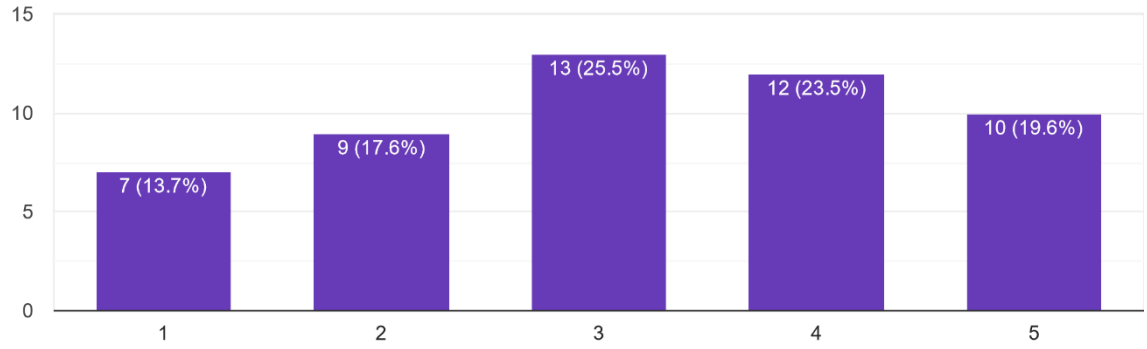
51 responses



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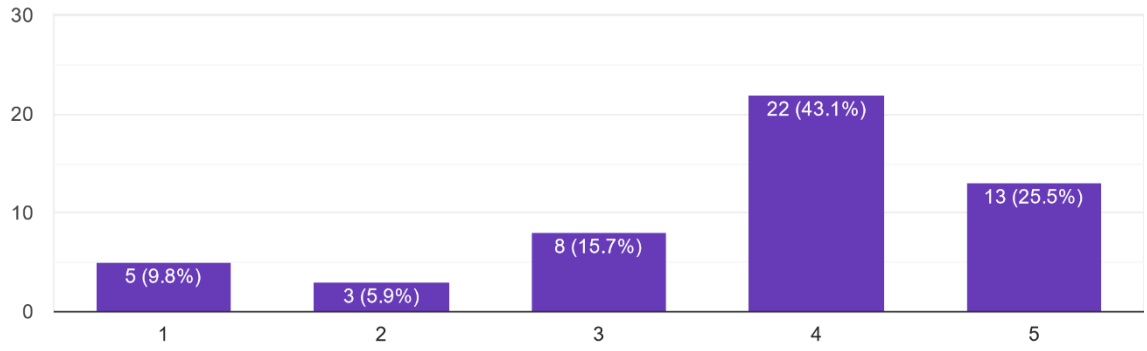
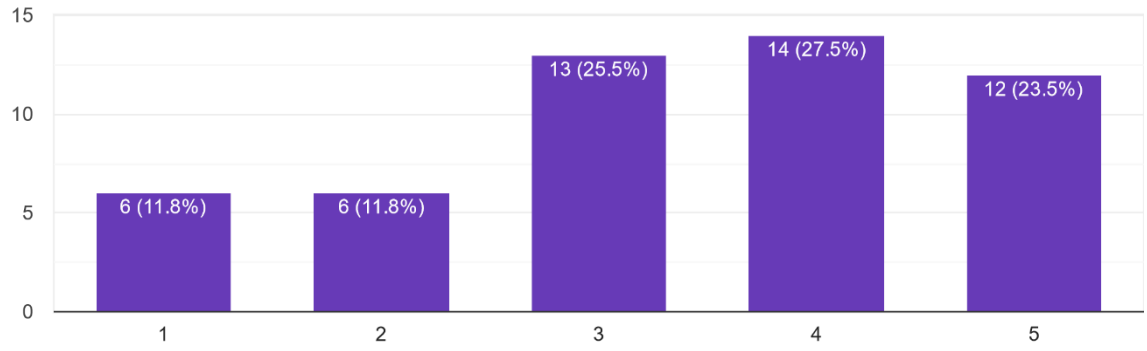
51 responses



Geef aan met oneens/eens: Als de locatie eerder geen gunstige bestemming/bedoeling had, zou ik positiever kijken naar de ontwikkeling van een zonneveld op die locatie.

51 responses



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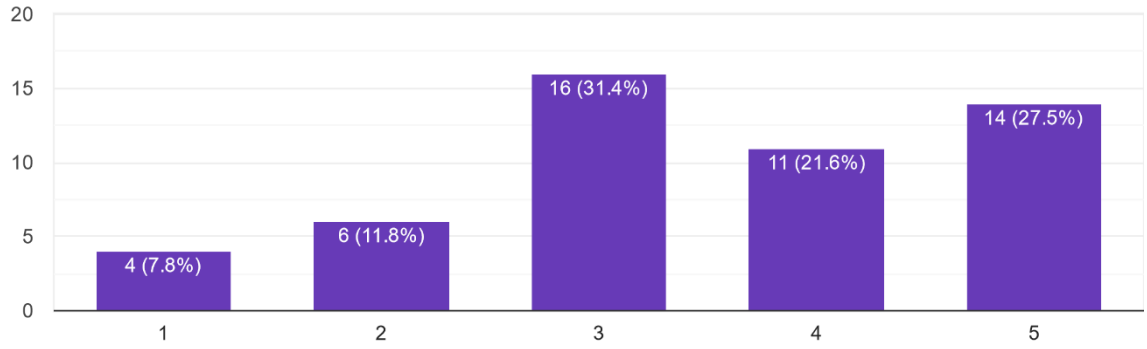
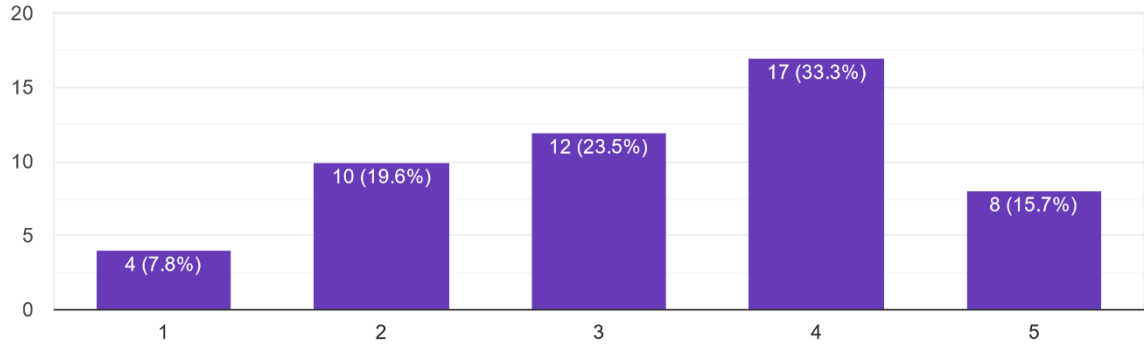
51 responses



Geef aan met oneens/eens: Dubbele functies zoals het combineren met landbouw, of het laten lopen van dieren (bijv. schapen) tussen de panel...wege de mogelijke economische meerwaarde ervan.

51 responses



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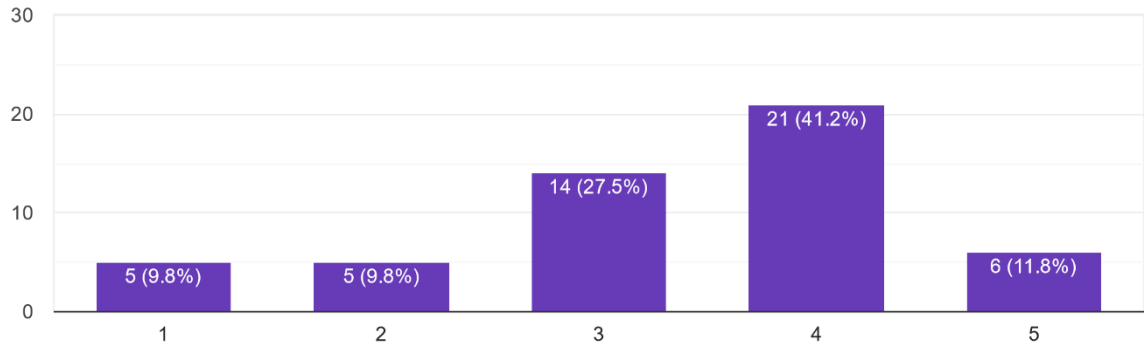
51 responses



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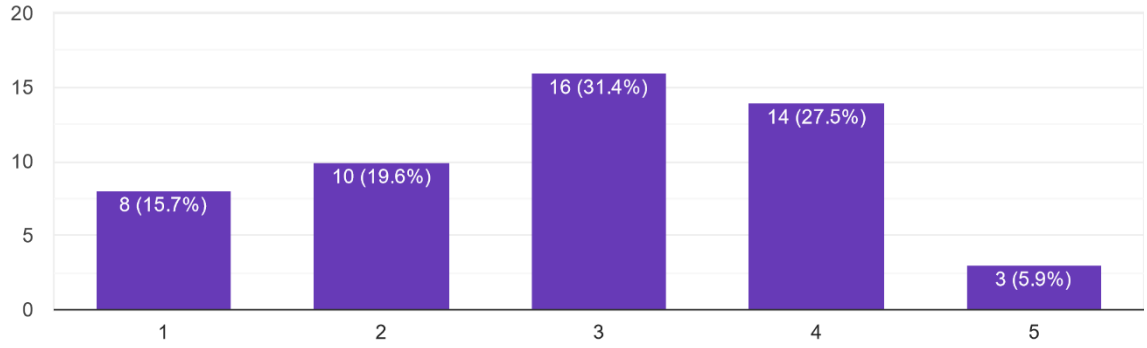
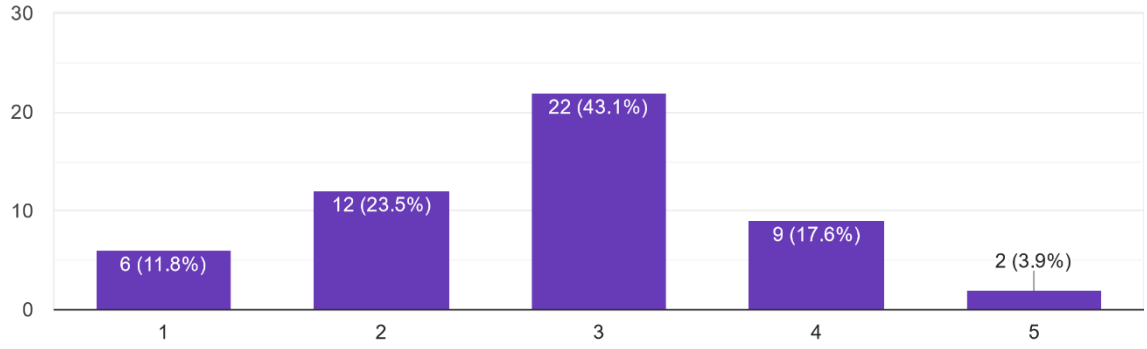
51 responses



Geef aan met oneens/eens: Als ik meer inzicht heb in wat andere mensen die in de buurt van het project wonen aan compensatie kunnen ontvangen, d...edt dat mijn standpunt over het project positief.
51 responses



Further remarks

Not all respondents answered this question, and not all answers were relevant for this research. Here are the answers that were beyond 'no comments' and 'good luck'.

"Meer zonneparken in combinatie met infrastructuur (geluidsschermen, op geluidswallen/stortplaatsen, talud van dijken)"

"Zonnepanelen op daken van grote bedrijven is een beter idee."

"Waarom worden er zonnevelden aangelegd terwijl er nog zoveel loodsen niet volgelegd zijn"

"Zonnepanelen dienen (in mijn optiek) primair op bestaande bouw geplaatst te worden. Integreren in bouwmaterialen is ook een optie. Pas nadat alle bestaande bouw voorzien is van panelen, dan pas kijken naar alternatieven. Dit zorgt voor meer participatie & acceptatie. Daarnaast worden financiële voordelen verspreid en komt dit niet in handen van grote (buitenlandse) investeerders. Het toepassen van panelen op cultuurgrond zonder duale functie vind ik verspilling, horizonvervuiling, en draagt bij aan de opwarming van de aarde. De panelen werken als een soort verwarming vanwege de zwarte kleur, daardoor alleen toepassen op oppervlakken die sowieso al donker van kleur zijn. Op grote schaal toepassen zorgt voor versnelde klimaatverandering. Hier is onvoldoende oog voor."

"Ik denk dat het draagvlak groter wordt als de opbrengsten ten goede komen aan de bewoners van Nederland en niet aan een al rijk bedrijf, met andere woorden delen door het betaalbaar houden van de energierekening. Ik vind ze een vernietiging van onze mooie provincie."

"Naar mijn mening is een zonneveld voor vele mensen een verstoring van het natuurlijke beeld en zal het draagvlak hiervoor onder omwonenden niet groter worden door subsidies te geven of bebossing/groen erom heen te planten of dieren te laten lopen".

"Het plaatsen van zonnevelden is absoluut een verwerpelijke zaak zolang er nog daken zijn waarop de geplaatst kunnen worden. Tevens is er op het moment zeker geen behoefte omdat bij hoge opbrengst de netwerken in Nederland het niet kunnen verwerken en daardoor installaties uitgeschakeld worden en stroom tegen negatieve prijzen aangeboden wordt. Dus eerst de infrastructuur op orde brengen en dan verder kijken naar verdere plaatsing."

"Vind in het algemeen zonneparken lelijk en overbodig, leg ze dan op daken."

"Ik vind dat de velden het mooie landschap bederven. M.u.v. b.v. de panelen op het terrein van de voormalige gas ontzwaveling fabriek in Emmen op het industrieterrein. Waar ze alleen vanaf het industrieterrein te zien zijn."

"Zonnepanelen zijn prima, maar voor velden waar alleen een ondernemer beter van wordt geldt dat niet. Op grote daken daarentegen zou beter zijn."

"Ik ben sws tegen zonneparken omdat men niet weet hoe zonnepanelen te recyclen. Ik vind het ook horizonvervuiling. En de ruimte die de parken innemen zie ik liever de weidevogels en andere dieren lopen. Mijn gevoel zegt dat de nieuwe energiebronnen voor meer ellende gaan zorgen dan men denkt. Noem mij maar ouderwets😊"