FIGURE 1: HTTPS://WWW.GNMF.NL/PROJECTEN/WINDPARK-NIJMEGEN-BETUWE

GETTING WIND OF A COLLABORATIVE EFFORT

The impact of citizen participation on speeding up the development towards regional wind energy goals in Rivierenland

Abstract

The Netherlands has set regional, and provincial targets to reach wind energy production goals, in combatting climate change. However, it is proving difficult to reach these goals; six of the twelve provinces are struggling to reach their targets in time. Many of the solutions to enhance wind energy development focus on increasing local support (decreasing the opposition). The expectations from increasing local support, for instance, by inceasing local ownership, are substantial and have resulted in changes in (proposed) policy. Due to the lead times of projects averaging around 5-7 years, the impact of new approaches to participation can not be empirically observed. This study clarifies the uncertainty, by conducting a survey among industry experts, and conducting 17 interviews, and analysing these results using a simulation model.

The thesis found that the form of participation used in a project can strongly influence the success chances, while it also impacts the lead times and returns and reinvestments. Moreover, this thesis found that the project development and achieval of the regional targets is quite sensitive to the success chances. Altogether, the impact of different forms of participation on the time to achieve targets is sizable. Government officials and developers alike should consider this in their approach to new developments.

Author: Justus René van Peer (S4285921)
Supervisor: dr. Vincent de Gooyert
Second reader: prof. dr. Paula Antunes

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Foreword

Throughout January 2019 until June 2019, I have viciously worked on the research project that completes my dual master degree, the European Master in System Dynamics. This two year long international program, has provided me with a new, life-long group of friends, many new skills, and many interesting lectures. Without the help, insights, and advice from my professors at the University of Bergen, the University of Palermo, and the Radboud University Nijmegen, I would not have come this far. Notably, Dr Vincent de Gooyert, my thesis supervisor invested many hours in this research project. I want to thank him dearly for all the advice he provided!

Vincent on-boarded me onto this research project, which he was doing together with Dr Huub Ploegmakers in early June 2018. The project focussed on modelling wind energy developments in the region Rivierenland in the Netherlands. This project was supervised by Prof. Cosenz from the University of Palermo. Upon the completion of the project, the topic retained my interest, so much that in September 2018, I decided to make this my thesis project. Due to a hectic first semester, my research efforts focussed mainly on writing the research proposal. This project would not be of the quality it is now without the many discussion with Dr Vincent de Gooyert. With the last exams completed in January, the research started! Ambitiously, and maybe a little overly optimistic, I decided to assist Vincent as a student-assistant for the BAFRO course and simultaneously work at a Consulting firm.

It was a real privilege to work as a researcher at the management consulting firm Summiteers. Summiteers allowed me to shift focus away from the thesis project, on a regular interval. More importantly, the work at Summiteers and my colleagues allowed me to learn many things about myself and to improve my approach to research and writing. Their focus on understanding client problems and approaches to resolving problems has been inspiring. Working at Summiteers has been a fantastic experience, one that has sometimes caused for a tight schedule, but more importantly, one that has been very rewarding!

Throughout this thesis project, I completed 16 interviews, two pilots with experts, cooperated with research partners, and I have had many conversations with others about the thesis. The interviews with 19 wonderfully helpful interviewees, were an enriching experience. I was surprised by the interviewees' openness, interest in the research and helpfulness. The interviewees allowed me to understand the research problem in a way that I would have never been able with just academic resources. They have provided countless examples, and they have patiently explained all the intricacies of the development of wind farms and the impact of different forms of participation. The interviewees have taken time away from their calendars to assist me with this research, and they have helped me to find more interviewees and distribute the survey I designed, for all this, I am very grateful. A few interviewees, Rik Harmsen, Anne-Marieke Schwencke and Sergej van de Bilt, even helped me in piloting the survey I designed to substantiate and validate the data from the interviews. They provided me with detailed feedback on how to ask the questions most efficiently, how to structure the survey, and what information to provide, this has proven to be extremely useful!

In distributing the survey, I received valuable assistance from Rik Harmsen, a member of the Dutch branch organisation for wind energy (NWEA). His help was valuable in reaching as many of the people with the expertise and experience in wind energy as possible. With his help and the help of all my interviewees and survey ambassadors, I have been able to contact 64 of the approximately 200 people with the expertise to answer the survey questions!

In all honesty, it would have been impossible to have finished this research in the time that it took without the help and support of my girlfriend, family and friends. Doing research, unfortunately, is not only about experiencing success. During this project, I have experienced many setbacks, not the least of which a repetitive strain injury in my wrist. Thankfully, Geerte has helped massively forcing me to take breaks, and motivating me whenever I needed motivation. My family (unvoluntary) was designated to hear all about my thesis, at all times of day, even during late night conversations over a glass of wine in an Italian hot-tub they helped me with structuring my thoughts. During the many walks, talks and phone conversations with my father, we must have discussed every little detail of the thesis and every decision at least twice. The feedback that both my father and my little brother have provided on the draft version of this study has been precious. The refreshers in statistics from Dinant have certainly contributed to the strength of the survey analysis. I have harressed many of my friends, classmates and acquaintances with draft versions of this study.

> I want to thank every single one who helped me improve this thesis in any way!

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1. Introduction:

1.1. Relevance

Over recent years, it has become abundantly clear, that human-caused climate change is a real and persevering threat. The Netherlands and its provinces, regions and municipalities have all been setting goals to reduce the emissions of greenhouse gasses to become carbon neutral, combatting climate change. Dutch provinces and their sub-regions are struggling to reach their target in time. Two of the twelve provinces are certainly not going to make their target by the deadline, and for four more provinces it is still unclear if they will make their respective targets (Dirks & Van den Berg, 2019). According to the Volkskrant, the opposition from local residents and nature organisations are often the cause for delays in the projects, making it harder to reach the targets (Dirks & Van den Berg, 2019). Despite the good intentions, the region of Rivierenland in Gelderland, which aims to have an installed capacity of 50 Megawatts from windmills by approximately 2025, is not seeing the progress they expected. Alongside some ambiguity about the goal, the region already recognises that they are behind schedule (Ploegmakers & de Gooyert, 2018). The region wants to speed up the process of wind energy development by increasing its understanding of the local market, understand where challenges lie, and where it can strengthen the local developments. In a quest to resolve the structural delays that have plagued onshore wind energy projects, many different authors have suggested solutions (Sovacool & Lakshmi Ratan, 2012; Wilson & Dyke, 2016; Wüstenhagen, Wolsink, & Bürer, 2007). Among the most popular suggested solutions are increasing citizen participation and increasing local ownership. Little research has focused on exploring the potential impact of those solutions.

Nonetheless, the most recent proposal for a Dutch climate agreement proposes a norm; this norm aims for 50% local ownership in the newly developed project, it is not clear about how to achieve this goal (Klimaatberaad, 2018, p.156). Regarding the implementation of this norm, there are two distinctly different developers in the Dutch wind energy market; the commercial ventures and the cooperative initiatives (Klimaatberaad, 2018). The latter differentiate themselves by involving the local citizens, among other things, by owning the project. It is of particular interest for the region Rivierenland, as well as for other regions in the Netherlands, to comprehend what effect, the increased ownership of the local citizens and the accompanying different business models will have on the achievability of their wind production targets. This thesis will explore the uncertainties surrounding the potential impact of different forms of local participation on the development of wind energy.

Scientifically this thesis will contribute to an extending research base on the impact of citizen participation in wind energy. Most projects focussing on citizen participation, address the impact of the participation on the local support for a particular project. On the contrary, this study focusses on the potential impact of the participation in terms of the success chances, lead times, and re-investment overall of wind energy projects. Furthermore, this study aims to combine benefits of the insightful qualitative, mental information, and the sizeable sample of expert estimation on parameters into one coherent conclusion.

This study is an extension on a previous study, designed to help the region Rivierenland strategising; on how it would be possible to speed up the local wind energy development, using a system dynamics model (van Peer, 2018). This thesis continues to work on the same problem, yet it uses more elaborate methods of data collections. Thereby improving a model that is based on the knowledge of experts in the sector, resulting in a significantly better-substantiated model. The study also changes the scope of the modelling effort, moving away from a microworld model and focussing on a theoretical contribution instead.

1.2. Research objective and focus

The objective of this research is to assist the region Rivierenland, in the province of Gelderland, in understanding the options it has to speed up wind development, focussing on different forms of participation. It is the aim of this thesis the develop a more profound, updated understanding into how current and upcoming ways of participation would impact the wind energy development towards set production goals by regions in the Netherlands with little few producing wind farms.

Existing research has focussed on an low implementation of onshore wind energy. Many of the suggested solutions focus on the local support of a project. Solutions range from different forms and levels of participation to ownership by the local community. Within the area of wind energy development, new policies will soon be developed and enacted, both the new environmental bill for project management and the most recent proposed climate agreement include standards for the inclusion of citizen living the proximity of the project sites.

The new insights provided by this thesis help to get a better grasp the impact of new policies that are being developed, like the 'Environmental bill' (de Omgevingswet), and the most recent proposal for a climate agreement (Klimaatberaad, 2018; Ministerie van infrastructuur en milieu, 2015). Within these policies, there is a strong focus on the incorporation of the local environment in decision procedures.

The thesis uses 17 interviews with 20 industry experts and a survey among experts to develop a better, updated understanding of the development of wind projects. The survey is used to estimate the impact of different forms of participation on wind projects. The interviews provide examples with context on how different projects have developed, as well as recent changes. The research question for this thesis is as follows:

Research question:

To what extent can local governments speed-up the onshore wind energy development by favouring projects with different perspectives on community participation and local ownership?

Within this research question, this study focusses mainly on the project lead time, success chances, depreciation, and the re-investment. The choice for these variables is substantiated in the next section.

1.3. Research sub-questions

Within the preceding section of the literature review, this thesis has shown that the most recent climate agreement proposal includes an explicit goal for local ownership of 50% in wind energy developments (Klimaatberaad, 2018, p. 156). In a research report, the Dutch wind energy consulting firm, Bosch & van Rijn, found that social resistance was one of the five most critical obstructive factors to the success chances of onshore wind energy projects (Bosch & van Rijn, 2008, p.4). The literature indicates that the form of participation affects the social resistance strongly; it is therefore expected to impact the success chances. Furthermore, there is no agreement about the impact of the participation form on the project development. This research aims to answer the following question in order to develop well-substantiated perspective of the impact of participation on the success chances of projects:

Question 1: How do different forms of participation in wind energy projects, impact success chances of wind energy projects?

In a paper focussing on the impact of participation on positive community engagement, it was shown that less involving forms of participation, for instance town hall assemblies, lead to dissatisfaction among the attendants, longer project development times and increased costs (Jami & Walsh, 2017; O'Faircheallaigh, 2010). Importantly, in group decision making literature it was found that building of consensus during more involving forms of participation is a time consuming process, however, it will result in less resistance and possible time savings in the following phases (Sager & Gastil, 2006). This study investigates if more involved approaches to citizen participation will follow the traditional behaviour from group decision making literature, by answering the following question:

Question 2: How are the lead times for wind energy projects impacted by different forms of interaction with the environment - participation and ownership?

On occasions, co-operative projects purchase windmills that have been retired by other parties (Luijkx, 2018; Lokal Energie Monitor, 2017). The fact that some cooperatives use windmills that have been retired by other parties can be an indication that different types of developers use windmills for different periods of time. To develop a good idea of how wind energy production will develop when the timescale stretches over a long period, it is important to research if

either of the parties producing wind energy would behave differently. As such, this study aims to understand the impact of participation forms on the operational lifetime of windmills, asking the following question:

Question 3: How does the operational lifetime of a windmill differ between projects with different forms of participation?

Onshore wind energy, is known to have a high yield per unit, and a short amortisation time (Langer, Decker, Roosen, & Menrad, 2018). This means that the returns are likely to be high, and that risk is limited due to the short repayment time. This makes wind farms into interesting investments. However, earlier studies found that less involving forms of participation can lead to increased project costs (Jami & Walsh, 2017), which would decrease the returns of a project. Some co-operatives decide against re-investing their profits into new developments, instead returning the profits to its investors and the local environment (International Co-operative Alliance, 2015). On other occasions, co-operatives invested their profits in unfeasible projects (Agterbosch, 2006). As the re-investment will likely have an influence on the behaviour towards a long-term goal, the study will investigate how co-operatives and commercial projects use their profits. Furthermore, some authors argue that large scale developers are efficient business able to invest in the most profitable project in areas with a high wind potential (Wierling et al., 2018). To develop a more uniform understanding of the impact of different forms of participation on the revenues and reinvestments of wind projects in the Netherlands, this study aims to answer the following question:

Question 4: How are the revenues and reinvestment from wind projects with different forms of participation used?

The answers allow for a more uniform and more thorough understanding of the dutch onshore wind development. Furthermore, the answers guide the parameterisation of the accompanying simulation model. The simulation model allows this study to answer its main research question. To answer the research question the simulation model compares the effectiveness of using different forms of participation in wind energy development, analysing if one is faster to reach set wind energy production goal as well as understanding why behavioural differences towards the goal of wind energy production exist. The simulation model will visualise the behaviour that follows from the outcomes of the interviews and the survey. The outcomes from the model allow this study to gain insight what the impact of different forms of participation is on the development of wind energy projects. Currently, the analysis on this topic focusses strongly on individual cases (Aitken, 2010a; Holstenkamp & Kahla, 2016; Toke, Breukers, & Wolsink, 2008; Wilson & Dyke, 2016), while a more general perspective is needed to properly understand the size of the impact. The sub-questions guide the research towards testing the dynamic hypothesis, which is used as a general guideline for the mechanical workings of the model. The dynamic hypothesis is designed to incorporate the different effects where participation forms impact the wind energy project development:

Progress towards a goal for onshore wind energy production, is faster for more involving forms of participation than for less involving forms of participation, assuming that all possible projects can be profitable and acting in a market where land is scarce, especially with developments near communities.

The simulation model can be found following this paragraph. It describes how in the Dutch wind energy market, the initiatives incept from the set wind energy production target. The stock and flow model (SFD, the model structure that guides the simulation model) shows the general steps all projects need to complete in their development, from the completion of the idea to granting of urban planning permissions, until the demolishment after the production period. Furthermore, it shows how the earnings from producing projects feed back into investments for new projects.

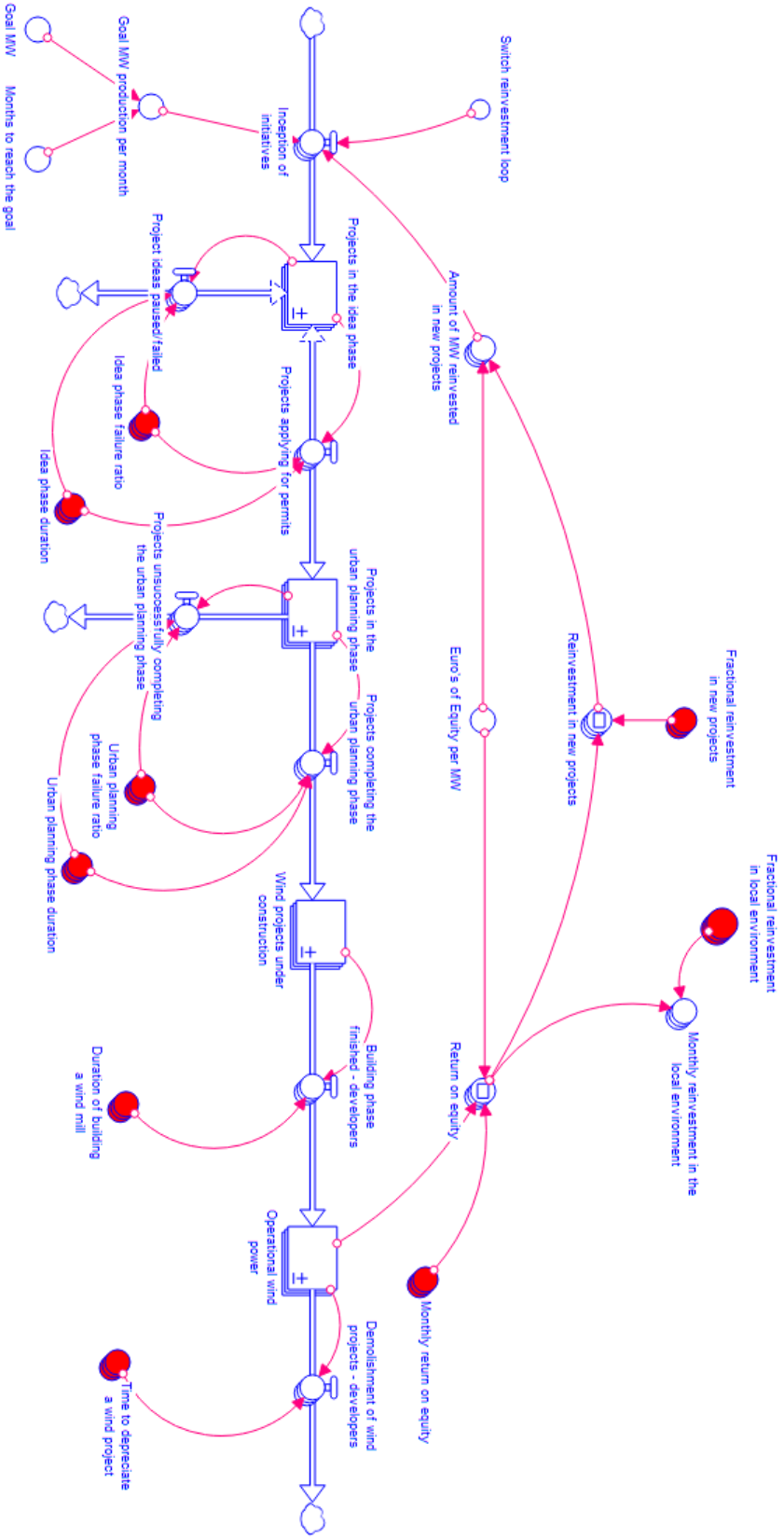


FIGURE 2: SFD (FIRST ORDER MODEL)

The variables estimated in this study are coloured red.

1.4. Thesis structure

In order to answer the research question, this thesis uses the following structure. The thesis will start by analysing the earlier research in the literature review. It will then provide insight into the methods of research that have been used to study the research questions. The analysis section provides a thorough analysis of the interviews, this is cross-validated by the survey results. Lastly, the analysis section provides an elaboration of the model results on a variety of scenarios. The conclusion, will reflect on the meaning and impact of the results and it will also provide an answer to the research question. The limitations will provide a boundary concerning the scope of the results and the conclusions drawn in this research. Lastly, this thesis will finish with a section on suggestions for further research.

2. Literature review

Within the literature review, this thesis will introduce the reader to the perspective that is used to research the transition towards wind energy. The literature starts by addressing earlier works from a system dynamics (SD) perspective on the diffusion of new technologies like wind energy. Following the section on technology diffusion, it will highlight the intricacies of onshore wind energy development in the Netherlands, explaining the different procedures of the process, in section 2.2. This section also addresses obstacles and impediments that project developers encounter, affecting the support for projects and eventually the success rates. Section 2.3, focusses specifically on how to increase the local support for wind projects, assessing solutions and concepts from earlier research. One of the policies suggested in the most recent proposal for the climate agreement is to increase local ownership; the most common way to execute this solution is using the business form of cooperatives. Cooperatives are businesses that differ from the more traditional developer. Section 2.4 delves deeper into their origins and characteristics. Lastly, section 2.5 will address which policy changes regarding the engagement of local residents are imminent at this point in time.

2.1. Energy transition earlier work from an SD perspective

Wind energy, with its 30-35 year history, is the most mature scaleable source of renewable energy (Curtin, McInerney, Gallachóir, & Salm, 2019a). Wind energy is not, yet, competitive with traditional non-renewable sources of energy production. System dynamics is a method with extensive experience in modelling the diffusion of new technologies, analysing how they grow market share. This sub-section will focus on the transition towards wind energy from an SD point of view. From the early 2000s onwards, there have been papers that have used systems thinking, and particularly SD to model the diffusion of wind energy. This section aims to assess previous work and how this work can be useful for this thesis.

SD is a problem structuring technique, that aims to develop a holistic perspective of the variables within the boundary of a system in order to comprehend why a particular problematic behaviour is occurring and how it can be adequately addressed (Sterman, 2000). Remarkable about SD is that it builds ‘flight simulators’ of a wide variety of systems, allowing one to experiment with policies and changes in a virtual environment. This characteristic helps in deepening one’s understanding of a complex system. SD is particularly helpful in providing insight into dynamic complexity. System dynamics models flourish in situations where the behaviour changes over time, in situation where changes in the structure govern the behaviour of that structure; when a system is dependent on what has happened in the past; in situations where the behaviour is hard to be explained on a first sight; in situations where the implemented policies do not seem to work; and when trade-offs have to be made in the development of adequate policies (Sterman, 2000).

The adoption of a technology has been a topic that received much attention in scientific research, starting with the threshold model (Griliches, 1957). SD models have contributed significantly to the models of diffusion, particularly the the Bass model gained much attention in marketing (Homer, 1987; Sterman, 2000). The Bass model divided the population into groups, a group of susceptible people and a group of exposed people. The strength of the model lies in its intuitive analysis of how the population moves from one group to another subject to certain conditions, such as the contact rate. Another category developed, combining the economic factors relevant to threshold models and the social aspects that are particular for the Bass diffusion models into “mixed influence models”. Distinguishing for the mixed influence models is their suitability for analysis using SD, due to their combination of economic and social effect, all of which represented as additional feedback relations affecting adoption behaviour (Sterman, 2000; Weil, 1996).

In the case of wind energy adoption, the dual socio-economic influence is essential for technology adoption. A previously developed model on wind energy, by Pruyt, intends to deliver a critique to non-systems models that ignored fundamental feedback mechanisms that influence the diffusion of wind energy (Pruyt, 2004). Dyner built a model of the overall electricity market; this came at the expense of modelling the wind energy industry itself (Dyner, 2006). Furthermore, there is a set of models that look at capacity expansion and electricity planning models, focusing on the technical and economic needs of the electricity system (Carlos, 2016; Ford, 1997; Institue for energy technology, 2009; Tejeda & Ferreira, 2014a).

The suitability of an SD approach to modelling the diffusion of new technologies in the energy market is also recognised outside the SD community. For instance, it has been indicated by the International Energy Agency, that “[…], ’systems thinking’ is essential to explore opportunities to leverage technology deployments within existing and new energy infrastructure.” (International Energy Agency, 2012, p. 1).

Within the field of SD, particularly in the modelling of technology diffusion, this thesis differentiates itself due to its focus on the social aspect of local support. Most current research focusses on the technical and economic aspects required for the diffusion of the technology (Pruyt, 2004; Sterman & Dykes, 2015; Tejeda & Ferreira, 2014b), however, the support by local communities is often overlooked. This thesis uses a model in a situation where every project is economically viable and assuming a fixed technological efficiency, instead the focus is on testing the impact of different approaches to participation of a local community.

2.2. Wind energy development and its obstacles

This study aims to understand the impact of different ways of engaging with the local community on wind development. In order to understand how community engagement, through different forms of participation, can impact project development, it is necessary to understand the processes followed in the development of a project. The project development will serve as a foundation for investigation on the impact of participation on project development.

Onshore wind energy production is running behind the set targets in the Netherlands, reportedly due to the late start of the permitting procedures as well as an unexpectedly high resistance towards the development of projects (Natuur & Milieu, 2015). There is an extending base of scientific literature that focusses on the reasons for the slow development; this section also explores the causes of delays and failures identified by the literature.

From start to finish, the process has a pre-phase, the spatial procedures, the permit procedures, the construction phase, and the exploitation (Rijksdienst voor Ondernemend Nederland, 2018a). More specifically, the projects have to follow many different procedures the superseding GANTT-chart shows the necessary procedures, see Table 1. These procedures might vary, based on the size of a project and its location, sometimes neighbouring projects can also cause additional procedures (Rijksdienst voor Ondernemend Nederland, 2018b). Please note, the estimations for durations of procedures rely on historical projects.

TABLE 1: PROCEDURES FOR WIND ENERGY DEVELOPMENT

Indication for lead times of onshore wind projects						
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	> Year 6
Research and plan development (developer)						
Agreement of intent (government and developer)						
Spatial adjustment (province)						
	Adjustment of the development plan (appropriate authority)					
		Permit incl. procedures (appropriate authority)				

					SDE+ application and disposition (developer)*								
							Construction of the wind park (developer)						
											Exploitation (developer)		

*SDE+ is the subsidy available for onshore wind development, it is addressed in section 2.4.

In the Netherlands, the majority of projects fail in the informal developing stages, running into resistance concerning the local support for wind energy projects (Agterbosch, 2006). Similarly, Toke, Breukers, and Wolsink (2008) found that 80% of the proposed developments are not given planning consent due to a foul of legal objections and formal procedures.

In a research by the Bosch & van Rijn (wind energy consulting firm), it was shown that the top 5 causes for wind projects to fail (Bosch & van Rijn, 2008). The study indicated that the municipal council, attitude of the alderman, municipal policies, the attitude of civil servants and organised local opposition are the most important limiting factors to wind energy development (Bosch & van Rijn, 2008).

Please note, the public opinion on wind energy as a means of energy production is very favourable (I&O research, 2014), this is not to be confused with the local support/opposition for a particular wind energy project. The public opinion here is the general attitude of the population towards wind energy, where the local support is the attitude of a local community towards a particular wind project. The latter is what this research will address.

The importance of local support for a project

Local support is a critical variable for the success of wind projects. It is not only a key to the failures of projects but also appears to be of significant importance for a successful implementation of projects (Curtin et al., 2019). In the Netherlands, the municipalities play an essential role in wind energy developments. As the zoning plans need to be adjusted, these municipalities can refuse if they fear that the local community will not support the development (Toke et al., 2008, p. 1135). It is vital to understand which factors affect the local support for wind energy developments. The factors that are indicated to affect local support include (Langer et al., 2018, p. 135), but are not limited to:

- Not In My Backyard (NIMBY)
  - Number of turbines
  - Proximity to a community
  - Population density
  - Visibility
- Democratic deficit
- Qualified opposition
- Experience of citizens
- The procedural and distributive justice during the planning of the project
- Trust in the project developer
- Mode of participation

Not In My Backyard argument

One of the most cited arguments to understand the opposition to local wind projects, despite high public support for wind energy, relates to the NIMBY argumentation. The supporters of this argument argue that individuals feel more favourable to the idea of wind energy. However, they do not want to carry this burden (Agterbosch, Meertens, & Vermeulen, 2009; Breukers & Wolsink, 2007; Jones & Richard Eiser, 2010; Wüstenhagen et al., 2007). During the early 2000s, this argument was particularly popular. Nonetheless, research has shown it cannot be a full explanation for the discrepancy between public opinion and the local support (Wolsink, 2000).

Number of turbines, proximity from a community, population density, and visibility of wind turbines and acceptance

These are four differently framed but conceptually similar arguments. It is possible to understand these four different items as substantiations for the NIMBY argument. Within the literature various significances have been discovered relating the number of turbines, the proximity of wind turbines to a community, and the visibility to the support for a project (Breukers & Wolsink, 2007; McLaren Loring, 2007; Toke et al., 2008; G. Walker & Devine-Wright, 2008; Westerberg, Jacobsen, & Lifran, 2013; Wolsink, 2007). It is important to note, that the distance to a community, the population density, and the visibility all seem to measure a similar concept and never have been included in the same statistical analysis, probably because of a multi-collinearity of the variables.

Despite the amount of research, there are also authors that believe that the support for projects does not change based on the proximity of the turbines to a community, however the validity of the argument changes (Langer et al., 2018). The objections diminish in value when the distance between the opponents' residence and the wind turbine increases.

Democratic deficit

NIMBY is not the sole argument that explains the slower than expected development of wind energy, Bell et al. (2005) wrote a paper that provides additional argumentation that could explain the smaller than expected developments. One of the key arguments they discovered is the democratic deficit. The democratic deficit argues that the democratic process is designed to listen more to often small, yet loudly voiced group of opponents, contrary to the more awaiting and silent groups of neutral citizens and proponents (Bell et al., 2005). Currently, processes still allow small groups with loud voices to gain a lot of attention and power, despite their minority position. The inadequacies of our democratic process often result in the fact that projects with a majority of local support, can still be overturned by the strong opposition of just a few citizens. Because those who oppose the project have an interest in sharing their views, while those who condone the project don't, listening to the voices the politicians hear the loudest gives a skewed perspective of the local support for projects. Often the decision makers hear the loudest voices, not the silence of approval.

Qualified opposition

Among the explanations provided as alternative to the NIMBY argument, there is also the argument of qualified opposition. The term qualified opposition insinuates that the NIMBY argument is an unqualified argument. Qualified opposition connotes that arguments against a project are well-substantiated, understandable, and idiosyncratic (Bell et al., 2005; Miner et al., 2010). Among the arguments that have been classified to be "qualified" are:

- Noise and infra-sound
- Bird and bat fatalities
- Dropping real-estate values
- Radar interference
- Natural reserve disturbance

Generally, one could say that these arguments regard the impact of developments on the landscape, the environment, animals and humans (Pasqualetti, 2001; Wolsink, 2000; Wüstenhagen et al., 2007).

Experience of citizens

Previous experience from communities with wind energy developments can also play an instrumental role in the local support from wind energy projects. If previous developments were troublesome for the community, there is a chance that this influences the local support at the start of the project, as the community will anchor their expectations to their previous experiences (Corscadden, Wile, & Yiridoe, 2012; Groth & Vogt, 2014).

The procedural and distributive justice during the planning of the project

Procedural justice regards the process of distributing outcomes; its focus is not the outcomes themselves, rather on the process followed to reach the outcomes (Cropanzano, Bowen, & Gilliland, 2007). To achieve procedural justice, "a process needs to be applied consistently to all, free of bias, accurate, representative of relevant stakeholders, correctable, and consistent with ethical norms"(Cropanzano et al., 2011, p.38). The use of a fair process has been proven to be able to mitigate unfavourable outcomes, the "fair process effect".

Beside procedural justice, distributional justice also appointed as a possible way to manage the local support. Distributional justice regards the outcomes of a process, something is fair "when outcome distributions of specific resources are perceived to be fair" this does not take objective fairness into account, only the perception of a fair distribution (Walter, 2014).

Both play at a higher level of abstraction and can have a make or break role (Fergen & B. Jacquet, 2016; Howard, 2015; Motosu & Maruyama, 2016). The level of justice both procedurally and distribution-wise can strongly affect the local support for a project, which influences the success chances of the project. This is a likely explanation for the impact that different forms of participation have on the project development.

The trust in the project developer

People are often highly suspicious of commercial developers and hence, engendering trust in such actors can present a significant challenge (Bell et al., 2005; Miner et al., 2010). The nature of project developers can cause feelings of intrusion, and a distrust of the developer; this can hinder the support for a project (Aitken, 2010a, p. 1066).

The mode of participation

The interaction between the project developer and the local environment has been indicated to be an essential factor in the development of wind energy projects, especially in managing the local support (Aitken, 2010b; Aitken, Haggett, & Rudolph, 2016; Eltham, Harrison, & Allen, 2008; Fast & Mabee, 2015; Friedl & Reichl, 2016; Howard, 2015; Jobert, Laborgne, & Mimler, 2007). Different modes of participation here refer to different ways that project developers can interact with the local environment as they can use many different ways of participation and engagement, including but not limited to consultation, financial participation and local ownership.

Note that there is no unilateral agreement within the scientific community on the influencing. For instance, the example regarding the proximity of the turbines to a community (place of residence) was not found to be a statistically significant factor in the acceptance of a project according to Langer et al. (2018). The level of support at the local level revolves around the issues related to local environmental quality, procedural justice, distributional justice and trust. Using a broader scope, public approval, electricity prices, profitability for investors, and the ability to improve energy security play an essential role too (Pruyt, 2004). In order to understand the impact of different forms of participation, this study singles it out, deliberately removing the possible noise caused by the other essential variables.

2.3. How to increase local support for wind projects

This study focusses on how different forms of participation influence the project development; often, this happens through local support, as is discussed in the next section. The local support is very much a double-edged sword; if there is no support, this often extends the time wind projects take to progress through the planning systems (Sovacool & Lakshmi Ratan, 2012; Wilson & Dyke, 2016; Wüstenhagen & Menichetti, 2012) and it can even stifle the progress (Eltham et al., 2008). On the other side of local support is that a high local support can be an enabling factor in the project development (Curtin, McInerney, Gallachóir, & Salm, 2019b; Jami & Walsh, 2017; Sovacool & Lakshmi Ratan, 2012; G. Walker, 2008, 2011; Wolsink, 2007). Managing local support is one of the crucial aspects in the development of wind projects. Local supports can directly influence the success chances of a project, it can also be an influencing factor for the decision making authority, local support can be vital in gaining the support of an alderman too.

2.3.1. Community engagement

Many of the papers cited in the previous section on challenges in wind energy development go beyond locating specific reasons for the low local support for wind energy developments and thus delayed projects. From the scientific literature, the answer is still ambiguous, but there is an apparent similarity in the direction of solutions to increase local acceptance. The engagement, involvement, and inclusion of local citizens seem to hold the key to the local support according to the many different authors (Bauwens & Devine-Wright, 2018; Breukers & Wolsink, 2007; Jones & Richard Eiser, 2010). Many benefits can be gained from early, sustained, and reciprocal engagement with local citizens (Jones & Richard Eiser, 2010, p.3116), and focus on inclusivity in engaging citizens is crucial (Enevoldsen & Sovacool, 2016). These strategies have been identified with increased chances of success in the planning phase (Breukers & Wolsink, 2007; G. Walker & Devine-Wright, 2008), while it offers the developers the opportunity to develop a relationship with the host community, gaining trust, identifying and helping to address the community concerns, while effectively communicating the potential risks and benefits.

Despite the unified perspective on the use of community engagement to manage the local support, the engagement of communities is not straightforward. Fulfilling promises on community engagement in wind energy projects presents challenges and dilemmas in practice (Aitken et al., 2016). Furthermore, just regarding the community engagement from a planning perspective there are already three different levels of engagement considered (Aitken, Haggett, & Rudolph, 2014, p.27)

1. Awareness Raising: This level of engagement is concerned with providing information. The aim of raising awareness is to increase the public acceptance and legitimacy of the project.
2. Consultation: This level involves forms of limited public feedback into the decision-making process. The objective is to gather insight into the public opinion and create a socially acceptable and appropriate project.
3. Empowerment: This level utilises more influential participatory forms of public engagement, allowing the influence of the participants to be more significant. The goal here is to work with the stakeholders, enabling them to play critical roles in the decision-making process, building ownership of the project, and enhancing the democratic process.

Community involvement is also recognised to be very important by project developers, as was found in Aitken et al. (2014). In the study by (Aitken et al., 2014), project developers, indicated that dialogue and interaction are useful. The reasons for this inlcude: keeping the community informed, allowing the community to express concerns, to be transparent and open, engaging with the community members and helping them to ensure they benefit from the development. Also, sound community engagement “keeps the people on the side” (Aitken et al., 2014, p.13), indicating that it results in fewer objections and appeal procedures.

2.3.2. Community ownership

Other scientists take a different approach and promote local ownership of wind projects, as a way to increase the local support (Bauwens & Devine-Wright, 2018; Bergman & Eyre, 2011; Bolton & Foxon, 2015; Dóci, Vasileiadou, & Petersen, 2015; Munday, Bristow, & Cowell, 2011; Parag, Hamilton, White, & Hogan, 2013; Rogers, Simmons, Convery, & Weatherall, 2008; Toke et al., 2008; Wüstenhagen et al., 2007). This latter group argues that a higher level of local ownership, increases the pace of technology deployment, in some cases (Curtin et al., 2019b). “Locally inspired and locally owned projects can help improve the prospects of schemes being given planning consent and arguably, also improve the general planning environment of wind power” (Toke et al., 2008, p.1140). Although, within this group, it is unclear to what extent the citizens are willing to provide investment capital to wind energy projects. Local ownership can be achieved in different ways, for instance, by involving citizens in the financing of projects, and by cooperative approaches.

2.3.3. Solutions and organisational justice

These solutions for managing the local support have recently also been linked to organisational justice (Enevoldsen & Sovacool, 2016; Fergen & B. Jacquet, 2016; Howard, 2015; Langer et al., 2018; Motosu & Maruyama, 2016). These different papers relate successful engagement of the local community to more substantial factors, specifically procedural justice and distributional justice (Cropanzano et al., 2007).

It is important to note that some studies found that the distance of the windmills from the place of residence has no significant influence on the acceptance of wind energy (Langer et al., 2018), preferably with the validity of the possible opposition. Namely, outside a radius of 400-500 meters, objections to windmills by citizens have no grounds, yet this does not change the public perception of that particular project. The research was able to substantiate the procedural and distributive justice are crucial to the acceptance of a project (Langer, Decker, & Menrad, 2017; Langer et al., 2018). Increasing the ownership by the community and the participation of the community within the project, depending on the form of participation and ownership will thus also change the perception from the community regarding the procedural and distributional fairness of a wind energy development process.

2.4. Co-operatives

Alongside, the other players (Farmers, Energy distributors, and commercial developers), the early co-operatives, who started in the 1990s, like the energy distributors, have struggled to gain traction in the beginning. Changes in legislation as well as the consequences of specific projects, have continuously changed the market. For instance, some early, substantial projects by Energy distributors incurred significant delays, leading them to see little use in

investing in onshore wind energy. Furthermore, a ban on solitary windmills leads to a decrease in the importance of small private investors (Agterbosch, 2006).

The rest of this section will elaborate on the nature, definition, advantages and disadvantages of co-operative businesses as this business model plays a vital role in the analysis that this study does. Co-Operatives are people-centred businesses, driven by values rather than profits. The co-operatives are owned, controlled and operated by their members in order to realise a specific goal. Within this thesis I will use the following definition for a co-operative: "A co-operative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise" (International Co-operative Alliance, 2015, p. 2). Some co-operatives further differentiate themselves from traditional commercial ventures by following ICA set cooperative principles, signing a charter to follow a set of 7 guidelines to verify their cooperative nature (International Co-operative Alliance, 2015). These guidelines are:

1. Voluntary and open membership
2. Democratic member control
3. Member economic participation
4. Autonomy and independence
5. Education, training and information
6. Co-operation among co-operatives
7. Concern for community

From these guidelines, it becomes clear that co-operatives are developed with a focus on fairness and the involvement of the local community. A cooperative structure in energy projects, can increase the perceptions of distributive and procedural fairness, which in turn increases the local acceptance (Bauwens, 2014; Bauwens & Devine-Wright, 2018), reinforcing the previously made point. The co-operatives seem like a solution that would achieve financial and procedural participation, and thus improve distributional and procedural justice. Although this is not clear if the business form works well in practice: "Despite the explicit idealistic background and the strategy of developing projects based on strong local support and public participation, wind Co-operatives experienced more problems with social resistance than small private investors did" (Agterbosch, 2006, p.132). Agterbosch (2006, p.132) also found that private projects experience virtually no social resistance, where 35% of the wind Co-operatives had problematic amounts of resistance.

Using co-operative business models happens throughout the onshore wind development in Europe. In each nation where these co-operatives are doing business, the reason for their appearance varies. Germany, the leading nation in co-operative wind energy, experienced a surge in co-operative wind development as a response against further expansion of nuclear power (Agterbosch & Breukers, 2008). In the Netherlands wind energy co-operatives developed in the late 1980s as a part of an early energy transition. There has been a resurgence of new co-operatives since 2010. The monetary debt crisis that hit Europe after the sub-prime mortgage crisis in the United States (Kooij et al., 2018), sparked a debated about the subsidy policy. To stimulate the production of renewable energy, the Netherlands used to have the SDE (Stimulation of Sustainable Energy Production) and green deals. In 2011 national government replaced the SDE by the SDE+, discontinuing the subsidy to citizens. The SDE+ is solely available to companies. Citizens aiming to develop larger projects now turn to the cooperative business form; this is visible in a resurgence of cooperatives since 2011 (Oteman, Kooij, & Wiering, 2017).

However, despite the grand ambitions, there are some caveats. Energy co-operatives face fierce competition, especially when more commercial parties entering this promising market (Wierling et al., 2018). Large co-operatives may provide a solution, allowing cooperatives to become more competitive. However, within the sector, there are concerns about the capabilities of co-operatives to manage large projects like wind energy development professionally and effectively. Questions are also raised on the capabilities to raise capital. In general, it is unclear if the benefits of co-operatives will outweigh the costs of choosing a co-operative business model. This study aims to provide more clarification surrounding the impact and capabilities of cooperatives to complete projects.

2.5. Embedding participation in agreements and legislation

In the new law for the environment, the Dutch government redesigns the process that project developers should follow in order to obtain permits for projects with a significant environmental impact (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2019; Ministerie van infrastructuur en milieu, 2015). In the most recent proposal for a new climate agreement, there is also a focus on including the environment; there even is a goal of 50% local ownership (Klimaatberaad, 2018, p. 156). Even before the enactment, these new pieces of legislation are starting to reshape the development processes that some project developers for wind energy processes use, albeit those developers that already focussed more on involving the local communities. The proposed climate agreement alone distinguishes five different forms of participation: process participation, financial participation, financial bonds, ownership participation, and environmental funds (Klimaatberaad, 2018, p.156). Furthermore, it indicates that any sort of combination is also possible. Besides, the proposed climate-agreement also sets a guideline requiring local ownership in 50% of the projects (Klimaatberaad, 2018).

1. Process participation – This form of participation includes a range of different ways for participants to be involved in the process of the project; this can range from mere information, through consultation, to empowerment.
2. Financial participation – Financial participation is an umbrella term regarding various non-specified forms of financial participation in projects.
3. Financial bonds – This form of participation, includes the local environment as investment partners into wind energy projects. Within this form of participation, the environment serves as a financier, not as an owner of the project, in return for the financial contribution the borrowed amount of money will be paid back to the participant with a specific, pre-defined, interest rate.
4. Ownership participation – This form of participation allows the participant to share in the risks and rewards. The participants are part owner of the project and thereby connected to the interests of the project. The residents can be recognised as an owner, having contributed financially, meaning that the participant has voting power regarding the execution of the project, decisive power so to speak.
5. Environmental funds – This form of participation has been agreed upon by the sector in NWEA guidelines since 2012 (NWEA, 2016). It entails that the projects setting aside a certain amount of revenue for the local environment to spend on community improvements.

Within participation, this study has shown there are many different forms, within the different forms there are many dimensions; as such, this research had to limit its scope, to those forms that would be expected to have the most substantial impact. Firstly, it will not focus on the fifth mode of participation, the environmental funds, as the majority of the sector already signed the NWEA and thus committed to using this form of participation. Combining this with this study's focus on projects that start their development from now onwards. Environmental funds themselves are no longer a distinguishing factor between different wind projects. Hence the additional value it provides is small. This study focusses particularly on process participation, in doing so, this study distinguishes the three different levels highlighted in the section on community engagement, informing, consulting and empowering. The nature of the strict legal requirements for large infrastructural projects in the Netherlands does little more than informing citizen(Akerboom, 2018; Akerboom, Buist, & Pront-van Bommel, 2012). The first form is thus referred to as the legal minimum approach. Secondly, the study investigates the impact of consultation on the local environment. Thirdly, it investigates what the impact of empowering the local environment to make decisions related to the project is. Lastly, this study investigates the impact of cooperative commercial partnerships on the development of projects; this covers the ownership participation as distinguished by the proposed climate agreement. Assessing the forms of participation from the perspective of the proposed climate agreement, this study assesses three different levels of process participation, and within the umbrella of financial participation, it assesses ownership participation.

3. Research methodology

In this chapter, the research methodology will be elucidated, showing the specific approach this thesis takes in researching the impact of participation forms on wind energy development. Firstly, the research strategy will be discussed [3.1.]. The research uses different methods for gathering data, i.e. interviews and a survey In section 3.2 the choice for these means of data acquisition will be addressed. In section 3.3, this research explicates the choice for interviews, the interview sample, methods of interview analysis and the ethical standards used. This section also elaborates on the survey methodology, methods of survey analysis, the survey design, the survey sample, the methods of survey analysis, and the survey ethics. Finally, in section 3.4, this chapter will elaborate on the SD techniques of analysis used.

3.1. Research strategy

The following section will describe the research strategy. The section will also substantiate the choices made on this facet of the study. In this section, it is of particular importance to understand that the choice of using SD modelling inherently changes the nature of this section as it analyses behaviour overtime, albeit based on cross-sectional data. Hence, this section starts by addressing the choice for SD, before moving on to the SD specific research strategy.

3.1.1. System dynamics

This research aims to provide insights into the reactions of a system, wind energy production, to changes in the participation form, specifically by favouring projects with different perspectives on community participation. In order to do this, it aims to develop an advanced understanding of the Dutch onshore wind energy development, gaining a perspective on how different variables interact and result in different outcomes. In doing so, this study uses an SD simulation model in its analysis, which allows the study to see the impact of the changes over time, with accurately smoothed delays. This section reiterates the role fo SD in this study.

As was discussed in the section on earlier related work in SD, SD is a problem structuring technique that aims to develop a holistic perspective to comprehend why a particular problematic behaviour is occurring and which policies are useful in solving the problematic behaviour (Sterman, 2000). In other words, SD is a technique, which uses simulation models to resemble the same problematic behaviour. This simulation model helps in the structuring of the problem and can be used to analyse the behaviour and policies in that particular system. The most important contribution of SD modelling in this study is the refined approach to time delays. System dynamics models smooth time delays, rather than taking a simple average. The smoothing approach leads to much more realistic simulations, which will be helpful in the output and analysis (Sterman, 2000). Sensitivity analysis is used to gauge a further insight in how the delay structure effects the behaviour of the model, no other approach to modelling can represent this adequately.

3.1.2. Theoretical versus applied research

Traditionally, research has distinguished between theoretical research, increasing the understanding by developing or evaluating theory, and applied research, solving concrete real-world problems and initiating social change (Babbie, 2011). Within the field of SD, differences are observed between more theoretical and applied approaches; despite this, the nuance within SD is slightly different. Within SD, modelling efforts that focus on supplying a theoretical contribution are generally developed to explain a phenomenon; there is not an exact aim to achieve a change (de Gooyert & Größler, 2018). Theoretical works in SD focus, even those with a practical perspective, on the identification of factors, linkages, and policies that might be interesting to investigate when there is a need for a real change (de Gooyert & Größler, 2018). Applied works usually follow all the steps of the modelling process (de Gooyert & Größler, 2018; Sterman, 2000). Applied works thus have a focus on representing a system as meticulously as possible, focussing on every aspect that would be present in real life. Theoretical contributions can work with fewer data and simplify a system to develop a better understanding of one particular aspect of the system. For this reason, applied models often grow to be very big, very quickly. A modeller wants to do justice to every little part of reality. On the contrary theoretical models flourish when they accurately represent a simplified system.

This research aims to understand the impact and workings of participation within the wind energy market better. Using a narrow focus, with few distractions in the model, will allow for the pinpointing of the origin and impact of changes that the variables researched make to the model, without any distractions from other variables. Furthermore, the market, particularly in the region Rivierenland, is very young, limiting the availability of dat. This makes validating the simulation model with market data impossible. Combining this lack of data and the aims of this research lead to the choice for a theoretical contribution.

3.1.3. Virtual conceptual laboratory

This study will utilise the SD specific research strategy – Conceptual Virtual Laboratory (CVL). CVL is a research strategy that applies a quantitative simulation model to build and test theoretical hypotheses to develop a deeper understanding of a system (de Gooyert, 2018). Primarily, CVLs are used to combine smaller theories, for instance, from literature or interviews, into one broader theory. “The principal contribution of my effort is to derive new insights from established variables and relationships" (Repenning, 2002, p. 110).

This study uses a simulation model of the local wind energy market, to study the effects of participation wind energy development. It will use the model, and the analysis of this model to develop a more extensive theory on the influence and role of participation in renewable energy transitions. To do this, parameters that have thus far been an unknown need to be estimated. This study uses interviews and an expert elicitations survey to acquire this data, the choice for these methods will be elaborated upon in the next section.

3.2. Data acquisition strategy

17 semi-structured interviews with experts in the Dutch onshore wind energy market, to elicit qualitative data about the wind energy market and the impact of participation on wind energy development. Additionally, an expert elicitation survey was distributed to acquire parameter values. Moreover, the survey data was used to cross-validte the information gathered during the interviews. This section will first address the interviews; the preceding section elaborates on the survey. This study uses a mixed methods approach, where 17 interviews have been used to gather qualitative information on the uncertainties and the advantages and disadvantages of using different forms of citizen participation on the project development.

Furthermore, it has used a survey to elicit parameter values contacting a sample that represents 90% of the industry experts, according to Mr Harmsen from the NWEA (Dutch branch organisation for wind energy) (R. Harmsen, personal communication, May 8, 2019). Consequently, this study uses a large, diverse, and industry resembling group of experts for eliciting parameter values and estimation. Previous research efforts in the energy sector, as well as methodologists focussing on expert elicitation have found a significant added value in surveying a large and diverse sample of experts (Baker, Bosetti, Anadon, Henrion, & Reis, 2015; Nemet, Anadon, & Verdolini, 2017; Wiser et al., 2016).

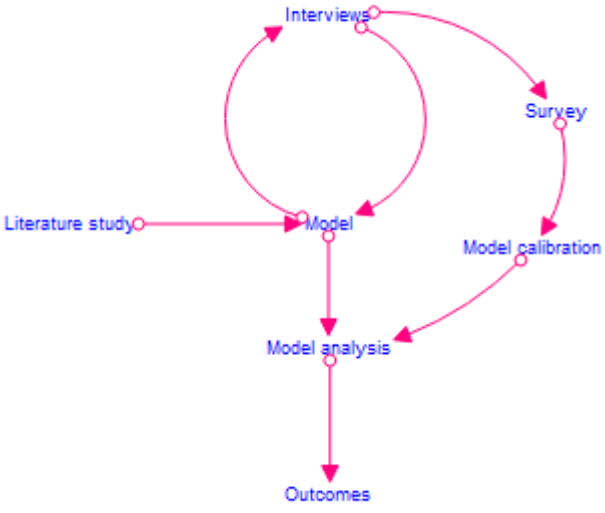


Figure 3 illustrates the relationship between the interviews and the survey. The research started with a literature study; this study fuelled the development of the theoretical SD model. The interviews focus on the uncertainties that exist about the impact of participation, as found in the literature study. The information provided in these interviews fuelled the development of an improved model, as well as the development of the expert elicitation survey. This survey seeks to discover the values of the parameters in the model, which is essential for model calibration. The combination of the model structure and the model calibration, allow for the analysis of the model behaviour. The model behaviour fuels the outcomes and conclusions of this study.

FIGURE 3: RESEARCH METHOD

3.3. Interviews

As can be seen in Figure 3, the interviews conducted for this study serve three purposes. Firstly, they have been used in a disconfirmatory fashion, validating the process of on-shore wind energy development, and the critical variables in this process. Secondly, the study uses the interviewees to understand why participation forms are expected to have a specific impact. Thirdly, the interviews have been used to determine what information was unknown and how questions can be asked to gain quantitative information on the impact of participation on wind energy developen. Both of these factors have contributed to the development of the survey.

3.3.1. Semi-structured interviews

The study uses the method of semi-structured interviews, to collect mental data from experts in the field of on-shore wind energy in provinces with a low density of onshore wind energy in the Netherlands. This methodology results in extensive and specific data (Barriball & While, 1994; Luna-Reyes & Andersen, 2003; Vennix, 1996). In testing the dynamic hypothesis in interviews this research uses a disconfirmatory interview strategy, as proposed by Andersen et al. (2012). It is aimed to complete the interviews in a face-to-face setting, as this allows for the advantages of the live conversation, as well as those of seeing and reaction to oneanother, being able to clarify questions and interpret non-verbal reactions (Denscombe, 2012; Opdenakker, 2006). Using a semi-structured interview approach, all of the prepared questions are in a setting that is comfortable for the interviewee, and that thus enhances the openness of the interviewee (Barriball & While, 1994). This technique is also well suited to the varied professional and personal histories of the prospective sample population (Barriball & While, 1994). An additional strength lies in the fact that the interviews were also used to test the dynamic hypotheses in interviews by asking for more specific information and presenting sections of the Work-In-Progress model with a request for dis-confirmation (Andersen et al., 2012; Luna-Reyes & Andersen, 2003).

The main variables studied in this research revolve around the difference between cooperative business models and commercial business models. The central variables are lead times; success chances; operational lifetimes; the policies for the use of profits; the dynamic hypothesis. In order to enhance the quality of the the transcripts have been sent to the interviewees, to check if it reflected their intended message accurately.

3.3.2. The interview sample

People involved in research projects, cooperative projects, commercial projects, consulting firms, and the municipalities were the target group for the interviews. Within these groups, it might prove to be challenging to reach an equal amount of interviewees from all groups, and there is a clear risk of speaking mostly to successful parties and getting an overly positive story from the interviewees. Despite these limitations, the different perspectives help in the triangulate the information (Vennix, 1996). In selecting interviewees, the focus was put on the selection of a diverse group of respondents, with different backgrounds, functions, and experiences. To further extend the aforementioned network, the interviewee pool was extended using a snowball method, based on the networks of the interviewees.

The interviewees all have leading roles in their respective backgrounds. Every interviewee had extensive experience with wind energy, for the position they hold. Table 2 shows the role of the interviewees as well as the dates of the interviews; three interviews were with two interviewees. The author of this study has conducted all the interviews, except for the first interviews. There are recordings and transcripts of all the interviews, except the first. The first interviewee requested to be treated anonymously, furthermore the interviewee didn't give consent to record the interview. The interview notes were analysed instead.

TABLE 2: OVERVIEW OF INTERVIEWS

Interview number	Position/organisation	Date
*1**	*Provincial representative**	*22/05/2018*
2	Governmental consultant	10/01/2019
3	Former government employee/Cooperative board member	26/02/2019
3	Cooperative board member	26/02/2019
4	Consultant	28/02/2019
4	Consultant	28/02/2019
5	Independent researcher/Cooperative board member	28/02/2019
6	Cooperative board member	01/03/2019
7	Cooperative board member/Lobbyist	01/03/2019
8	Consultant/Partner	26/03/2019
9	Cooperative board member	02/04/2019
10	Sustainable energy company/Director	08/04/2019
11	Consultant/Partner	08/04/2019
12	Former cooperative board member/Project advisor	09/04/2019
13	Sustainable energy company/Environmental manager	16/04/2019
14	Sustainable energy company/Developer	15/04/2019

14	Commercial developer/Environmental manager	15/04/2019
15	Commercial developer/Developer	16/04/2019
16	Commercial developer/Environmental manager	15/03/2019
17	Municipal alderman	29/05/2019

**This interview was conducted by different interviewers, the notes have been used in the coding process.*

3.3.3. Methods for interview analysis

The analysis of the interviews consisted of coding all the interviews and comparing the codes (Turner, Kim, & Andersen, 2013). This thesis used selective coding in the software Atlas t.i (Corbin & Strauss, 2008). Selective coding helped with developing a better overview, while allowing a strong focus on answering the research questions. Figure 5 shows the coding tree used by this research. The coding tree has three different iterations, only the first and the last were used in the interview analysis. The few interviews that were coded with the earliest version of the coding tree were re-coded in order to develop consistency. To ensure a high quality of the coding, one interview was used to compare codes with a second coder; Appendix 6 includes the coding comparison. The coding comparison yields a percentage agreement of 41.5% and a Holsti index of 51.2, these values do differ, however the differences can be explained simply by the evolution of the coding tree. These values in these indices give this study confidence in the quality of the qualitative data analysis (Feng, 2014; Snyder-duch, Lombard, & Bracken, 2002). This research used an inductive coding approach, which fits seamlessly with the explanatory approach for the interviews (Luna-Reyes & Andersen, 2003). The research focusses on finding what differences are caused by different forms of participation, and why these differences exist. In became apparent even in early interviews that people with different background hold different perspectives on the same issue. To provide insight into those factors that are unilaterally agreed upon and those where people hold different views, the study pays attention to the different narratives.

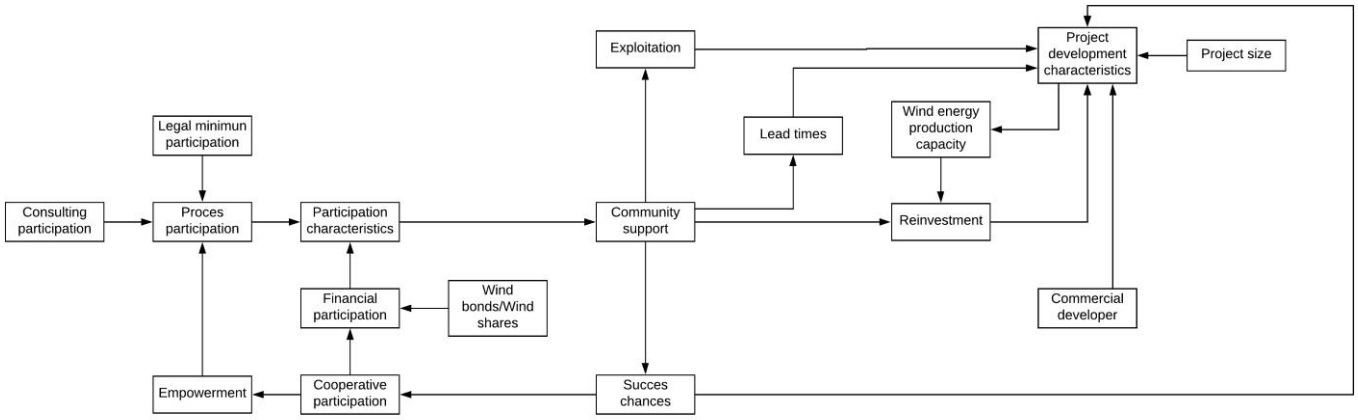


FIGURE 4: CODING TREE

3.4. Survey

The interviews' purpose has been twofold, firstly to (dis)confirm the structure of the model structure. Secondly, to develop an understanding of the reason behind different influences of various participation forms. This section will discuss the methodology of surveying utilised by this study. The thesis uses a survey to get a quantitative perspective of the impact of different forms of participation on wind energy development. By using a survey, a much larger audience could be reached.

The data from the survey serves two purposes in this study; firstly, the survey provides a means of validating the interview findings. Being able to validate the data from the interviews with a different type of data and a more comprehensive sample allows this study to increase the confidence in the results found. Secondly, it provides quantitative data on a specific wind energy development case; this quantitative data is used to make an SD analysis. The quantitative perspective allows for the data to be tested in conjunction with each other, developing a realistic perspective of the total impact of using an individual method of participation on the project development. In order to develop a holistic perspective of the impact of participation on the project development, this study focusses on four categories of uncertainties, reflected by the four sub-questions. The categories of uncertainties are success chances, the project development lead times, the project production time, and the reinvestments (Knol, Slottje, Van Der Sluijs, & Lebret, 2010).

The survey uses a specific case for onshore wind energy development. This case takes away some of the variables that were blurring the conversation during interviews. An example of this was experienced during one of the interview questions, which asked interviewees to substantiate the impact of different forms of participation in on-shore wind energy projects using examples from wind projects. The responses to this question usually included one of the following lines:

> *"I think there are several other factors in the constellation of the project that may or may not occur and how long it takes for it to occur, which are at least as important." – G. Bosch (personal communication, March 15, 2019*
>
> *"The tricky thing is that in my experience, no project is the same."- G. Velthoven (personal communication, March 1, 2019)*
>
> *"[…], I might not be able to give an immediate answer because that relationship is very difficult to establish. There is only one reality; only one process has been done. You cannot compare two situations in which the process has been followed in [a comparable] way." – S. Van de Bilt (personal communication, April 8, 2019)*

What the interviewees indicated here is that there are many different variables that impact project development. The range of these variables is extensive, examples include the time until an election, attitude of a development partner, and even wind developments in neighbouring municipalities. Another complicating factor is that the information on the utilisation of participation in projects is very scarce, and the effects of the most recently developed forms will only be evident after at least eight years (Rijksdienst voor Ondernemend Nederland, 2018a). In trying to limit the impact of these other variables, and understanding information that is not yet empirically visible, two methods of surveying stood out [1] a vignette experiment and [2] an expert elicitation survey. A vignette experiment is appropriate for estimating decisions, values and believes; on the contrary, this study aimed to find estimations (Finch, 1987). Formal expert elicitation is one of the methods approaching uncertainties in a structured and transparent way (Knol et al., 2010). Expert elicitation can serve as a means to synthesise the available information before conclusive scientific evidence becomes available. The development of estimates when data are sparse or lacking, and when projections for future conditions vary from the current conditions is of particular importance to this study (Wiser et al., 2016). The ability to synthesise information before there is empirical evidence exists requires estimates on the impact of participation on project development. As the most recent developments in citizen involvement will only start to show results after ten years, this will prove very useful in this study. Expert elicitation became popular due to the rise of systems theory and decision analysis (Knol et al., 2010). Among the methods categorised as expert elicitation are: delphi methods, expert panels, expressions of likelihood, and expert elicitation surveys. Applying expert elicitation to estimate the impact of participation on project development has allowed this thesis to increase the external validity of the data, and gain quantitative estimations on the impact. This study uses an expert elicitation survey to develop a sector-wide overview of the estimations for the variables. An expert elicitation survey is the most efficient method to provide uniform contextual information, it is considered to be the best way to develop credible estimations when data is non-existant. It is particularly effective in estimating parameters in the foreseeable future (M. G. Morgan, 2014; Wiser et al., 2016). Practically, the expert elicitation survey proves very suitable as it only requires a one-time survey, can be distributed by ambassadors within the leading companies in the market, allowing this study to circumvent possible GDPR compliance issues, and can easily be distributed.

In developing the expert elicitation, this study followed the seven-step guidelines (Knol et al., 2010), as they improve the quality of the knowledge derived, the transparency and the reproducibility.

1. Characterisation of the uncertainties
2. Scope and format of the elicitation
3. Selection of the experts
4. Design of the elicitation protocol
5. Preparation of the elicitation
6. Elicitation of expert judgements
7. Possible aggregation and reporting

3.4.1 The expert elicitation survey

The survey's role within this study is to get an expert estimation of the main variables. From the interviews, it has become clear that estimating the parameter values is a challenging task, prone to subjectivity. One of the core goals in the design of the survey has thus been making the questions easy to answer. One of the ways to achieve this involved writing a realistic case. The case alone would not be enough to keep the survey short and easy to answer. The length of the survey will also play a critical role in the response rate to the survey (Sahlqvsit et al., 2011). As has evolved from the interviews, people in this sector often experience, time pressure.

The next section addresses a few critical decisions regarding the content of the survey.

3.4.2. The survey design

Distribution

As a result of the many interviews, the author developed an extensive network in the Dutch onshore wind energy market. Together with the Dutch branch organisation for wind energy the list of contacts was expanded up until it covered approximately 90% of the experts in the market. This study recruited ambassadors for the survey based on the extended contact list. This approach allowed the negation of sharing personal details by the contacts in the sector, which could result in a GDPR violation. The author requested the ambassadors to share how many people they had forwarded the email too. Section 3.4.5. addresses the ethical considerations of the survey and the use of the ambassador method for survey distribution.

The case

Appendix 7 provides the survey, which includes the case. This section explains the decisions made in describing the case. The most crucial decision in the development of the case revolves around the importance of participation modes. In the interviews, it showed the way of engaging with the environment has more of a stake when there a community nearby. Including this in the case, allows the survey to estimate the impact of participation in cases where the environment is expected to play a role.

Furthermore, the case sets the stage and provides essential contextual information. The case was designed based on question interviewees asked during the interviews, and it was extended by suggestions from the pilot interviews. This allows the survey to cover the most vital contextual information. In providing contextual information, the case notes:

- that few wind farms exist in the region;
- all possible locations adjourn a community;
- there are policy documents regarding sustainability and wind energy;
- there is a set of guidelines from the local municipality regarding wind developments. The survey does not discuss what the guidelines are;
- the responsible alderman supports the project;
- the municipal council is neutral in opinion about the development of a wind farm;
- there is an understanding of the need for sustainable energy;
- the majority of the population has a neutral attitude towards a local wind farm; however, at all the possible locations, a few citizens oppose the project.

What are the main variables in the survey?

Within the literature review, this study has pointed out the lack of understanding revolving around the impact of citizen participation. Increasing citizen involvement is often seen as a promising solution to managing the environment and increasing the wind energy production, yet there is no empirical evidence substantiating this. The lack of evidence is understandable, as the projects generally take 6-8 years to develop, and within the projects, many factors differ, making them hard to compare.

In order to develop a holistic perspective of the impact of participation on the project development, this study focusses on four categories of uncertainties. The sample of experts estimated the failure rates, lead times, for different phases; the production time and reinvestments were not estimated over different phases. The literature showed that the form of participation could impact these variables. The following section shows the variables' operationalisation in the survey.

Failure rates

Asking questions to survey respondents about the success chances of a project turned out to be a difficult thing to do in the pilots. Respondents were confused about when something was successful and when it was not. As such, the final version of the survey enquires about the failure rate of projects. Furthermore, they survey defines a "failed project" as a paused or discontinued project. This framing of the question removes the unclarity about what is a successful project, or for that matter, successful completion of a phase. This way, finishing a phase, even in a sloppy manner, is perceived as successful.

Lead times & production time

The unit of measurement for the lead times during the different production phases is months. The unit of measurement for the production time in the survey is in years. Because of the different units of measurement, and the vastly different nature of the processes involved, these questions have been split up into two segments. The split avoids confusion for the survey respondents, as happened in one of the pilots.

Reinvestment

The reinvestment focusses on the share of the return on equity (ROE) reinvested into new wind projects; this includes the risk compensation that commercial investors use in the diversification of projects. The risk compensations aim to cover the costs of failed investment; it is a part of the returns that investors relay into their investment fund. The survey inquires into the ROE, rather than the profits because the project developers are more familiar with this measure. Another possible variable for reinvestment was the profit. However, there is no project profit. There only is a profit for the entire investment portfolio, where each project is assessed based on the ROE. Furthermore, the ROE has become the sector standard, as it also plays a crucial role in the subsidy (SDE+) (Planbureau voor de leefomgeving, 2018).

Further questions

The survey also enquires about further information, namely the background of the respondents:

- Role
- Amount of experience
- Regions of experience
- Age
- Gender

These questions allow for checking of the influence of the participants' background on their estimations; can be useful in further studies of this dataset.

What phases are distinguished?

Upon careful consideration of the crucial phases for the previously identified variables, it was decided not to ask for information in every phase for every variable; this allowed for a more concise survey. The project phases distinguished are as follows: the interviews substantiate this phasing:

1. The idea phase – this phase entails the development of a plan and if desired the development of collaborations and alliances.
2. The planning phase – this phase entails the change of the municipal zoning plan and the preparation and approval of the necessary permits.
3. The preparation and building phase – this phase entails the preparations for the construction like the grid connection and contracting, and the construction.
4. The exploitation phase – this phase entails the monitoring of the equipment, the production and supply of energy and the payment of dividends.

Within the interviews, this timeline was discussed in a disconfirmatory question, as it relates closely to the structure of the SD model used in this study. The timeline developed from a disconfirmatory survey question; the interview analysis discusses the phasing.

According to the interviews, the majority of the projects "fail" in either the idea phase or the planning phase. After the granting of the permits, the project is sure to continue. For this reason, the question of the success chances focusses only on the idea phase and the planning phase.

> *Interviewer: "In which phase do most of the projects get paused?"*
> *Interviewee: "I believe in the idea phase." – M. Sweep, cooperative developer (personal communication, March 26, 2019)*

Consequently, the survey asks for all the project development stages sequentially. The unit for measuring the duration of project development is months.

The survey addresses the exploitation phase in a separate question in order to avoid confusion. The production life time is measured in years, while the survey measures the project development in months. During a pilot session, one of the experts fell into this trap. To avoid survey participants from making the same mistake regarding the unit of measurement, the survey now addresses the exploitation in a different question than the project development.

What are the forms of participation addressed?

The literature review of this study addressed the participation forms researched by this thesis. The survey, therefore, requests estimates for the legal minimum, consulting, empowerment, and partnership between a cooperative and commercial developer. The introduction of the survey describes what participation, generally, implies for each different form. In the explanation the survey provides guidance without dictating every step taken within the approach. Appendix 7 contains the survey, including its introduction.

Do any additional questions need to be asked?

In order to extend the dataset of another researcher at Radboud University, the survey included one question. The added question asks for projects names using certain types of participation. This way, this allows for the expounding of the other researchers' database of wind energy projects, with hardly any additional time needed for the respondents.

How will the survey be structured?

Following careful deliberation, this study has decided to ask the questions in a matrix format, addressing one variable over one or more phases and the four forms of participation at the time — the body of the survey consists of four matrices. The survey uses the matrix structure in order to achieve a shorter survey. A shorter survey is expected to lead to a higher response rate. Other survey structures in the pilots yielded long response times. The matrix structure does increase the risk of politized and anchored responses. One of the pilot respondents expressed that his response (using a different survey structure) took much longer as he kept going back to his previous answers to verify his new answers.

3.4.3. The sample

This section describes the sample used for the expert elicitation survey. In order to establish the completeness of this studies' sample, this study collaborated with the Dutch branch organisation for Wind Energy (NWEA). A thorough check by Mr Harmse allowed this study to establish how well the survey covered the sector. The list of interviewees covered approximately 60%-70% of the onshore wind energy developments. This contact list was extended, allowing the study to approach approximately 90% of the players in the market, requesting them to be ambassadors for the survey. The total population of experts in wind energy development with the capabilities to estimate the impact of participation on the project as a whole is approximately 200 people.

As to the completeness of and possible biases to certain types of actors, this study has done everything within its power to get a sample reflective of the market. The confirmation by the branch organisation (the NWEA) on the completeness of the sample gives confidence in this studies' attempt to reach the entire sample population. Nonetheless, some of the contacts approached to be ambassadors shared their reservations about this role, and particularly about the framing of the researched. For this reason, three commercial developers have not participated in the research, two of whom shared their reasoning. Section 6.3.2. addresses the reservations.

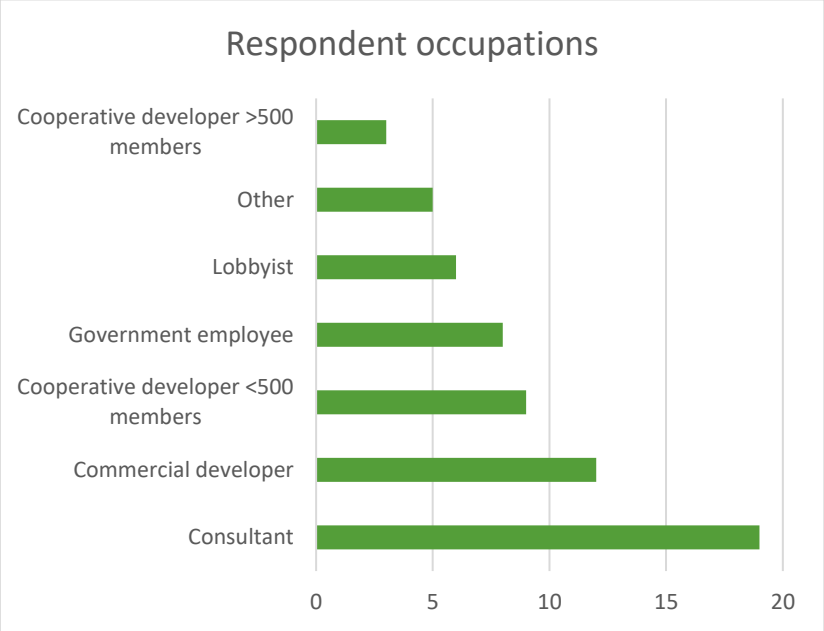


FIGURE 5: RESPONDENTS ROLES IN WIND ENERGY DEVELOPMENT

Using a methodology of expert elicitation also leads to areas where additional care is needed (M. G. Morgan, 2014). Over a large variety of studies all using expert elicitation techniques, Morgan developed a guide to the use of the methodology (M. G. Morgan, 2014; M. Granger Morgan & Keith, 1995; M Granger Morgan, Keith, & Curtright, 2008).

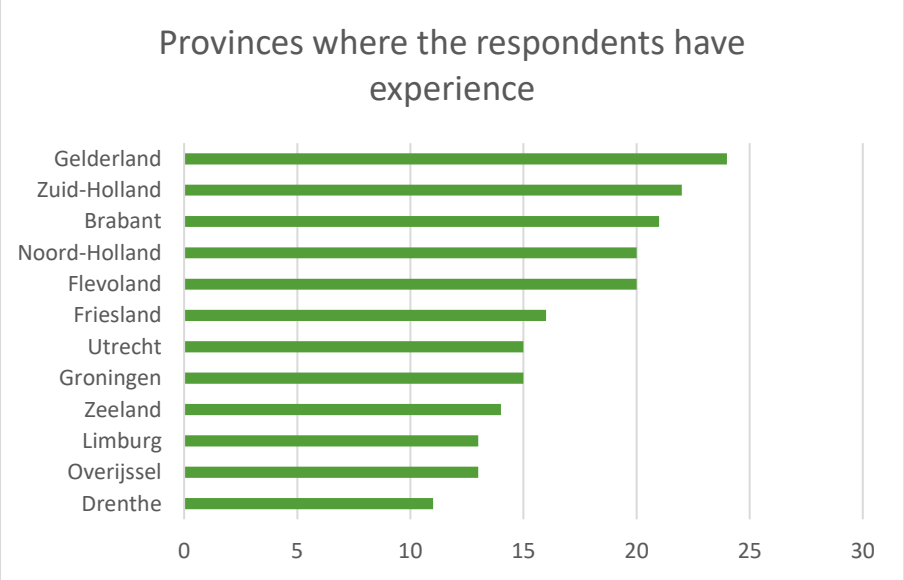


FIGURE 6: PROVINCES WHERE RESPONDENTS EXPERIENCED PROJECTS

Following further advice, this study has been pilot tested by one non-expert, three quasi-expert, and two experts (M. G. Morgan, 2014, p. 7183). The study also tested the response time to the survey using three non-experts.

The survey received 64 responses to the survey, 39 of which are (partially) complete. Twenty-five respondents started the survey but were unable to complete any section. The analysis focusses on the responses that completed at least one of the four sections with parameter values. These sections are divided based upon the variable being estimated, respondents of the survey were unable to proceed to the next section without completing the foregoing one. 39 respondents completed the section regarding the success chances, 28 respondents completed the section regarding the project development lead times, 14 respondents completed the section regarding the exploitation times, 9 respondents completed the section regarding the reinvestment rates. The respondents estimated a total of 857 parameter values. The estimated response rate to the survey is 33%. The limitations section 6.2.2. discusses the reason why the response rate had to be estimated. The response rate is good, however due to the length of the survey the response rate decline with every sectionm, this and other limitations are addressed in section 6.2.2.

The sample of respondents constitutes a majority of males respondents. Within the sample, most respondents have experience in consulting work, followed by developers both commercial and cooperative. There is also a strong representation of government employees in the sample. Many respondents hold positions in more than one role in the sector. These multiple positions can incept due to a previous job, or because they hold multiple positions at the same

time. Furthermore, the respondents of this sample have experience with developing wind energy in every single province in the Netherlands. Some respondents even have experience in every Dutch province.

3.4.4. Data cleaning

The 25 responses from respondents that were unable to partially complete any section were deleted. Some of the respondents to the survey filled in irrepresentative data in order to proceed to the following question, and some respondents misinterpreted one or more questions. In cleaning the data all the comments were read, some respondents noted that their responses were unsubstantiated, yet completed to proceed to the next section, as it was impossible to proceed without an answer. The responses with these notes were deleted; none of the other responses followed patterns similar to these respondents; this resulted in three deleted responses. Section three of the survey intended to investigate if the production lifetimes of windmills built with different forms of participation were the same, however, some respondents interpreted the question differently, answering how long the development would take in years, instead. The estimations from these respondents resulted in values for the production lifetime lower than 15 years, the duration of the SDE+. This production time make no sense, considering that fact that every project is economically viable for these 15 years due to its subsidy (Planbureau voor de leefomgeving, 2018). The responses below 15 years were deleted too, resulting in 11 deleted responses.

3.4.5. Methods for survey analysis

The primary information that elicited from the survey focusses on the key research variables, these being the success chances, the lead times, and the reinvestments. However, in order to validate the correctness of the information supplied by the respondents in the survey, the quality of the data is analysed in the survey analytics.

In analysing the answers of the survey respondents, correlation matrices will be analysed. Furthermore, the study uses a Shapiro-Wilk statistic to gauge the normality of the sample (Jarque & Bera, 1987; Razali & Yap, 2011). The study also checks for the sphericity of the sample, using Mauchly tests (Mauchly, 1940).

3.5. System dynamics

This section focusses on what means of SD analysis are applied to gain more understanding of the topic.

3.5.1. Methods of model analysis

Sensitivity analysis

Further analysis will focus on the SD model that runs based on the information from the survey. The sensitivity analysis will focus on testing two sensitivities of the model. Firstly, it will test the models' sensitivity to variations in the 9 estimated variables. Secondly, it tests the models' variation to the structure, order, of the delays (Sterman, 2000).

Within this survey, respondents estimated nine variables for each of the four forms of participation. It is essential to know what kind of impact the variances of the sample variables will have on the system, as the variance in the sample determines the reliability of the data. In order to discover the impact of the measured variables is, the system will be initialised with the mean values of all the parameters. In the sensitivity tests the individual variables were changed by one standard deviation up and down, comparing the outcomes will lead to an understanding of the sensitivity of the model to changes in this variable.

Due to the high standard deviations of in the survey responses, the sensitivity analysis tests the model for extreme conditions too.

Scenario analysis

The research uses scenario analysis (W. E. Walker, Marchau, & Kwakkel, 2013; Warren, 2000) to provide insight into the uncertain sections of the Dutch onshore wind energy sector, this allows us to test a variety of conditions that can affect the implementation of Wind energy. The mean scenarios will be compared in order to understand what impact participation has on the operational wind power, over time. An additional set of graphs includes upper and lower bounds based on the standard deviation, in order to develop an understanding of the reliability of the model estimations.

4. Analysis

The analysis section aims to clarify answers to the research questions. The sub-questions, which were discussed in the literature review, focus on specific variables that participation might impact.

The first and second sub-chapters each provide clarification towards the sub-questions. The first sub-chapter, interview analysis enquires to understand the reasoning towards the impact of different participation forms on the different variables. The is followed by the second sub-chapter, which focusses on the survey analysis and aims to quantify the impact of participation forms on the different variables. In doing so, it also validates the findings from the interviews. The third and final sub-chapter, system dynamics analysis extends on the survey analysis. In the SD analysys it is tested which of the four sub-questions is most instrumental for wind-energy production. Finally, the SD analysis compares the influence of the combined variables on the wind energy production for the four forms distinguished in the survey. In doing so, it provides an answer to the research question:

To what extent can local governments meet onshore wind energy development goals by favouring projects with different perspectives on community participation and local ownership?

4.1. Interview analysis

The interview analysis aims to clarify why different forms of participation are expected to have an impact on the failure rates, lead times, operating lifetime, returns and reinvestments.

4.1.1. The conceptualisation of the phasing

In the operationalisation of the survey, this study addressed the phasing used. This phasing developed from a disconfirmatory question in the interviews.

1. The idea phase – this phase entails the development of a plan and if desired the development of collaborations and alliances.
2. The planning phase – this phase entails the change of the zoning plan and the preparation and approval of the necessary permits.
3. The preparation and building phase – this phase entails the preparations for the construction like the grid connection and contracting, and the construction.
4. The exploitation phase – this phase entails the monitoring of the equipment, the production and supply of energy and the payment of dividends.

Initially, the interviews used a project structure, as suggested by the RVO. Interviewees from different backgrounds, both cooperative and commercial, felt uncomfortable with the RVO structure. Two significant adjustments were made to the RVO phasing, resulting in the phasing addressed previously. Firstly, this study added an idea phase, Matthijs Oppenhuizen and Marije Arah, among others, suggested this:

> *"Before this preliminary phase, we attempt to contact the environment as early as possible in time, so that they know about it [...] There is not already a ready-made plan. Preferably we devise a plan together with each other, the environment, residents, social organisations and the competent authorities. Moreover, only then do you go to the preliminary phase." – M. Oppenhuizen, commercial developer (personal communication, April 15, 2019)*

Adding the idea phase is an essential nuance for this study, as it plays an instrumental role in more extensive forms of process participation. Secondly, the RVO splits the procedures into two different phases; some interviewees were uncomfortable with this division.

4.1.2. The impact of participation on success chances

Process participation

All interviewees agreed projects are unfeasible without an inclusive process and partnerships. One of the interviewees explained the purpose of the idea phase very well:

> *"What you're actually trying to do in the discovery phase is to make sure you don't have to go to the Council of State" – Anonymous 3, commercial developer (personal communication, April 16, 2019)*

According to the interviewees, process participation is about dialogue, not only informing people but making an effort to listen to the local community. Cooperatives implement this, as it is a fundament of the cooperative business structure. However, commercial developers can also choose to use this approach. Process participation is about the process of developing trust; often interviewees referred to implementing a "good neighbour policy", where they aim to treat the local environment as good neighbours. The good neighbour policy involves informing the citizens and listening to their concerns, trying to resolve the concerns. The foundation of a good neighbourhood policy can be found in inclusiveness, listening with particular care to everyone involved. The interviewees indicated the importance of building trust from the local environment. This process eventually leads to a better plan, which will increase the success chances. However, it will also create more understanding from the local environment and a feeling of more control in the project, resulting in less resistance.

> *"I believe that a process in which the local community participates results in a better plan. With this better, well-tuned plan the municipal council is much more inclined to grant a permit." – M. Roorda-Knape, consultant (personal communication, January 10, 2019)*

It is not possible to rush the process. Some municipalities with favourable views on sustainable energy projects tried this by picking a project, which resulted in resistance from the residents. The process of informing involves developing an understanding of the need for sustainable energy, developing a realisation of the efficiency of different forms of sustainable energy production, choosing a form of sustainable energy production, choosing a location for this production. Without completing each of these steps, resistance occurs.

Process participation does not stop with a proper consultation process. Some commercial developers have pilots testing empowerment of the local environment in projects. In empowerment, the local environment has a say in the project (by proxy), their representatives are involved in the decision making for significant decision in the project development. These decisions can involve the location of the windmills, the size of the windmills, the number of windmills, and the demolishment policy. However, the process of involving citizens, consulting or empowering is very tricky.

> *"In fact, about the agreements for the future we have an agreement with them [Environmental advisory council]; the environmental agreement you can find on nijhiddumhouw.nl. It is interesting in the sense that they have actually contributed to the decision. Go from inquiring to advising to co-determination" – Erik van Norren, commercial developer (personal communication, April 16, 2019)*

> *"Process participation first of all very difficult because if the plan is too global, then people do not come, people do not want to start thinking along there they are not going to spend any time. And if the plan is too concrete, people will feel bypassed."- M. de Bruin, commercial developer (personal communication, April 16, 2019)*

However, extensive process participation is not viewed favourably upon by every developer. Some developers are afraid that this heavy involvement gives the impression that a lot is about to happen in an area. The perception that the impact is vast can be a trigger for resistance. These developers are afraid to organise their resistance by involving the environment.

> *"These first conversations create the impression that it is causing quite a lot of impact in that environment." – S. Van de Bilt, consultant (personal communication, April 8, 2019)*

> *"Suppose that, as a developer, you give the impression of being able to think along with others when that process is participation. We also provide insight into how it all works and people can make a real contribution. Then you can also organise people to think about it carefully and possibly draw the conclusion. It is already what is going to happen in my environment and the resistance is being created." – S. van de Bilt, consultant (personal communication, April 8, 2019)*

Lastly, extensive process participation is not always necessary, and some locations have little to no residents in close vicinity of development locations. In these cases, it is insensible to try an organise very inclusive participation.

Differences between cooperative and commercial developers

Project developers come in different judicial forms, and as addressed in the literature review, the cooperative form stands out. The impact of a cooperative approach often results in a different narrative. Rather than an outsider, intruding in a community bearing burdens for the community. A cooperative developer originates from the community, its members are also members of the community, and its returns remain within the community. The narrative changes from an intruder aiming to develop a project to a "we" the local community want to contribute to sustainability by realising a project. The narrative changes, because members from the local community are the owners of the cooperative. In other words, cooperatives organise local support for a project; it provides local citizens with incentives to support the project. Nonetheless, not every municipality recognises the difference in narrative.

> *"Some political parties within the municipal council are still opposed to the cooperative(s) as it suits them. Here, the city council also said, "Delta wind only works for their own benefit.""– M. Sweep, cooperative developer (personal communication, March 26, 2019)*

Additionally, cooperatives benefit from their residence in the local community, knowing things faster, being able to act quicker, and having many connections.

> *"The members can help decide the process of how to do it. These can be residents who have an interest in what happens to the cooperative, and what the cooperative wants is for the cash flows to remain local." – A. Schwenke, consultant (personal communication, February 28, 2019)*

Despite these advantages, the cooperative organisation is also subject to some disadvantages. Especially starting cooperatives have a voluntary nature in their organisation. Until the completion of a (first) project, the cooperative has no stable income. Meanwhile, project development is a complicated, time-consuming procedure that requires a lot of professionalism and expertise. This local origin of many cooperatives means that a cooperative will often focus all its efforts on the one project in their area, even is the situation is less than favourable to develop wind energy. Additionally, the local origin of cooperatives can be obstructive in diversifying risks. Please note that the conglomerate of cooperatives, RESCoop, is working on solutions to solve this issue.

Commercial developers have different advantages and disadvantages than cooperatives; in some ways, they are opposites of one another. Commercial developers are experienced professionals, who have often completed many successful projects, know the procedures involved in the development, and have a team of people working on realising the most viable projects every working day. Furthermore, they can diversify in their risk-taking, running a portfolio of projects and project developments.

> *"I think they pick up projects differently. They choose projects from a different perspective. Where can I get the most return, which projects are the easiest to realise also plays a role. The easiest way is both technically and in terms of support." – M. Roorda-Knape, consultant (personal communication, January 10, 2019))*

However, in managing their portfolio's, they can come across as intrusive outsiders. Furthermore, they primarily have their shareholders' interests at heart. This often leads them resort to informing the environment, rather than engaging with it.

> *"It is not someone […] that comes from Amsterdam, and everything flows away again immediately, and we only have the burdens." – M. Roorda-Knape, consultant (personal communication, January 10, 2019)*

> *"Commercial developers often limit themselves to informing, but people just want to be taken seriously. […] So, in other words, the developers had listened and we had started a cooperative approach in that area, they would have been in building planning by now." – A. Jansen, cooperative developer (personal communication, February 23, 2019)*

Financial participation

Financial participation is much narrower in scope; it focusses on how citizens in the vicinity of project locations can reign financial benefits from the project. Nowadays, financial participation is often part of the requirements for a project from a municipality. Project developers aim to be compliant with these demands. Thus they offer ways for the local environment to financially participate in a project, for instance, by issuing wind bonds.

> *"It has become a kind of conditio sine qua non." – A. Vermeulen, commercial developer (personal communication, April 2, 2019)*

> *"Within the municipality we strongly support allowing the local community to benefit financially, for instance, by offering bonds and stocks." – T. Burgers, municipal alderman (personal communication, May 29, 2019)*

Nonetheless, there is no universal agreement among the interviewees on the effect of financial participation on the success chances. Some note that bad timing can result in a feeling of bribery; others do not see significant changes in the success chances; someone else notes that the target audience for the bonds is small; finally, one of the interviewees sees the benefits it can have, but isn't convinced by the impact of financial participation on the success chances.

> *"If you talk about financial participation at too early a stage with a resident, even though the project is still in its initial phase, i.e. if there is still no certainty that the project will ever materialise […] If you talk about financial participation, then you do not find that breeding ground. It may be counterproductive for it to be seen as a form of bribery." – G. Bosch, consultant (personal communication, March 15, 2019)*

> *"[…] studies have shown that a wind farm benefits the individual, that people experience less inconvenience as a result of it. - I certainly think it can help to reduce the annoyance that people experience. However, I do not think it is huge. […], but I do not think that a financial product increases the chances of success. […] I do not think it has any impact on concerns that people have, that they want to have figured out or the fact that they do not want it at all." – Anonymous 2, commercial developer (personal communication, April 9, 2019)*

In other words, the (positive) impact of financial participation on the success chances is ambiguous but undoubtedly small. Repercussions might follow from poorly timed financial participation.

Furthermore, some interviewees believe that cooperatives are just another form of financial participation.

> *"Look ownership participation in a cooperation that is, in essence, a form of financial participation, that cooperation becomes the owner and will therefore also participate financially and achieve financial returns. " – G. Bosch, consultant (personal communication, March 15, 2019)*

As shown in the previous section on cooperatives, other interviewees, both commercial and cooperative developers, see cooperatives as a process to develop local project ownership.

4.1.3. The impact of participation on the project lead times

Process participation

The responses from interviewees on the impact participation forms on the lead times were not always in agreement with each other. Two groups can be distinguished, some of the interviewees believe that developing a plan with the environment takes additional time in the idea phase; they believe that this time is partially made up in the urban planning phase. Altogether a thorough and inclusive process usually leads quicker development times for projects, as can also be seen in Zeewolde.

> *" It looks like you might lose 1 to 2 years there, but I think that will save you time in the future." – M. Roorda-Knape, consultant (personal communication, January 10, 2019)*

Another group of respondents agrees that more thorough processes indeed take longer in the idea phase. However, they do not necessarily believe that the urban planning phase becomes shorter due to good process participation.

> *"I am inclined to say yes, process participation is an excellent thing to do, however it very time intensive." – M. Sweep, cooperative developer (personal communication, March 26, 2019)*

The interviewees do agree on one thing, notwithstanding their backgrounds. The possibly longer lead times are compensated for by increased success chances.

> *"In my opinion the time investment has a huge positive effect on success rate of projects and the societies benefits as well." – I. de Jong, consultant (personal communication, February 8, 2019)*

Differences between cooperative and commercial developers

The voluntary nature and (sometimes) novice levels of experience can lead to slower lead times through the project development phases.

> *"I think a cooperative can speed it up if it does it right. It depends on who is in the cooperative, who leads the cooperative, how is the cooperative organised, and how the cooperative takes the local community along. It is also possible that the cooperatives are very slow." – M. Duppen, consultant (personal communication, February 28, 2019)*

Their inexperience often leads them to "reinvent the wheel", and they often make the same mistakes that developers have made before and already took their learnings from.

Commercial developers are institutions designed to efficiently and effectively develop wind farms. The project developers are experienced and know how to react to the situations they will encounter. Furthermore, the commercial developers also have the back office to support the projects. The commercial developers develop wind farms as their profession; inherently, they have enough time to work on the project every working day. It is important to note that some larger commercial developers are subject to quite extensive bureaucratic procedures.

> *"I think the lead time under development, in terms of project development, might be faster. However, the whole preliminary phase of support is not their strong suit. They can come across as intrusive, that means that you need much time sometimes to regain confidence. So I think they have a slower turnaround time there." – M. Roorda-Knape, consultant (personal communication, January 10, 2019)*

> *"Also, a utility can have many bureaucratic processes, which slow their developments down." – M. Duppen, consultant (personal communication, February 28, 2019)*

Financial participation

The interviewees agreed on the fact that financial participation has virtually no impact on the lead times of projects.

4.1.4. The impact of participation on the operating lifetime

From the interviews, it became clear that the operating lifetime of wind farms is not dependent on the type of developer or form of participation, rather on the safety of the windmill, its technical state, and the electricity price.

4.1.5. The impact of participation on the returns and reinvestments

There is a substantial difference in the reinvestments of a project depending on the kind of developer, not necessarily the form of process participation. Generally, projects will achieve similar returns. How the return of equity is reinvested, is what is interesting for future developments as well as the support for projects.

> *"From the business case you often have a return on equity of between 10% and 15%, an investor is often satisfied with 6%, so the interest difference or yield difference that is, in fact, your return on equity." – G Velthoven, consultant (personal communication, February 01, 2019)*

Cooperative developers

Cooperatives distinguish themselves, among other things by there focus on the community, and there members from the community. These members influence the decision on how to reinvest the returns. These characteristics affect the reinvestments of cooperative ventures. Often focussed on giving back to the local environment. Giving back to the local environment can be done in many ways, like increasing the contribution to the local fund, and providing returns to the members of the cooperation.

> *"We are not profit-driven. We want to create something that benefits the community. We use the profits to realise new sustainable projects in the same area." – M. Sweep, cooperative developer (personal communication, March 26, 2019)*

Commercial developers

Commercial developers often have closed or limited ventures, making it obscure and unclear how they spend the returns. Furthermore, shareholder incentivises commercial developers to deliver on profit targets. To achieve the targets, they will develop arrangements that minimise the risks for the company. The risk minimisation is likely to result in higher returns for commercial developers. A previously mentioned advantage of commercial developers is their ability to diversify risk, among other things by diversifying the location of the projects. However, this also has an impact on the reinvestments of profits.

> *"While a project developer rethinks what he is going to focus on and that can be anywhere in the world. The profit from Goeree-Overflakkee can also be spent in southern Germany, but with us, it always remains in the region. In that sense, there is a difference between cooperatives, namely whether cooperatives are local or not. Most of the cooperatives are tied to one place." – M. Sweep, cooperative developer (personal communication, March 26, 2019)*

4.2. Survey analysis

This section aims to estimate the impact of using different forms of participation in the development of wind energy. In order to get a nuanced insight into the impact of participation on wind energy development this study used an expert elicitiation survey. This section aims to validate and discuss the results. In validating the survey the this section checks the correlations between variables of the same category and it tests the normality and sphericity of the sample.

4.2.1. The validity of the data

Statistical reliability

In testing the assumptions that need to be satisfied in order to run non-parametric statistical tests, normality and sphericity, as would suit this data, this study found that the data does not satisfy the necessary assumptions (Mauchly, 1940; Razali & Yap, 2011). It is therefore impossible to run pair-wise comparison t-tests, ANOVA's, and One-way Repeated ANOVA's (Muller & Barton, 1989). This study can therefore not prove if the found parameters are statistically different, it will therefore use the means of each variables, assuming that all the parameters are well estimated by the survey respondents. The documentation of the analyses conducted by this thesis can be found in the appendices, Appendix 10 contains the descriptive tests, Appendix 11 the correlation matrices, Appendix 12 the Normality tests, Appendix 13 the Sphericity tests, and Appendix 14 the statistical syntax.

4.2.2. The influence of participation on the failure rates

TABLE 3: PROJECT FAILURES RATES BY FORM OF PARTICIPATION

Project failure rates	**Legal minimum**	**Consulting process participation**	**Empowering process participation**	**Partnership cooperative/commercial**
Count	39	39	39	39
St Dev	29.6%	25%	20.2%	16.2%
Project failure rate	83%	77%	72%	61%

The data shows that the more involving the participation form used by a project, the lower the failure rate of a project. This trend matches the data from the interviews. Interestingly, the standard deviation becomes lower, the more involving the participation form.

Contrary to the interviews, the data from the survey does not validate the standpoint that projects are unfeasible with the legal minimum approach to participation. The data does confirm the perception from the interviewees that the success chances of project increase with more involving participation. The data cannot confirm or deny the observation from the interviews that the process cannot be rushed, as the survey did not allow analysing this in the answers. The results from the survey also do not reflect the fears of some developers in engaging more with the local environment.

These results mean that in any case, more than twice as many project ideas must exist than will eventually be completed. If a region would use the legal minim approach, less than 20% of the projects would succeed, meaning that there need to be five times as many ideas to achieve the set goal for the projects. This is really quite a remarkable finding.

4.2.3. The influence of participation on the project development time

TABLE 4: PROJECT DURATION BY FORM OF PARTICIPATION

Project development time	**Legal minimum**	**Consulting process participation**	**Empowering process participation**	**Partnership cooperative/commercial**
Count	28	28	28	28
St Dev	44 Months	40 Months	37 Months	38 Months

Project duration	65 Months	62 Months	62 Months	63 Months

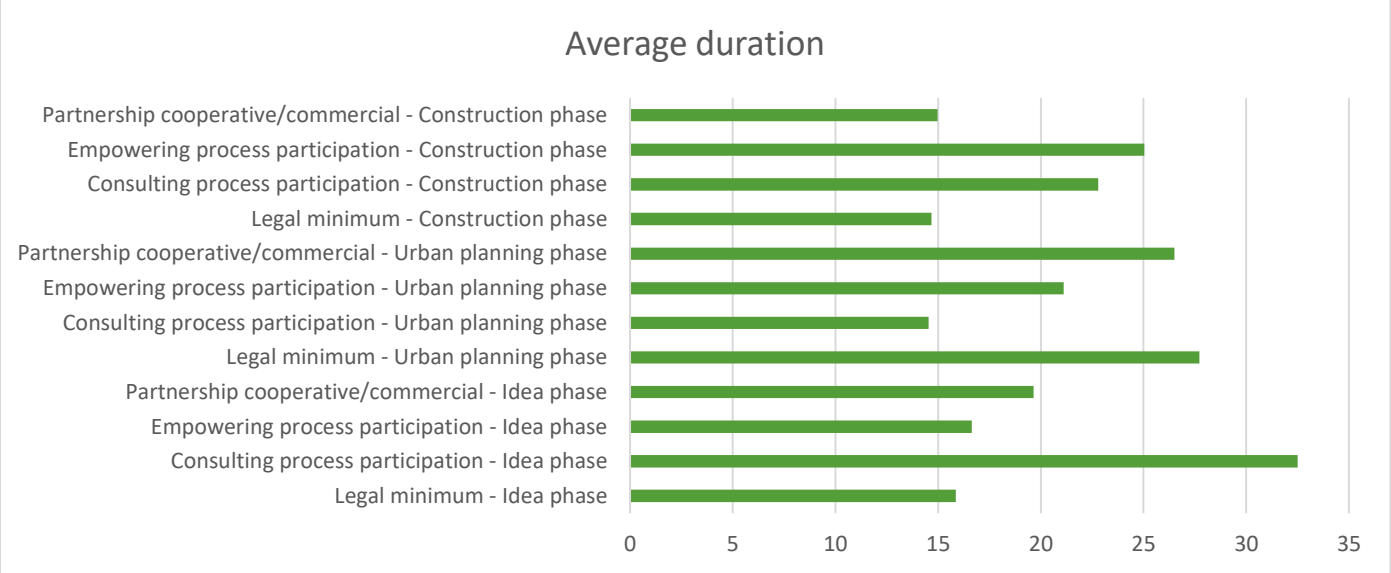


FIGURE 7: PHASE DURATION BY FORM OF PARTICIPATION

Figure 7 depicts the average outcomes of the phase length by form of participation. In line with the expectations from the interviews, the idea phase takes less time when using the legal minimum in the project development. The more involving forms of participation seem to take an approximately equal length of time. As was suggested by the interviewees, this trend reverses in the urban planning phase. Here the most involving form of participation is quickest, while the least involving form is slowest. The data from the survey does suggest that the more involving forms of participation are faster in development than the less involving forms, this goes beyond the positive expectation from some interviewees that the more extensive forms of development would merely off-set the slower idea phase.

4.2.4. The influence of participation on the production time

TABLE 5: PRODUCTION TIME BY FORM OF PARTICIPATION

	Legal minimum	**Consulting process participation**	**Empowering process participation**	**Partnership cooperative/commercial**
Count	15	15	15	15
St Dev	56 Months	56 Months	52 Months	46 Months
Average	273 Months	273 Months	273 Months	281 Months
Average in Years	23 Years	23 Years	23 Years	23 Years

The generalisability of the results regarding the production time is debatable. The standard deviation of the answers of the respondents is substantial and the observation count is low; this makes it difficult to draw conclusions. Nonetheless, it appears, the cooperative developer takes 8 months longer. The lack significant differences matches the findings of the interviews.

4.2.5. The influence of participation on the reinvestment

The interviews found that commercial developers reinvestments are not very well known; they were expected to invest mostly in dividends for the owners and the development of new projects. Cooperatives have a focus on providing benefits to the local environment; this allows less opportunity to invest in new projects. The survey asked more detailed questions, firstly estimating the yearly return on equity. The respondents estimate what share of the ROE would be spent on new projects and the local environment. This study urges caution with the generalisation of these results, as the number of observations is low, and some standard deviations are high. The estimates of the returns on equity are reasonably robust, regarding their standard deviation, the reinvestment in new projects is ambiguous, and the reinvestment in the local environment is much less robust.

TABLE 6: RETURN ON EQUITY BY FORM OF PARTICIPATION

Return on equity	**Legal minimum**	**Consulting process participation**	**Empowering process participation**	**Partnership cooperative/commercial**
Count	14	14	14	14
St Dev	3%	3%	%3	3%
Average ROE	11.6%	10.8%	9.7%	8.6%

The more extensive the form of participation, the lower the ROE of a project is. In other words, the costs of projects increase with the intricacies of the forms of participation.

TABLE 7: REINVESTMENT IN NEW PROJECT BY FORM OF PARTICIPATION

Reinvestment in new projects	**Legal minimum**	**Consulting process participation**	**Empowering process participation**	**Partnership cooperative/commercial**
Count	10	10	10	11
St Dev	27%	26%	21%	24%
Average RNP	49%	46%	48%	37%
% RNP	6%	5%	5%	3%

These results show that the reinvestment rate for new projects is roughly equal for all the project developed by commercial developers. In line with the expectations, the reinvestment rates in new projects by commercial cooperative partnerships are significantly lower.

TABLE 83: REINVESTMENT IN LOCAL ENVIRONMENT BY FORM OF PARTICIPATION

Reinvestment in local environment	**Legal minimum**	**Consulting process participation**	**Empowering process participation**	**Partnership cooperative/commercial**
Count	10	10	10	10
St Dev	6%	9%	15%	18%
Average RLE	5%	7%	11%	20%
% RLE	2%	3%	5%	7%

The reinvestments in the local environment increase with the level of involvement of the form of participation, the more the local environment is involved with the project, the more of the returns will be reinvested in the projects. This clarifies the rough image developed from the interviews. The validity and generalisability of the data on the returns and reinvestments has a low observation count and particularly the data on the reinvestment has an extremely high standard deviation, care is urged in the interpretation of these results.

4.3. Model analysis

In analysing the impact of different forms of participation on the total project development, this thesis utilises an SD model. The model uses the averages from all the survey responses for each variable. However, before estimating the total impact of different forms of participation where the success chances, lead times and reinvestment rates play a role, this section will first analyse the sensitivity of the wind project supply chain to the different success chances and lead times.

4.3.1. Model validation

It is important to validate the correctness of the model. This study has executed a variety of tests on the model to substantiate its validity. Appendix 19, contains an explanation on the validity tests conducted for the validation of the simulation model. In the table contain the validity tests for this model test the model reacts well to the executed validity tests, inspiring confidence in the validity of the model. The tests executed include but are not limited too: structure confirmation, parameter confirmation, direct extreme conditions, dimensional consistency, and boundary adequacy. These tests were the applicable tests suggested by leading publications in the field of SD (Barlas, 1996; Homer, 2012; Jay W. Forrester; Peter M. Senge, 1980; Sterman, 2000). Additionally, Appendix 16 contains the model documentation, and Appendix 17 contains the full sensitivity analysis. The model documentation contains all the variables, formulae, units of measurement, and sources to substantiate every single one of these variables. The

combination of model documentation and the outcomes of the validation tests provides this study with the confidence to gauge the impact of participation forms on wind energy development.

4.3.2. Sensitivity analysis

Within this survey, respondents estimated nine variables for each of the four scenarios. It is essential to know what kind of impact the variances of the variables will have on the system. To which variances is the model most sensitive. In order to discover the impact of the measured variables is, the system was initialised with the mean values of all the parameters. The study conducted five sensitivity runs for every variable. The sensitivity runs had an incremental step increase, from the lower bound to the upper bound, run 3 of all the sensitivity runs is the normalised run using all the means. In calculating the lower bound and upper bound, this thesis uses the following calculations:

$$Lower\ bound = Mean - St.Dev.$$

$$Upper\ bound = Mean + St.Dev.$$

Additionally, this study conducted a sensitivity test on the structure of the delays. The additional figures for every variables can be found in Appendix 17. The figures below provide an overview of the lower and upper bounds, mean, standard deviation, and observation count. The range covered by this study falls in the 68% confidence interval, this might seem like an odd choice, knowing that the 95% confidence interval is the standard (Morey, Hoekstra, Rouder, Lee, & Wagenmakers, 2016). However, the values on the lower bound would be so low that it would allow the model to run, hence the 68% confidence interval is used.

TABLE 4: STANDARD DEVIATION BY VARIABLE (ALL FORMS OF PARTICIPATION INCLUDED)

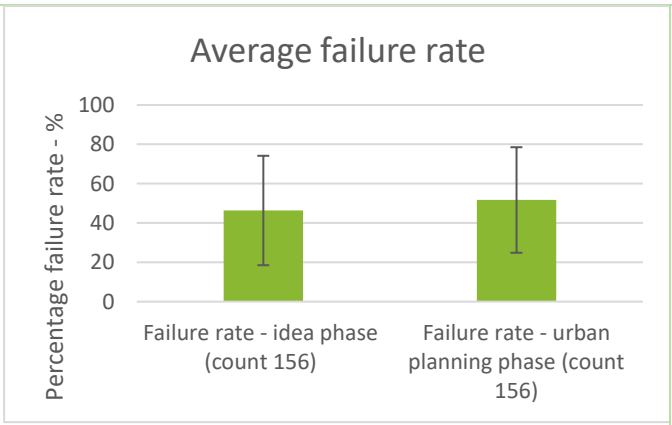


FIGURE 8: AVERAGE FAILURE RATE (COMPLETE SAMPLE)

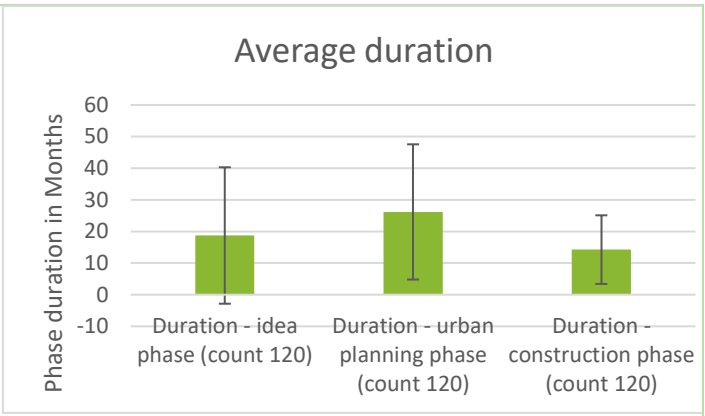


FIGURE 9: AVERAGE DURATION (COMPLETE SAMPLE)

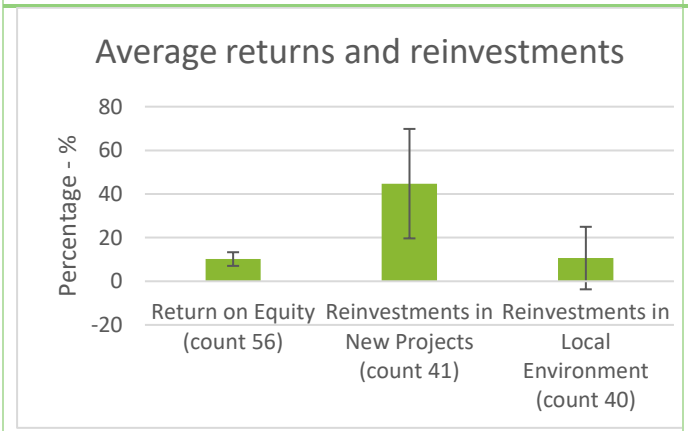


FIGURE 10: AVERAGE RETUNRS AND REINVESTMENTS (COMPLETE SAMPLE)

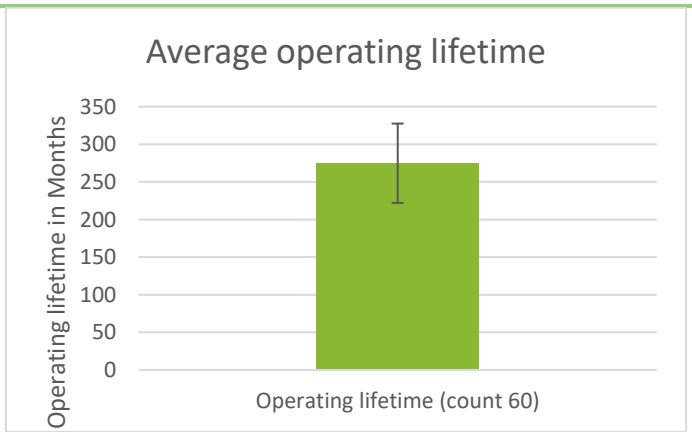


FIGURE 11: AVERAGE OPERATING LIFETIME (COMPLETE SAMPLE)

The high standard deviation for the variables can be caused by the fact that the samples include all the different forms. In this particular case, it is the intention to understand the complete variation for each variable.

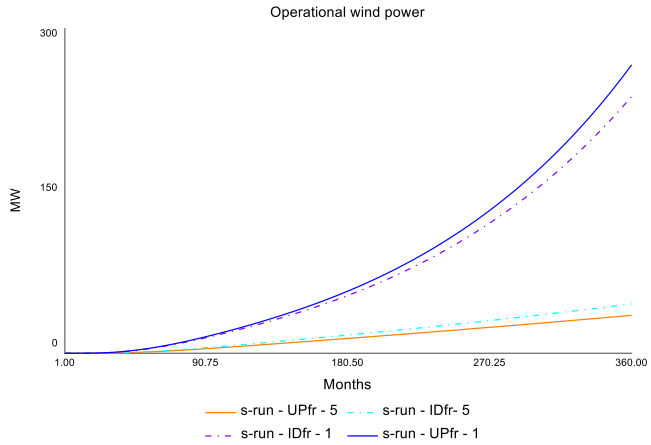
TABLE 10: HIGHLIGHTS SENSITIVITY ANALYSIS

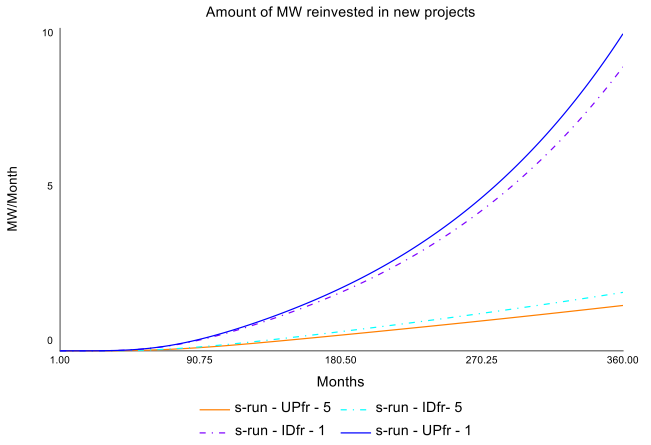
The body of the sensitivity analysis compares the extreme values. The upper bound and lower bound sensitivity values of comparable variables to get a better perspective on how sensitive variables are, compared to each other. Please be aware, the scaling of the graphs is subject to change.

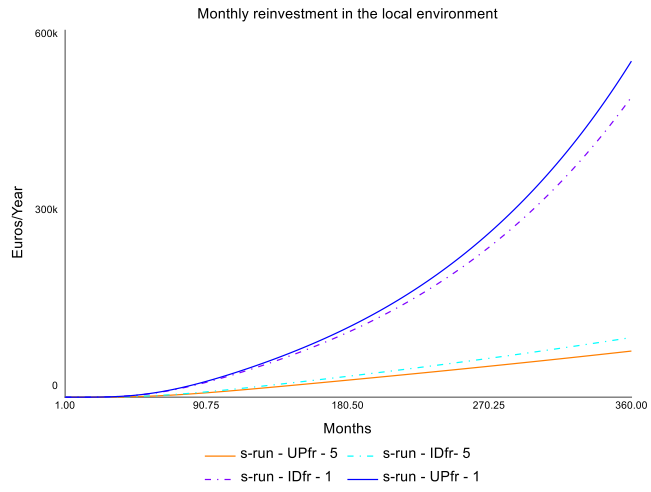
Assumptions

- The runs that are analysed assume that every month a fixed amount of MW in project ideas incepts.
- All the returns are reinvested within 1 year.

Comparing the minimum and maximum sensitivity runs of failure ratios



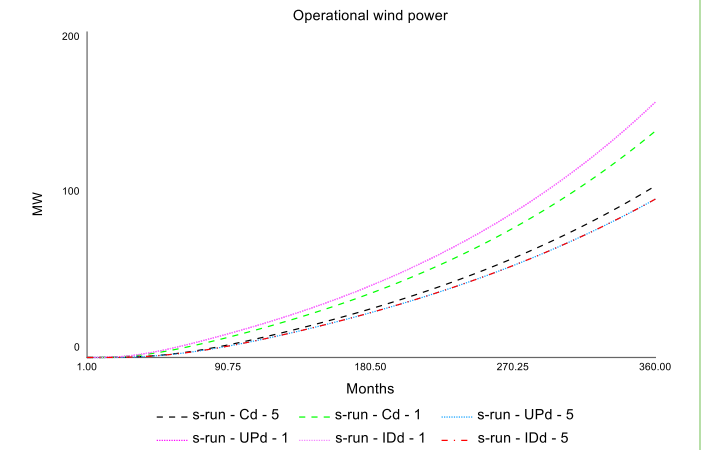


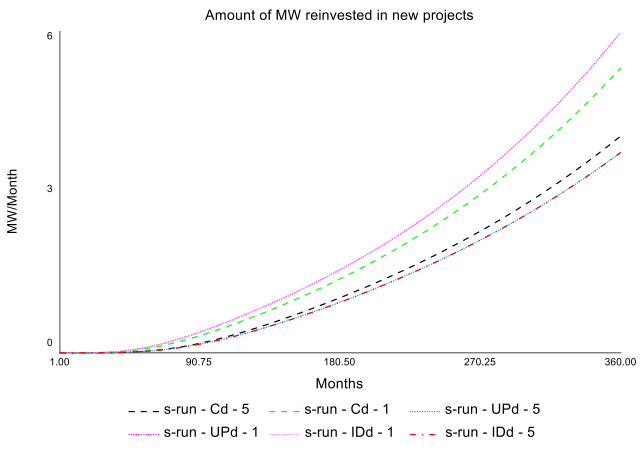


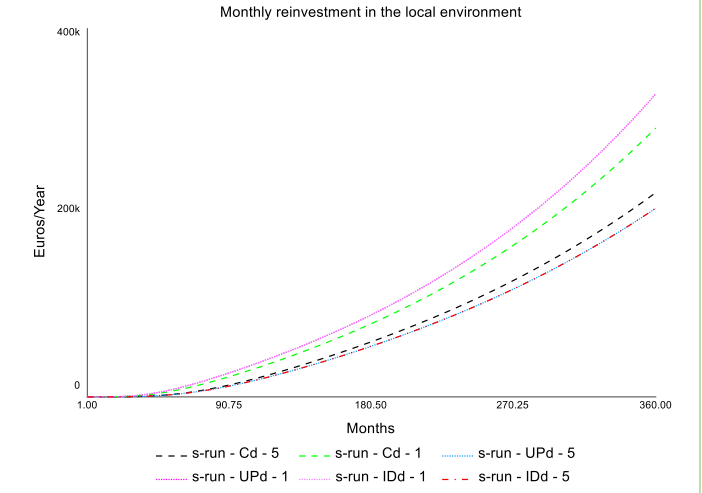
Notice that the lower lines represent the upper bound failure rates, and the higher lines represent the lower bound failure rates. An increased failure rate hurts the production goal.

This graph shows that the failure rate in the idea phase is slightly more sensitive to changes to the lower bound than the failure rate in the urban planning phase; the two upper lines represent this. This graph also shows that the failure rate in the idea phase is slightly less sensitive to changes to the upper bound than the failure rate in the urban planning phase; the two lower lines represent this.

Comparing the minimum and maximum sensitivity runs of project lead times



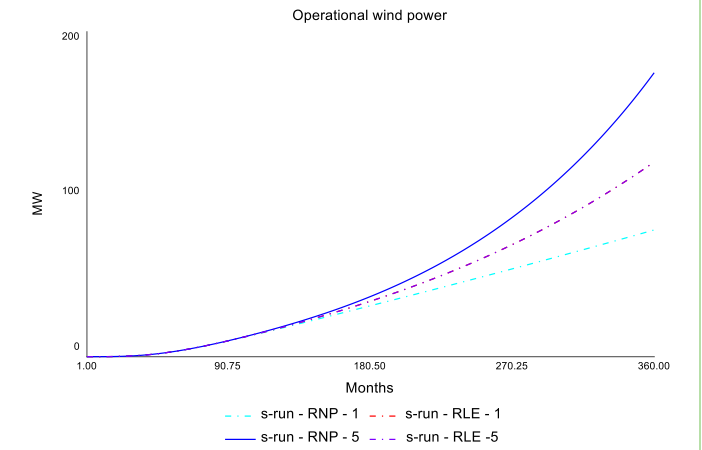


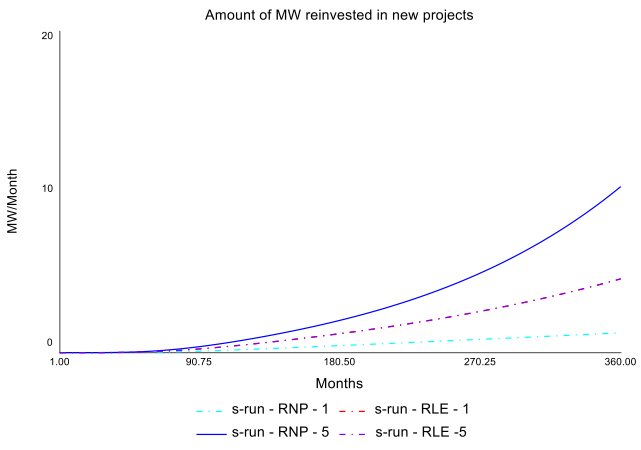


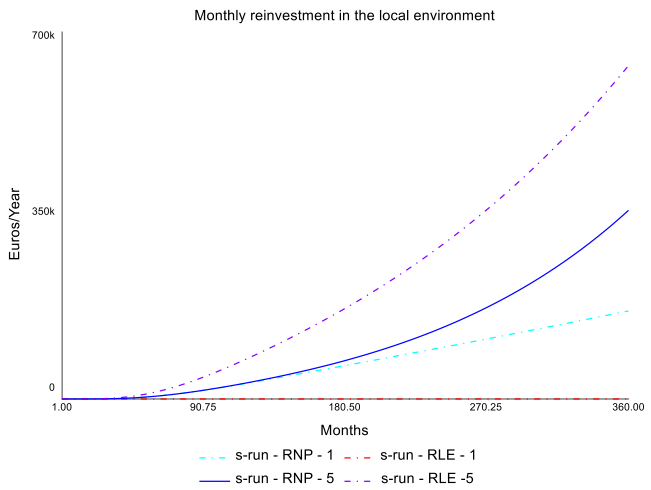
Notice that the lower lines represent the upper bound phase duration, and the higher lines represent the lower bound phase duration. An increased phase duration hurts the production goal.

This graph shows that the duration of the idea phase is exactly as sensitive to changes to the lower bound and upper bound as the duration of the urban planning phase; the two upper lines represent and two lower lines this. This graph also shows that the model is less sensitive to the duration of the construction phase. The lower sensitivity from the construction duration can be the case be caused by the mean duration of the construction phase, which is shorter than the mean duration of the idea phase and urban planning phase.

Comparing the minimum and maximum sensitivity runs of reinvestments



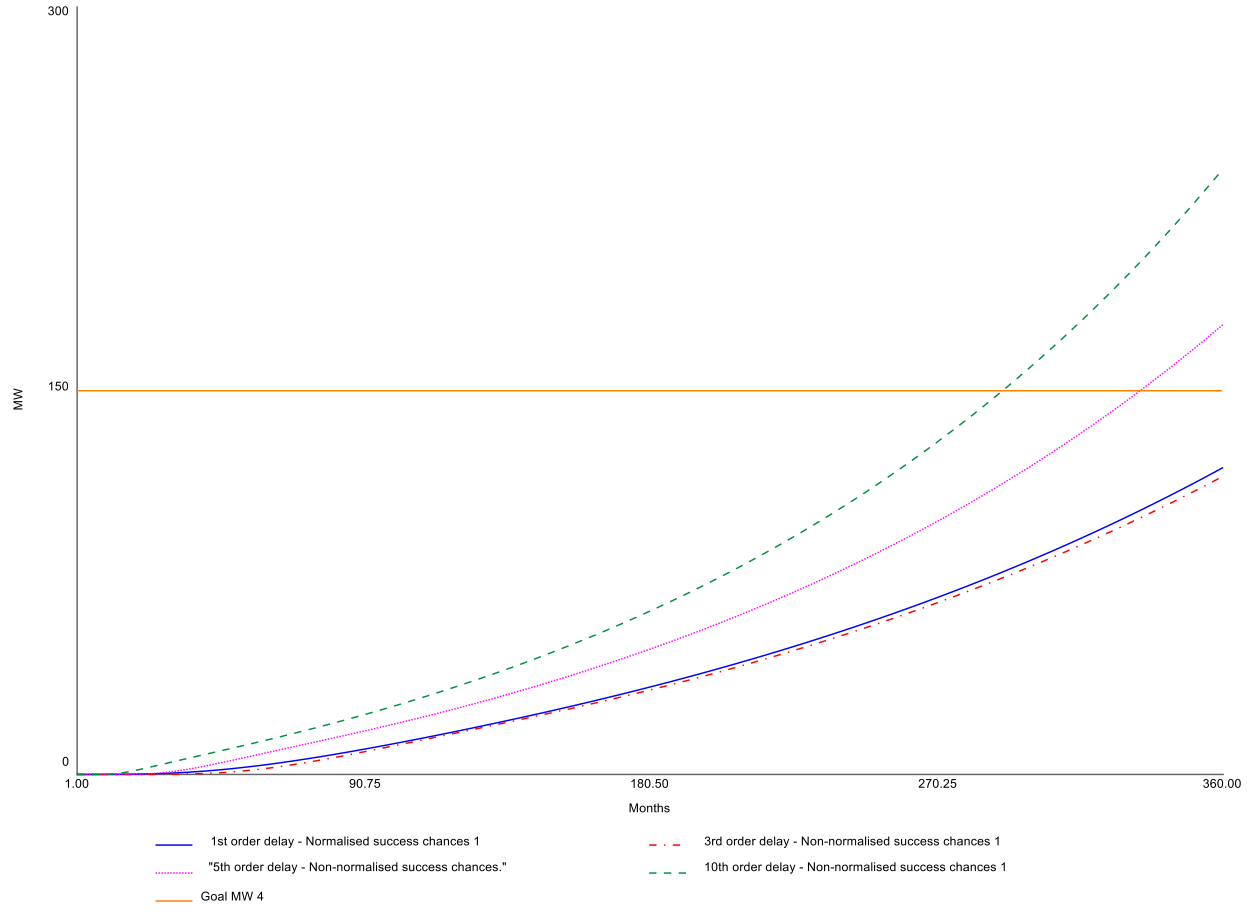


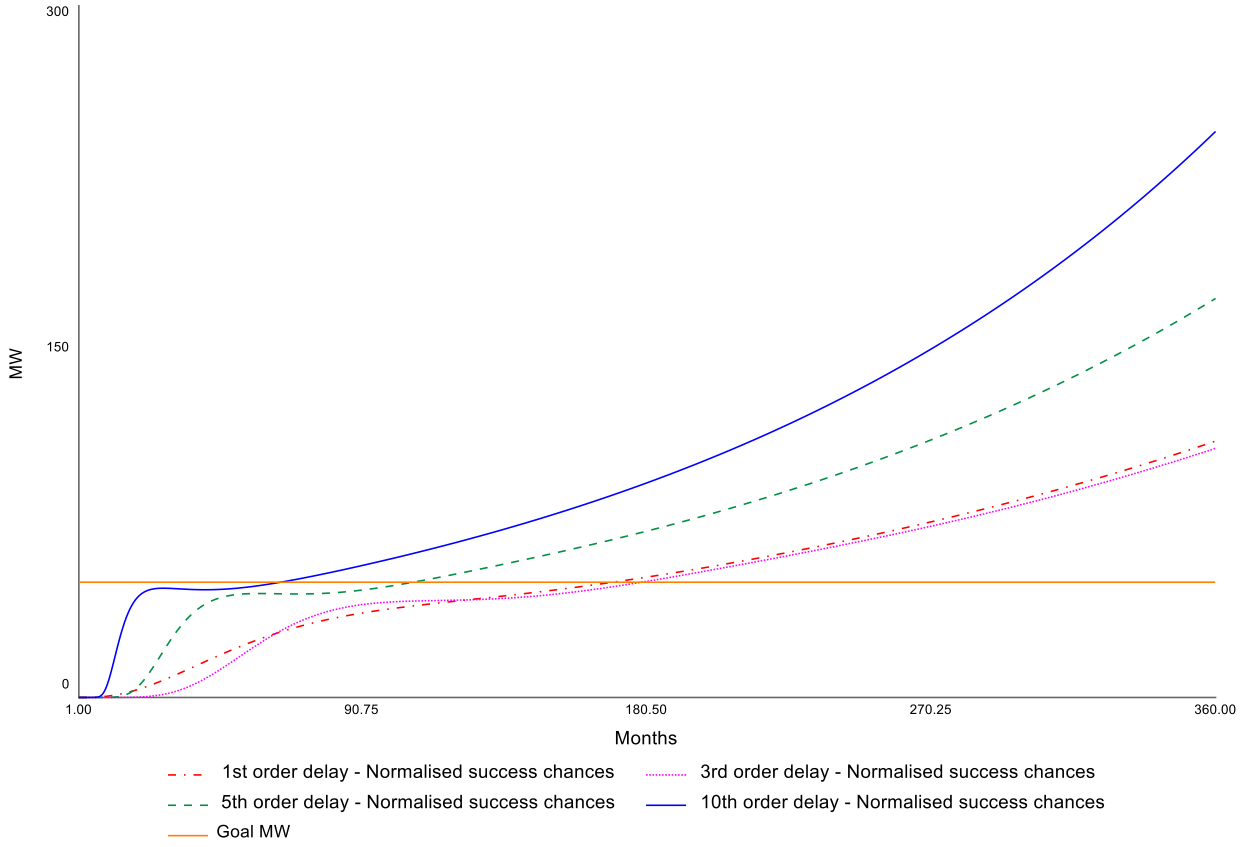


Notice that the lower lines represent the lower bound reinvestment rates, and the higher lines represent the upper bound reinvestment rates. An increased reinvestment rate can benefit the production goal.

In this comparison, it shows that the reinvestments to the local environment do not change the models' behaviour, except for the reinvestments in the local environment, while the reinvestments in new projects do greate variance.

Sensitivity to the order of the delays





The analysis of the models' sensitivity to the order of the delay, shows that the model is sensitive to changes in the amount of delay. The models' sensitivity towards the order of the delays shows more when the model runs based on normalised success chances.

The analysis has shown that the model is most sensitive to changes in the failure rate. Within the failure rate, the model is more sensitive to the possible variances in the urban planning phase than the possible variances in the idea phase. This means that depending on the form of participation used more or less ideas need to be develop in order for a region to achieve its goal. The project duration has a smaller yet still notable impact on the behaviour of the model. The duration of the idea phase and urban planning phase have an approximately equal impact, while the construction phase has a slightly smaller impact. Meaning that the form of participation would indeed impact how long it would take, on average, for an idea to be realised into a project. Lastly, the return on equity and the reinvestment in new projects do impact the model behaviour in a delayed fashion. The reinvestment in the local environment only feeds into an outside parameter, resulting in no significant changes in the model behaviour. These results do show a significant change in behaviour, however it is debateable if range is reliable, and if the projects are able to reinvest all their returns into new projects.

4.3.3. Scenario analysis

This section analyses the impact of using different forms of participation on the operation wind power.

In the development of wind energy, some of the changes offset each other. The increased success chances of more involving forms of participation offset the longer lead times; this will lead to more projects and thus more wind power produced by these kinds of producers. For individual developers, it would still make more sense to decrease the risks and invest in more extensive forms of participation. Projects with less involving forms of participation, however, make a higher return on equity. Therefore they can invest more in new projects than developers using more involving forms of participation. The results show that even on the longer term, these additional earnings and investments in new projects do not offset the lower success chances.

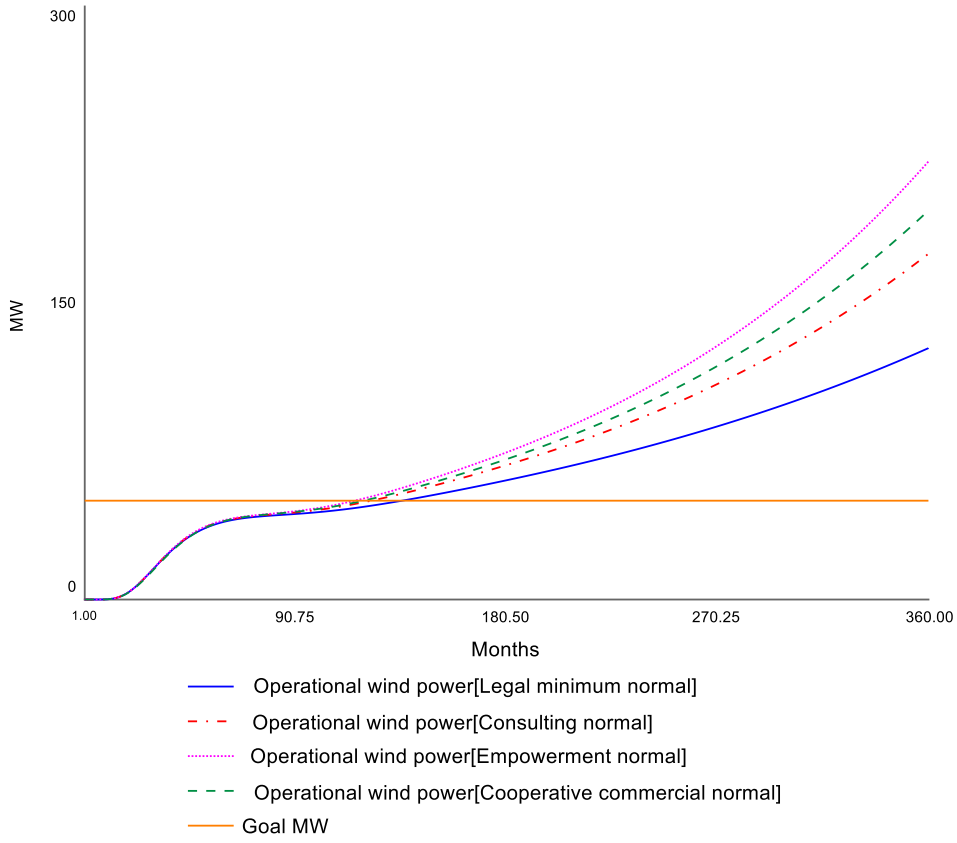
TABLE 11: SCENARIO ANALYSIS

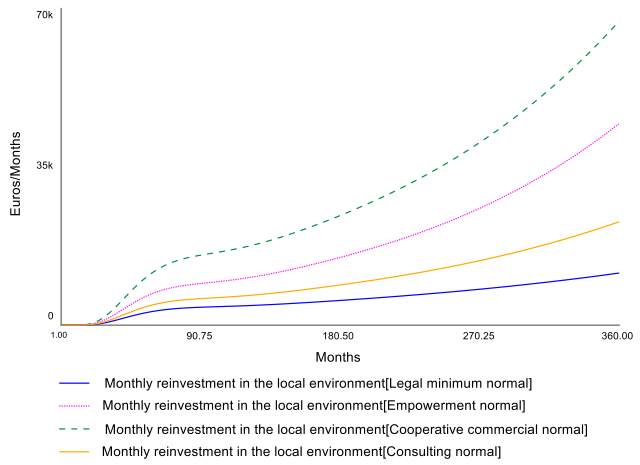
The body of the scenario analysis the mean, upper bound and lower bound values for the different forms of participation. The upper bound and lower bound scenario's provide insight in the degree of certainty of the analysis. Please be aware, the scaling of the graphs is subject to change.

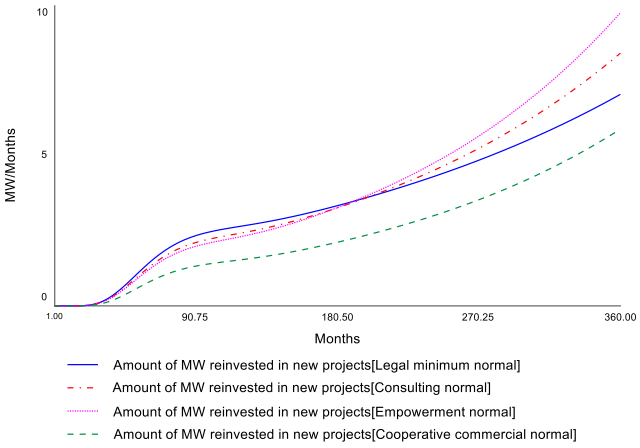
Assumptions

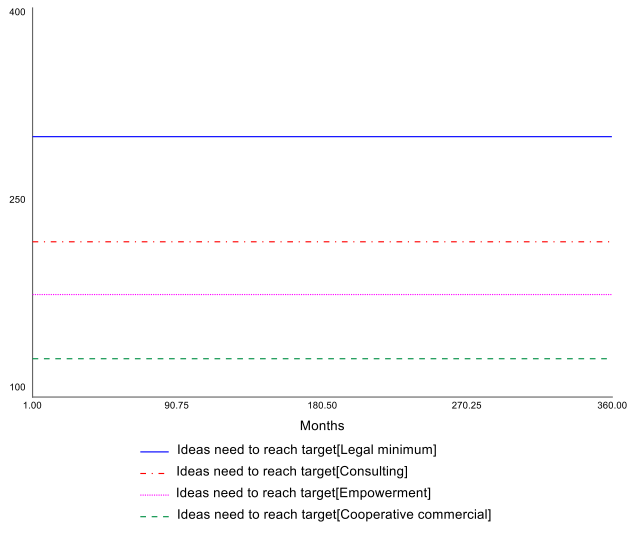
- The ideas for all the projects incept at the moment the goal is set, in month one.
- The amount of ideas that incept has been normalised based on the failure rates, every form has exactly enough ideas to achieve the goal.
- All the returns are reinvested within 1 year.
- The idea phase has a 3rd order delay
- The urban planning phase has a 5th order delay

Normal scenario – normalised success rate









The analysis of the mean scenario for the different forms of participation provides an interesting narrative. After the normalisation of the success chances, the approach of empowering local communities reaches the goal first, followed by the cooperative commercial partnership, the consultation approach, and lastly the legal minimum approach. However, the amount of ideas (in MW) needed to achieve these equali results are vastly different. Due to the lower failure rates the cooperative commercial partnership would need the fewest ideas, while this progressively climbs the less involving the form of participation becomes.

The reinvestments in new projects appear to be highest during the first 15 years for the legal minimum perspective, due to the higher failure rate it gets overtaken by the empowerment and consulting approaches. The gap between the legal minimum and the cooperative commercial partnership shrinks toward the end of the simulation.

Lastly, despite its slightly lower amount of operational wind power, the cooperative commercial approach reinvests the most in the local environment.

In reality it is not possible to directly control the amount of ideas for wind energy projects. Every idea is worked for very hard by all the people involved in a project. The cooperative commercial partnership is the most effective at transferring ideas into successful implementations of wind energy projects. Furthermore, the approach scores really quite well even when the initial amount of ideas is adjusted for its higher success rate. The cooperative commercial partnership still reaches the goal, and due to its high success rate if efficiently turns reinvestments into new successful projects. Furthermore, its reinvestments in the local environment exceed those of any other form of participation.

Appendix 20, contains the extended scenario analysis. The extended scenario analysis tests a best case scenario and a worst case scenario based on the standard deviations of the survey data. This extended scenario analysis provides

insight into the robustness of the model to variations within one standard deviation of the mean. The variation of the outcomes between the worst and the best case scenario's is very substantial. This is is caused by the large standard deviations, these in turn are a likely cause from the design of the survey, as is discussed in the limitations section. The simulations provide estimations of the outcomes, however to a low degree of precision. Nonetheless, the relationsships between the variables in the different cases remain similar. It is essential to question the representativeness of this model, as will be done in the section discussing the limitations of the system dynamics analysis.

5. Conclusion

This section will provide answers to the sub-questions of this thesis and answer the research question. Furthermore, it clarifies the impact of these results for wind energy development in the Netherlands.

5.1. Answering the research question

Research question:

To what extent can local governments speed-up the onshore wind energy development by favouring projects with different perspectives on community participation and local ownership?

(Local) governments can speed-up their development of operational wind power, by choosing to favour and assist cooperative-commercial developer partnerships whenever project ideas are in close proximity to communities. The interviewees cautiously pointed to the effects that community participation in onshore wind energy projects can have, under the right circumstances. Indicating it was likely to have an impact on the success chances of a project, the lead times of different phases of the project development, and the distribution of the reinvestments. The survey indicates that the changes differences in the success chances are quite sizable, in the circumstances of the case provided. Furthermore, the survey provided insight in the differences in lead times, the expected production lifetimes, and the returns and reinvestments. Using the analysis of the simulation model, this model found that using different forms of participation appears to have a very strong impact on the project development, and the behaviour of the amount operational wind power towards the regional target. In endorsing more involving forms of citizen participation, local governments will be able to strongly impact the pace of onshore wind energy development. Especially, the differences in the success chances of the different forms of participation have a strong impact on the behaviour toward the goal. From the results of this study, it can be concluded that using a cooperative commercial partnership in developing wind project in the vicinity of community is a vastly more efficient way of development.

Combining all the estimations allows one to see different forms of participation can impact the number of successful projects. The most involving form of participation tested in this study, cooperative-commercial partnership, proves to be the most favourable for total wind energy project development, as it has the lowest failure rate, a reasonable lead time, and a long production time. On the contrary, the least involving form of participation possible, the legal minimum approach, yields the worst overall results, despite some developers favouring this approach. These findings appear to corroborate the suggestions to focus on increasing local support, and it inspires confidence in the policies suggested.

Additionally, the analysis conducted in this study provided insight in what of the factors that participation affects is the most influential on the project development. The success chances have an influence on that exceeds any of the other variables. The analysis of the interviews also provides this thesis with a well nuanced perspective on the impact of participation on project development, again here the amount of information on the success chances was vastly more important for the interviewees than any of the other variables.

However, the cooperative-commercial partnership is not without its disadvantages particularly, wind project development is very demanding for an organisation that is voluntary in nature. Furthermore, some commercial developer are hesitant in partnering with cooperatives, as this would mean they have to share the revenues, and would partner with an organisation that has somewhat different interests. This study itself is not without it limitations, the survey was accompanied by a case, to take provide all the respondents of the survey with an identical contextual situation. This case included information on the windmill density in the area, the political readiness for wind projects, and the vicinity of a community. The suggestions should therefor be interpreted with care, the limitations were expound on the limits of this study.

Question 1: How do different forms of participation in wind energy projects, impact success chances of wind energy projects?

The more comprehensive the form of participation, the higher the success chances are, with the caveat that some cooperative projects can experience lower success chances because they lack the necessary professionalisation.

In the interviews, it became clear that project developers progressively choose more extensive forms of participation in order to increase the success chances of projects. Examples of this include the shift from Pure-Energie, Eneco and Vattenfall to focus on developing the project in partnership with local cooperatives.

However, the interviews also showed that there are risks involved with more extensive forms of participation. The most significant risk is that the developer creates a realisation that the project is impactful on the environment. This realisation can help foster resistance to the project. In other words, involving forms of participation run the risk of organising one's opposition.

The data, shows that the more extensive the form of participation, the higher the success chances. The higher success rates appears to confirm the suggestion from research that more involvement can increase the community support (Bauwens & Devine-Wright, 2018; Breukers & Wolsink, 2007; Enevoldsen & Sovacool, 2016; Jones & Richard Eiser, 2010). An important finding of this research substituting the earlier research, is that the form of participation, does influence the failure rate of projects, likely by proxy of the local support. Furthermore, the survey results of cooperative suggests that arguments on the benefits of local ownership also holds some truth (Bauwens & Devine-Wright, 2018; Curtin et al., 2019b; Toke et al., 2008).
Although the interviewees raise the important point that local ownership in and off itself is no solution; the process needed to achieve local ownership is likely the differentiating factor. This finding contradicts the general perspective from the literature, that mainly focussed on the benefits of local ownership itself (Bauwens & Devine-Wright, 2018).

Question 2: How are the lead times for wind energy projects impacted by different forms of interaction with the environment - participation and ownership?

More involving forms of participation lead to longer lead times for projects in the idea phase, shorter lead times in the urban planning phase and similar lead times during the construction phase. Altogether, the changes have only a very slight impact on the total project lead time.

The interviews found that the lead times of projects are also influenced by the form of participation. The interviewees believe the idea phase, where a plan is developed and partnerships are made, takes longer with more extensive forms of participation like empowering the local community and developing a partnership between a local cooperative and a commercial developer. However, some interviewees believe the speed of the urban planning phase might be able to compensate for the long idea phase for more involving forms participation, although there was no unison on this topic. These interviewees thought this would be the case because the more involving idea phase is expected to result in a better plan, which would result in faster decisions and less resistance in the urban planning phase. The construction phase, where contractors are contracted, the park is connected to the power grid and the windmills are build, was expected to take equally long for all forms of participation.

The interview outcomes broadly match the findings of the survey. The "legal minimum" procedures will take the longest. Based on the estimations from the respondents to the survey, the consulting participation would typically take half a year shorter, and the other forms take longer and longer but will not take as long as the legal minimum participation. In doing so, these findings substantiate the literature which found that less involving forms of participation would lead to longer project development times (Jami & Walsh, 2017; O'Faircheallaigh, 2010). This extends the academic knowledge, as this study was conducted in the Netherlands, rather than in Ontario Canada. Furthermore, the survey findings indeed substantiated the findings from group decision making literature, that reaching consensus in the idea phase would cost additional time, which it would result in time savings in later stages of the development (Sager & Gastil, 2006).
Notably, the overall impact of the form of participation on the total lead time is minimal. Additionally, the sensitivity analysis shows that the impact of this on the total model is neglectable compared to impact of success chances.

Question 3: How does the operational lifetime of a windmill differ between projects with different modes of participation?

There might be a longer operational life time for windmills in cooperative commercial partnerships and those developed by commercial developers alone.
However, the interviews did not indicate significant changes in the exploitation times of wind parks based on the form of participation used in the project development. According to the estimations from the survey respondents cooperatives do differ slightly from commercial developers. The survey findings establish that their wind projects would produce energy approximately 8 months longer. However, this finding cannot be substantiated with findings from the interviews and is an interesting line for further research. Among the possible causes for the differences in operational life time, might be a smaller need for returns within cooperatives; an aim to be less burdening to the local society by building new turbines less frequently; or the small observation count of this variable in the survey, which could mean that this difference is caused by outlier responses.

Question 4: How are the revenues from wind projects with different modes of participation used?

The returns of wind projects with more involving forms of participation, like cooperative commercial partnerships, appear to be consistently lower than those with less involving forms of participation, like the legal minimum. This impacts the size of the reinvestments that can be made. Furthermore, two trends showed in the reinvestments. Firstly, the more involving the form of participation becomes, the less will be reinvested in new projects. Secondly, the more involving the form of participation become the more is reinvested in the local environment. It is important to note that these changes do not appear to be proportional to one another.

The return on equity between the different projects is quite different in the survey results, while this was not highlighted by any of the interviewees. The survey, however, showed that the more involving the form of participation, the lower the return on equity. Most likely, this is the case due to the increasing costs of organising the participation, it would be interesting to further understand this, based on more observations. The costs of citizen participation have also been determined to be substantial in earlier studies(Jami & Walsh, 2017; Kleinman, Delborne, & Anderson, 2011). It would be understandable that this would effect the returns. This finding is different from the expectations from the literature, where commercial developers were expected to invest in more profitable projects (Wierling et al., 2018). Neither the literature, nor the interviews indicated that the form of participation would impact the return on equity of projects as the survey shows. Care should be taken in interpreting the results from the survey as the standard deviation is quite large, and the observation count is low. The interviews indicate that commercial investors are expected to reinvest more in new projects, for instance by diversifying the risks in the projects they start, they also invest in those projects with the best expected outcome. Cooperatives on the other hand were likely to reinvest more in the local environment. This finding is similar to what was expected based on the literature (Agterbosch, 2006; International Co-operative Alliance, 2015). The survey does seem to substantiate this perspective, however the real impact is hard to estimate with the low observation count and very high standard deviations.

5.2. What is the impact of the results?

This study provides an estimated quantification of the impact of different ways of engaging with the local environment in the context of wind energy development. It has shown that different ways of engagement impact the total amount of successful projects. In doing so, it contributes to the literature on technology diffusion showing how social aspects in the diffusion process impact the overall outcome. In isolating the effects of the different approaches, the study shows what the impact of the participation form is on the project development. From the study it can be concluded that purely on a participation perspective, the partnership between commercial developers and cooperatives was the most promising option from those that were tested in the survey. The study highlights an important, yet often overlooked aspect of technology diffusion, in this case implementation of onshore wind energy. Namely, how different ways of social engagement influence the diffusion of a technology. The results from the survey reiterate the importance of different forms of participation, showing how more involving forms can be a much more effective means of developing windfarms, particularly in the vicinity of communities.

Engaging with local environments in unsatisfactory ways can increase the resistance from the citizens and hinder the diffusion of a useful, needed technology. Assessment of effective ways of involving the local environment is something that should happen with more large infrastructural projects. However, this study is only a first step; it focusses on the impact that different forms of participation can have on project development, yet it does not assess the mechanisms and processes that lead to these changes. Furthermore, it assesses projects based on well executed forms of participation, without looking exactly into what a well-executed form of participation means. Much can still be learned about how to manage the energy transition most effectively, and local support for renewable energy projects is instrumental to a successful transition.

Practically, this study enables an educated policy debate on what forms of participation to simulate and strive for in project development. Even without the additional positive feedback that might come from more local support, as is likely to be the case with higher investments in the local environment, the cooperative commercial partnership makes a strong case. It is important for project developers and government officials alike to consider what form of participation leads to the desired effect. This paper has provided a more nuanced perspective on the advantages and disadvantages of different forms of participation. The Nation Government should take an active role in guiding the energy transition, aiming to have a smooth transition towards its goal and a transition that happens as quick a possible. Currently, about half the provinces are struggling to meet their wind energy production targets. Actively, stimulating and endorsing partnerships between cooperative and commercial developers would lead to higher success chances, and faster project developments. Furthermore, it allows the local environment to benefit from the

advantages of both the developers. Provinces, regions, and municipalities alike should devise a strategy on how to achieve their wind energy production goals, the approach to engaging citizens is indispensable to the success of this strategy and it should therefore be prudently considered. Endorsing cooperative commercial partnerships is strongly recommended near populated areas. However, these partnerships still are prown to result in failed projects, as the process of engaging with the local environment is extremely sensitive; they can easily be miss-used by opponents of projects to delay the process. Lastly, the reinvestment from these partnerships in new wind energy projects is expected to be limited.

6. Limitations

This study analysed a sector in the Netherlands that has a vital role in the transition toward renewable energy. The sector has evolved drastically over recent years due to changing policies and shifting perspectives. This study attempted, as best as possible to cover the intricacies involved in the sector. Nonetheless, some complicated and impactful decisions were made in this process. This chapter covers the limitations of this study.

In order to cover the limitations adequately, the chapter will start by covering the limitations caused by the scope of the research. Moving on, it covers the limitations of the choices made with the different methods applied in this study; this section is sub-categorised by the method. The next section will discuss the limitations of the analyses used. Finally, there have been a few inhibiting external factors, these will also be addressed.

6.1. Limitation from the scope

The limitations in scope focus on the impact that the chosen scope has on the research and the research results. Many of the limitations are substantiated using quotations from the interviewees. The primary limitations in scope are:

- the Netherlands has a limited amount of wind farms,
- the choice for expert elicitations methods (interviews and survey),
- the lack of focus on the evolution in the sector,
- the importance of other variables affecting project development,
- and the lack of focus new approaches to location acquisition in development.

In other words, the market this research aims to understand is small, intricate and ever-changing. This study focusses on one small part of this market. One of the interviewees pointed out very swiftly that the information that is currently available on wind energy development in the Netherlands is reasonably limited. Making it very difficult to make empirical observations. The interviewee is entirely correct regarding the lack of empirical observations, specifically about participation. Nonetheless, this study has addressed this particular issue by calling on a substantial base of experts, requesting estimations on the impact. Naturally, these estimations cannot replace or even approach the value of empirical observations. The expert estimations are the best alternative available at this point. The study has paid much attention to its sensitivity analysis to limit the impact of the variations caused by the estimating nature. An essential factor in the choice for expert elicitation also lies in the vast developments that the market has made over recent years, expert elicitations allows this study to focus on the results in the new context. The use of expert elicitation, particularly in the design of this survey, can lead to larger variances. Also, the results from expert elicitation will always be subject to less certainty than empirical observations of the changes.

In the interviews preceding the survey, it was indicated several times, that arguably the most crucial factor was the decision of the local municipality (Bosch, 2019). This governing body has the final say in the success of the project. Many factors influence the success chances, among which the form of citizen participation. One interviewee quoted Ed Nijpels: “The call for [citizen participation] must not be a refuge for frightened politicians and frightened administrators.”(Nederlandse Vereniging Duurzame Energie, 2018). Ed Nijpels points out that participation might not be as critical a factor, as was suggested by many sources in the literature review although the call for citizen participation from the politicians will naturally make it an essential element for project developers. It is also critical to understand that this study provides a cross-sectional overview of the influence of participation on the Dutch on-shore wind energy market. It provides context to the changes that have happened to a limited degree, aiming to focus on understanding the role that engaging the local environment plays in project development these days.

6.2. Limitation of the methods

Within this utilised, two different methods in acquiring data (interviews and an expert elicitation survey), both substantiating a third method (SD). This section focusses on the limitations accompanying the methods used, and the choices made within the method used.

6.2.1. Limitation of the interviews

The interviews have proved to be a valuable source of information in this study. In conducting the interviews, this study reached a large, influential and diverse sample. Nonetheless, the interview script included many questions that asked for examples to explain something. In hindsight, it would have benefitted the duration of the interviews and speed of analysing and interpreting results to ask about the impact, and then ask for substantiation with an example.

6.2.2. Limitations of the survey

In a conversation Rik Harmsen noted that some of his contacts within the sector did no envy participating in the study, as they were afraid that the results from this particular case would favour cooperatives. While this case is not representative of every type of onshore wind project in the Netherlands. The specificity of some of the questions reinforced this perspective. Critically, a fictive case has been used to allow all the respondents to provide an estimation on an identical situation. The limitation that accompanies this choice is that the results from the survey can only be generalised to a situation very akin to the situation of the case. This thesis minimises the impact of this limitation by using the survey data primarily in substantiating the general information deduced from the interviews. This allows both the intricacies of the interview analysis flourish, with validated and quantified data.

Another limitation regards the scope of the case within the survey. One of the interviewees whom was requested to fill in the survey replied with an email. She stated that even with the supplied case, she did not feel comfortable whatsoever answering the accompanying questions, because it would be challenging to distil the impact of participation among the many other factors.
In distributing the survey, the study contacted all major players in the onshore wind energy market. Innogy is one of the companies contacted regarding the distribution of the survey. Innogy reviewed the survey prior to possible distribution within the wind energy development department. Upon careful review and deliberation within the department, they choose not to complete the survey. In a phone call with Innogy's Rob Smit, the critique to the survey and Innogy's reasons not to distribute the survey were discussed.

> *"The nature of the questions is very subjective, allowing for easy politicisation of the answers. The answers we would provide are gross estimations and would include noise from other factors influencing the success chances and lead times. For instance, the political climate might suddenly change in the middle of the project development. Lastly, the participation forms used in the survey do not correspond to the forms of participation in use by Innogy. Consequently, our department does not feel comfortable answering the survey questions." – R. Smit, commercial developer (personal communication, May 24, 2019)*

The scope of the survey also did not allow for checking of the influence of financial participation on the project development. From the interviews, this line of research appeared less promising, nonetheless due to the limited scope of the survey; this study was unable to confirm or deny this finding.

Moreover, the survey proved to be very difficult for respondents.

> *"Your questions are too complicated for me to answer" – Survey respondent A regarding the success chances.*

> *"I honestly have no idea, rather I have converted my perspective from the previous question onto this question."– Survey respondent B regarding the project lead times.*

Rob Smit highlights a couple of significant limitations of the survey. Importantly, the cause of the limited response could be related to the selected participation forms. Developers unfamiliar with the different forms can feel very uncomfortable estimating the effect of it on the project development. Respondents might perceive the subjective nature of the questions as challenging and easy to manipulate, resulting in hesitance to answer the questions. While the ease to manipulate the results in answering the questions can be obstructive in answering the questions, it has been highlighted and pointed out in the analysis. One of the ambassadors of the survey noted that among the non-responders (his con-colleague), there was a feeling of unease with the positioning of the survey and the relation of the author and supervisors of this thesis to Betuwse Energy Samenwerking. Furthermore, the survey is also subject to the limitations of the scope of this

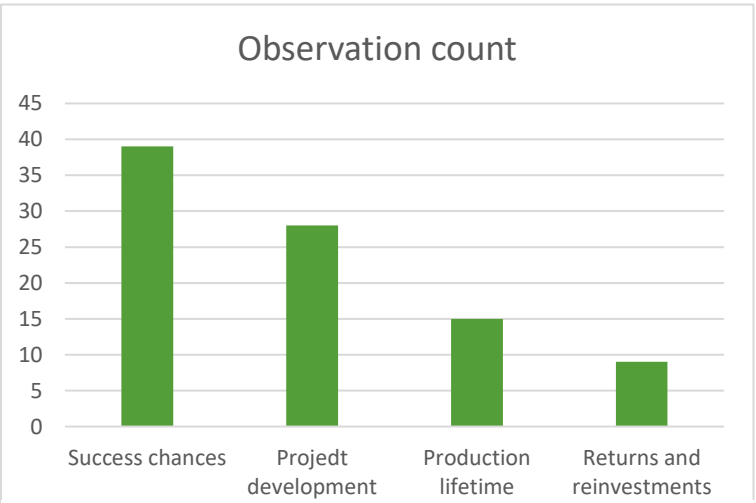


FIGURE 12: MINIMUM OBSERVATION COUNT BY SURVEY SECTION

research; respondents believe other factors also impact the project.

The responses to the questions decreased with every section, most likely due to the length of the questions. The last section, covering the returns and reinvestments, was experienced to be particularly hard, 14 respondents answered some of the questions regarding the returns, while only 9 respondents felt comfortable answering the questions regarding the reinvestments.

Additionally, the method of using survey ambassadors was a good, no-strings attached means of distribution the survey. However, it meant that there was little influence from the researcher in determining how many people would receive the link to the survey. Furthermore, it proved to be particularly time intense. Moreover, the dependence in the relation with the survey ambassadors proved to be skewed. The researcher was very dependent on the ambassadors, for instance, one ambassador asked someone in his network to distribute the survey, however he was not able to inform the researcher of the amount of people who received the link in time. As a result of the ambassador approach, the researcher was only able to provide an estimated response rate. It should be noted that the estimation is reasonably accurate, as only one of the nine survey ambassadors was unable to share how many people received the link in time.

6.3. Limitations of the analysis

6.3.1. Interview analysis

In analysing, the interview transcripts, this thesis used a simple narrative analysis. The interview coding was compared to one other coder the thesis could have benefitted from a more complex analysis and more comparisons.

6.3.2. Survey analysis

The survey analysis has been executed as best a possible considering the results of the survey. The results were the limiting factor, not the analysis. If the data had allowed for it, this study would have run one-way repeated ANOVA's to understand the explanatory value of the different forms of participation for each of the variables. As the responses were limited, and the data did not satisfy the normality nor sphericity requirements, this proved impossible.

6.3.3. Model analysis

The model uses a very narrow scope in assessing the impact of different participation forms on project development. The nature of choice for a theoretical model means that it is a vast simplification of reality; this translates to the results. Preceding this, one can find a list of possible additions:

- This model uses estimates for the effect of different social process on the project development; it does not model the social processes themselves.
- There is no effect from choosing a more involving form of participation on the support of a project. The combination of the previous projects would determine a developers' reputation and affect the failure rates of new projects.
- Similarly, the reinvestments are expected to have an impact on the failure rates of new projects.
- This model assumes that developers can carry the additional risk of investing solely in projects using the legal minimum. The interviews showed a different picture where developers are consciously choosing less risky projects.
- The model does not incorporate a developing awareness within municipalities of the urgency of involving the local environment in wind energy projects. Interviews showed that municipalities have an increasing interest in community support for projects; this shows in the compliance nature of financial participation.
- The model assumes that all the earning can be invested in new projects. However, the limiting factor in developing currently is the willingness of a municipality to develop.
- The model assumes every project is economically viable and presuming a fixed technological efficiency.

Including these suggestions into the model is vastly beyond the scope of this thesis. However, these limitations show that the results of this research are to be interpreted with care.

6.4. Limiting external conditions

The group of experts in the market with the knowledge to understand how participation impact project development in the Netherlands is very modest. Rik Harmsen estimates it to be 200 people; this includes commercial developers, experienced cooperative developers, consultants, and governmental employees. The limited sample population means that it is especially important to have a large sample size, as changes of perspectives from individuals have a

substantial impact on the results. The fact that a few leading companies have decided against completing the survey can lead to skewed results.

The recent spike in survey distributions in some of the sample companies is likely a factor that played a significant role in the limited response to the survey. It has been the reason for some companies to distribute the survey to a more selective part of their employees. It is also likely to be the reason fewer people responded, even when they were selected.

7. Suggestions for further research

Further studies should sample the municipal and provincial decision makers, to develop a better understanding of the importance of participation and the success chances of onshore wind energy projects. Furthermore, it would be very beneficial in understanding what factors are most instrumental in wind projects. Focussing on the success chances and critical success factors can assist project developers to invest more efficiently. Increased success chances would benefit the amount of wind energy in the Netherlands.

In interviewing this study has been able get a good cross-section of the market, interviewing representatives from large commercial developers, large and small successful cooperatives, various consultants, municipal- and provincial representatives. Nonetheless, it would be beneficial to get insights from the other major commercial developers, unsuccessful cooperatives, and national government representatives.

Many more variables impact the project development of wind energy projects; some have a much more significant impact on project development than participation. Within the interviews, a quick snapshot from other variables of importance mentioned during the interviews results in the following influencing factors. The variables mentioned include, but are not limited to:

- the political process,
- the population,
- spatial obstacles,
- adjacent lands,
- neighbouring projects,
- the time the development starts,
- political support and administrative support.

Possibly, some of these variables are more important to the development of wind energy projects. Another particularly important factor in the success of wind energy development is the acquisition process of locations. The process of land acquisition has changed significantly for some developers, including some cooperatives. The evolution and use of this ways of acquiring locations to build wind farms have moved in tandem with more engagement of the environment. The variances of the answers provided by the respondents of the survey now include these variables. Changing the scope of the questions can help to further clarify the uncertainty, also surrounding aforementioned variables.

Furthermore, this study had few observations for the final questions of the survey, particularly the questions regarding operating life time and the return on equity and the reinvestments receive a low response. This area of project development has a strong influence on the system, and it is important to develop a further understanding of it. More research into the effects of reinvestments is certainly warranted. Questions regarding the size of the reinvestments in new projects, and how quickly funds get reinvested are interesting for further research. The impact of reinvestments in the local environment and the way of completing the development process on the (local) support for wind energy are also of particular interest. As the local support will likely have a strong impact on the completion of next generations of windmills.

In analysing the results of this survey, this study was limited by the lack of normality and sphericity of the data, the large standard deviations, and low numbers of observations. To get an even better understanding of the impact of participation on project development, it is useful to replicate this study trying to reach an even larger fraction of the population. This would also allow for more nuanced analysis of the data, for instance the ability to run non-parametric tests that allow to get insight in the explanatory value of participation form in the variances between means. Another suggestion would be to apply Bayesian updating to the results, narrowing down the findings.

In surveying this study used an expert elicitation survey, asking for estimations on the success chances, lead times, operating life times, returns and reinvestments of projects. To develop a better gauge of the success chances this study would suggest to distribute a vignette-survey among municipal councils, as this would provide researchers with insight in the decision-makers perspective on the impact of participation forms, as well as an even more accurate perspective on the success chances of projects.

The simulation model is subject to a narrow model boundary, one that was very well fit to analyse this particular question. However, along with the narrow model boundary come many assumptions that impede on the realism fo the results from the model. Extending this theoretical model and including the findings of this study in larger microworld

simulation model, is a promising alley of research. This would mean that many of the assumptions made in can be released.

8. Bibliography

Agterbosch, S. (2006). *Empowering wind power*. *Nederlandse Geografische Studies*. Retrieved from http://www.scopus.com/inward/record.url?eid=2-s2.0-33845380107&partnerID=40&md5=36afc668d3909efb2b667ebc8d265149

Agterbosch, S., & Breukers, S. (2008). Socio-political embedding of onshore wind power in the Netherlands and North Rhine-Westphalia. *Technology Analysis and Strategic Management*, *20*(5), 633–648. https://doi.org/10.1080/09537320802292958

Agterbosch, S., Meertens, R. M., & Vermeulen, W. J. V. (2009). The relative importance of social and institutional conditions in the planning of wind power projects. *Renewable and Sustainable Energy Reviews*, *13*, 393–405. https://doi.org/10.1016/j.rser.2007.10.010

Aitken, M. (2010a). Why we still don't understand the social aspects of wind power: A critique of key assumptions within the literature. *Energy Policy*, *38*, 1834–1841. https://doi.org/10.1016/j.enpol.2009.11.060

Aitken, M. (2010b). Wind power and community benefits: Challenges and opportunities. *Energy Policy*, *38*, 6066–6075. https://doi.org/10.1016/j.enpol.2010.05.062

Aitken, M., Haggett, C., & Rudolph, D. (2014). *Wind farms community engagement good practice review. The University of Edinburgh*. Retrieved from http://www.ecoconnect.org.uk/download/Review of Good Practice on Community Engagements.pdf

Aitken, M., Haggett, C., & Rudolph, D. (2016). Practices and rationales of community engagement with wind farms: awareness raising, consultation, empowerment. *Planning Theory and Practice*, *17*(4), 557–576. https://doi.org/10.1080/14649357.2016.1218919

Akerboom, S. (2018). Between Public Participation and Energy Transition : the case of wind farms.

Akerboom, S., Buist, G., & Pront-van Bommel, S. (2012). Ruimtelijke inpassing van lokale duurzame energievoorzieningen.

Andersen, D. L., Luna-Reyes, L. F., Diker, V. G., Black, L., Riche, E., & Andersen, D. F. (2012). The disconfirmatory interview as a strategy for the assessment of system dynamics models. *System Dynamics Review*, *28*(3), 255–275.

Babbie, E. (2011). *The basics of Social Research*. *Cengage Learning*.

Baker, E., Bosetti, V., Anadon, L. D., Henrion, M., & Reis, L. A. (2015). Future Costs of Key Low-Carbon Energy Technologies: Harmonization and Aggregation of Energy Technology Expert Elicitation Data. *Energy Policy*, *80*, 219–232.

Barlas, Y. (1996). Formal aspects of model validity and validation in system dynamics. *System Dynamics Review*, *12*(3), 183–210. https://doi.org/10.1002/(SICI)1099-1727(199623)12:3<183::AID-SDR103>3.0.CO;2-4

Barriball, L., & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing*, *19*, 328–335. https://doi.org/10.1111/j.1365-2648.1994.tb01088.x

Bauwens, T. (2014). What Roles for Energy Cooperatives in the Diffusion of Distributed Generation Technologies? *Ssrn*, *7*(0), 1–29. https://doi.org/10.2139/ssrn.2382596

Bauwens, T., & Devine-Wright, P. (2018). Positive energies? An empirical study of community energy participation and attitudes to renewable energy. *Energy Policy*, *118*(February), 612–625. https://doi.org/10.1016/j.enpol.2018.03.062

Bell, D., Gray, T., & Haggett, C. (2005). The "social gap" in wind farm siting decisions: Explanations and policy responses. *Environmental Politics*, *14*(4), 460–477. https://doi.org/10.1080/09644010500175833

Bergman, N., & Eyre, N. (2011). What role for microgeneration in a shift to a low carbon domestic energy sector in the UK? *Energy Efficiency*, *4*, 335–353. https://doi.org/10.1007/s12053-011-9107-9

Bolton, R., & Foxon, T. J. (2015). A socio-technical perspective on low carbon investment challenges - Insights for UK energy policy. *Environmental Innovation and Societal Transitions*, *14*, 165–181. https://doi.org/10.1016/j.eist.2014.07.005

Bosch & van Rijn. (2008). *Projectenboek Windenergie: Analyse van windenergieprojecten in voorbereiding*.

Bosch, G. (2019). Interview transcript.

Breukers, S., & Wolsink, M. (2007). Wind power implementation in changing institutional landscapes: An international comparison. *Energy Policy*, *35*, 2737–2750. https://doi.org/10.1016/j.enpol.2006.12.004

Carlos, J. M. T. (2016). *A system dynamics approach applied to the wind energy system*.

Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research*.

Corscadden, K., Wile, A., & Yiridoe, E. (2012). Social license and consultation criteria for community wind projects. *Renewable Energy*, *44*, 392–397. https://doi.org/10.1016/j.renene.2012.02.009

Cropanzano, R., Bowen, D. E., & Gilliland, S. W. (2007). The Management of Organizational Justice. *Academy of*

Management Perspectives, 34–48. https://doi.org/10.5465/amp.2007.27895338

Curtin, J., McInerney, C., Gallachóir, B., & Salm, S. (2019a). Energizing local communities—What motivates Irish citizens to invest in distributed renewables? *Energy Research and Social Science*, *48*, 177–188. https://doi.org/10.1016/j.erss.2018.08.020

Curtin, J., McInerney, C., Gallachóir, B., & Salm, S. (2019b). Energizing local communities—What motivates Irish citizens to invest in distributed renewables? *Energy Research and Social Science*, *48*(March 2018), 177–188. https://doi.org/10.1016/j.erss.2018.08.020

de Gooyert, V. (2018). Developing dynamic organizational theories; three system dynamics based research strategies. *Quality and Quantity*, 1–14. https://doi.org/10.1007/s11135-018-0781-y

de Gooyert, V., & Größler, A. (2018). On the differences between theoretical and applied system dynamics modeling. *System Dynamics Review*, *34*, 575–583. https://doi.org/10.1002/sdr.1617

Denscombe, M. (2012). *Research proposals a practical guide*.

Dirks, B., & Van den Berg, J. (2019). Provincies slagen er niet in voldoende windmolens te bouwen. *De Volkskrant*.

Dóci, G., Vasileiadou, E., & Petersen, A. C. (2015). Exploring the transition potential of renewable energy communities. *Futures*, *66*, 85–95. https://doi.org/10.1016/j.futures.2015.01.002

Dyner, I. (2006). SD for Assessing the diffusion of wind power in Latin America: The Colombian case. In *Proceedings of the 2006 System Dynamics Conference* (p. 61).

Eltham, D. C., Harrison, G. P., & Allen, S. J. (2008). Change in public attitudes towards a Cornish wind farm: Implications for planning. *Energy Policy*, *36*, 23–33. https://doi.org/10.1016/j.enpol.2007.09.010

Enevoldsen, P., & Sovacool, B. K. (2016). Examining the social acceptance of wind energy: Practical guidelines for onshore wind project development in France. *Renewable and Sustainable Energy Reviews*, *53*, 178–184. https://doi.org/10.1016/j.rser.2015.08.041

Fast, S., & Mabee, W. (2015). Place-making and trust-building: The influence of policy on host community responses to wind farms. *Energy Policy*, *81*, 27–37. https://doi.org/10.1016/j.enpol.2015.02.008

Feng, G. C. (2014). Intercoder reliability indices: Disuse, misuse, and abuse. *Quality and Quantity*, *48*(3), 1803–1815. https://doi.org/10.1007/s11135-013-9956-8

Fergen, J., & B. Jacquet, J. (2016). Beauty in motion: Expectations, attitudes, and values of wind energy development in the rural U.S. *Energy Research and Social Science*, *11*, 133–141. https://doi.org/10.1016/j.erss.2015.09.003

Finch, J. (1987). A research note to vignette surveys. *Sociology*, *21*(1), 105–114.

Ford, A. (1997). System Dynamics and the Electric Power Industry. *System Dynamics Review*, *13*(1), 57–85. https://doi.org/10.1002/(sici)1099-1727(199721)13:1<57::aid-sdr117>3.3.co;2-2

Friedl, C., & Reichl, J. (2016). Realizing energy infrastructure projects - A qualitative empirical analysis of local practices to address social acceptance. *Energy Policy*, *89*, 184–193. https://doi.org/10.1016/j.enpol.2015.11.027

Griliches, Z. (1957). Hybrid Corn : An Exploration in the Economics of Technological Change. *The Econometric Society*, *25*(4), 501–522.

Groth, T. M., & Vogt, C. (2014). Residents' perceptions of wind turbines: An analysis of two townships in Michigan. *Energy Policy*, *65*, 251–260. https://doi.org/10.1016/j.enpol.2013.10.055

Hier opgewekt. (2017). bijlage Collectieve windprojecten.

Holstenkamp, L., & Kahla, F. (2016). What are community energy companies trying to accomplish? An empirical investigation of investment motives in the German case. *Energy Policy*, *97*, 112–122. https://doi.org/10.1016/j.enpol.2016.07.010

Homer, J. B. (1987). A diffusion model with application to evolving medical technologies. *Technological Forecasting and Social Change*, *31*, 197–218. https://doi.org/10.1016/0040-1625(87)90011-4

Homer, J. B. (2012). Partial-model testing as a validation tool for system dynamics. *System Dynamics Review*, *28*(3), 281–294. https://doi.org/10.1002/sdr

Howard, T. (2015). Olivebranches and idiot's guides: Frameworks for community engagement in Australian wind farm development. *Energy Policy*, *78*, 137–147. https://doi.org/10.1016/j.enpol.2014.12.026

I&O research. (2014). *Graag meer windenergie, maar liever niet in de buurt*. Retrieved from http://www.ioresearch.nl/Portals/0/Windenergie - Eindrapport.pdf

Institue for energy technology. (2009). *Future energy demand - a Norwegian overview*. Retrieved from https://www.ntnu.no/documents/7414984/0/IFE-report+Future+energy+demand.pdf/6c210f3a-7511-421b-96e9-fe21c92803f1

International Co-operative Alliance. (2015). *Guidance Notes to the Co-operative Principles*.

International Energy Agency. (2012). *Factsheet: Energy systems Tapping into synergies across sectors and applications*. https://doi.org/10.1007/978-0-85729-244-5_1

Jami, A. A., & Walsh, P. R. (2017). From consultation to collaboration: A participatory framework for positive community engagement with wind energy projects in Ontario, Canada. *Energy Research and Social Science*, *27*, 14–24. https://doi.org/10.1016/j.erss.2017.02.007

Jarque, C. m., & Bera, A. K. (1987). A Test for Normality of Observations and Regression Residuals. *International Statistical Review*, *55*(2), 163–172.

Jay W. Forrester; Peter M. Senge. (1980). Testing for Building Confidence in Systen Dynamics Models. *TIMS Studyies in Management Sciences*, 209–228.

Jobert, A., Laborgne, P., & Mimler, S. (2007). Local acceptance of wind energy: Factors of success identified in French and German case studies. *Energy Policy*, *35*, 2751–2760. https://doi.org/10.1016/j.enpol.2006.12.005

Jones, C. R., & Richard Eiser, J. R. (2010). Understanding “local” opposition to wind development in the UK: How big is a backyard? *Energy Policy*, *38*(6), 3106–3117. https://doi.org/10.1016/j.enpol.2010.01.051

Kleinman, D. L., Delborne, J. A., & Anderson, A. A. (2011). Engaging citizens: The high cost of citizen participation in high technology. *Public Understanding of Science*, *20*(2), 221–240. https://doi.org/10.1177/0963662509347137

Klimaatberaad. (2018). Ontwerp van het Klimaatakkoord.

Knol, A. B., Slottje, P., Van Der Sluijs, J. P., & Lebret, E. (2010). The use of expert elicitation in environmental health impact assessment: A seven step procedure. *Environmental Health*, 1–16. https://doi.org/10.1186/1476-069X-9-19

Kooij, H. J., Oteman, M., Veenman, S., Sperling, K., Magnusson, D., Palm, J., & Hvelplund, F. (2018). Between grassroots and treetops: Community power and institutional dependence in the renewable energy sector in Denmark, Sweden and the Netherlands. *Energy Research and Social Science*, *37*, 52–64. https://doi.org/10.1016/j.erss.2017.09.019

Langer, K., Decker, T., & Menrad, K. (2017). Public participation in wind energy projects located in Germany: Which form of participation is the key to acceptance? *Renewable Energy*, *112*, 63–73. https://doi.org/10.1016/j.renene.2017.05.021

Langer, K., Decker, T., Roosen, J., & Menrad, K. (2018). Factors influencing citizens’ acceptance and non-acceptance of wind energy in Germany. *Journal of Cleaner Production*, *175*, 133–144. https://doi.org/10.1016/j.jclepro.2017.11.221

Luijkx, J. (2018). *Masterthesis – Lokale participatie in energieprojecten*.

Luna-Reyes, L. F., & Andersen, D. L. (2003). Collecting and analyzing qualitative data for system dynamics: Methods and models. *System Dynamics Review*, *19*, 271–296. https://doi.org/10.1002/sdr.280

Mauchly, J. W. (1940). Significance test for sphericity of a normal n-variate distribution. *The Annals of Mathematical Statistics*, 204–209.

McLaren Loring, J. (2007). Wind energy planning in England, Wales and Denmark: Factors influencing project success. *Energy Policy*, *35*, 2648–2660. https://doi.org/10.1016/j.enpol.2006.10.008

Miner, P., Warren, C., Strachan, P., Hadwin, R., Wolsink, M., NadaÏ, A., … Ellis, G. (2010). Wind Power: Is There A “Planning Problem”? Expanding Wind Power: A Problem of Planning, or of Perception? The Problems Of Planning—A Developer’s Perspective Wind Farms: More Respectful and Open Debate Needed, Not Less Planning: Problem “Carrier” or Proble. *Planning Theory & Practice*, *10*(4), 521–547. https://doi.org/10.1080/14649350903441555

Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. (2019). Participatie in de Omgevingswet. Retrieved from https://aandeslagmetdeomgevingswet.nl/publish/pages/151608/presentatie_workshop_participatie.pdf

Ministerie van infrastructuur en milieu. (2015). Omgevingswet in thema’s De stelselherziening uitgediept.

Morey, R. D., Hoekstra, R., Rouder, J. N., Lee, M. D., & Wagenmakers, E. J. (2016). The fallacy of placing confidence in confidence intervals. *Psychonomic Bulletin and Review*, *23*(1), 103–123. https://doi.org/10.3758/s13423-015-0947-8

Morgan, M. G. (2014). Use (and abuse) of expert elicitation in support of decision making for public policy. *Proceedings of the National Academy of Sciences*, *111*(20), 7176–7184. https://doi.org/10.1073/pnas.1319946111

Morgan, M. Granger, & Keith, D. W. (1995). Subjective Judgments by Climate Experts. *Environmental Science and Technology*, *29*(10), 468A-476A. https://doi.org/10.1021/es00010a003

Morgan, M Granger, Keith, D. W., & Curtright, A. E. (2008). Expert Assessments of Future Photovoltaic Technologies. *Environmental Science & Technology*, *42*(24), 9031–9038.

Motosu, M., & Maruyama, Y. (2016). Local acceptance by people with unvoiced opinions living close to a wind farm: A case study from Japan. *Energy Policy*, *91*, 362–370. https://doi.org/10.1016/j.enpol.2016.01.018

Muller, K. E., & Barton, C. N. (1989). Approximate Power for Repeated-Measures ANOVA Lacking Sphericity Approximate Power for Repeated-Measures ANOVA Lacking Sphericity. *Journal of American Statistical*

Association, *84*(June), 549–555.

Munday, M., Bristow, G., & Cowell, R. (2011). Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity? *Journal of Rural Studies*, *27*, 1–12. https://doi.org/10.1016/j.jrurstud.2010.08.003

Natuur & Milieu. (2015). Bouwtempo windmolens op land blijft achter. *Https://Www.Natuurenmilieu.Nl/Nieuwsberichten/Bouwtempo-Windmolens-Op-Land-Blijft/*, p. 1.

Nederlandse Vereniging Duurzame Energie. (2018). http://www.nvde.nl/nvdeblogs/ed-nijpels-energietransitie-is-betaalbaar/.

Nemet, G. F., Anadon, L. D., & Verdolini, E. (2017). Quantifying the Effects of Expert Selection and Elicitation Design on Experts' Confidence in Their Judgments About Future Energy Technologies. *Risk Analysis*, *37*(2), 315–330. https://doi.org/10.1111/risa.12604

NWEA. (2016). *Gedragscode Acceptatie & Participatie Windenergie op Land*. Retrieved from http://www.nwea.nl/images/PDFs/20161215-Gedragscode-Acceptatie--Participatie-Windenergie-op-Land.pdf

O'Faircheallaigh, C. (2010). Public participation and environmental impact assessment: Purposes, implications, and lessons for public policy making. *Environmental Impact Assessment Review*, *30*(1), 19–27. https://doi.org/10.1016/j.eiar.2009.05.001

Opdenakker, R. (2006). Advantages and Disadvantages of Four Interview Techniques in Qualitative Research. *Forum: Quality Social Research*, *7*(4). https://doi.org/10.1016/j.jpedsurg.2016.07.009

Oteman, M., Kooij, H. J., & Wiering, M. A. (2017). Pioneering renewable energy in an economic energy policy system: The history and development of dutch grassroots initiatives. *Sustainability*, *9*. https://doi.org/10.3390/su9040550

Parag, Y., Hamilton, J., White, V., & Hogan, B. (2013). Network approach for local and community governance of energy: The case of Oxfordshire. *Energy Policy*, *62*, 1064–1077. https://doi.org/10.1016/j.enpol.2013.06.027

Pasqualetti, M. J. (2001). Wind Energy Landscapes : Society and Technology in the California Desert. *Wind Energy*, *14*(8), 689–699.

Peer, J. R. van. (2018). *Windmill investments in the Betuwe: What is the worth of investing extra in cooperative windmill initiatives for municipalities to obtain their investment goals*.

Planbureau voor de leefomgeving. (2018). *Eindadvies basisbedragen SDE+ 2019*. Retrieved from https://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2018-eindadvies-basisbedragen-SDE-plus-2019_3342.pdf

Ploegmakers, H., & de Gooyert, V. (2018). Interview Anonymous (1).

Pruyt, E. (2004). *System Dynamics Models of Electric Wind Power*. https://doi.org/10.1016/j.cognition.2011.08.004

Razali, nornadiah M., & Yap, B. W. (2011). Power comparisons of Shapiro-Wilk , Kolmogorov-Smirnov , Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, *2*(1), 21–33. Retrieved from http://instatmy.org.my/downloads/e-jurnal 2/3.pdf

Repenning, N. P. (2002). A Simulation-Based Approach to Understanding the Dynamics of Innovation Implementation. *Organization Science*, *13*(2), 109–127. https://doi.org/10.1287/orsc.13.2.109.535

Rijksdienst voor Ondernemend Nederland. (2016). *RVO Monitor Wind op Land 2015*.

Rijksdienst voor Ondernemend Nederland. (2018a). *Monitor Wind op Land 2017*.

Rijksdienst voor Ondernemend Nederland. (2018b). *Procedures voor windenergie*.

Rogers, J. C., Simmons, E. A., Convery, I., & Weatherall, A. (2008). Public perceptions of opportunities for community-based renewable energy projects. *Energy Policy*, *36*, 4217–4226. https://doi.org/10.1016/j.enpol.2008.07.028

Sager, K. L., & Gastil, J. (2006). The origins and consequences of consensus decision making: A test of the social consensus model. *Southern Communication Journal*, *71*(1), 1–24. https://doi.org/10.1080/10417940500503464

Sahlqvist, S., Song, Y., Bull, F., Adams, E., Preston, J., & Ogilvie, D. (2011). Effect of questionnaire length, personalisation and reminder type on response rate to a complex postal survey: randomised controlled trial. *BMC Medical Research Methodology*, *11*(1). https://doi.org/10.1186/1471-2288-11-62

Snyder-duch, J., Lombard, M., & Bracken. (2002). Content Analysis in Mass Communication. *Human Communication Research*, *28*(4), 587–604. https://doi.org/10.1111/j.1468-2958.2002.tb00826.x

Sovacool, B. K., & Lakshmi Ratan, P. (2012). Conceptualizing the acceptance of wind and solar electricity. *Renewable and Sustainable Energy Reviews*, *16*, 5268–5279. https://doi.org/10.1016/j.rser.2012.04.048

Sterman, J. (2000). *Business Dynamics: Systems Thinking and modeling for a complex world*.

Sterman, J., & Dykes, K. L. (2015). Model Formulation/Documentation - Wind energy, (1).

Tejeda, J., & Ferreira, S. (2014a). Applying systems thinking to analyze wind energy sustainability. *Procedia Computer Science*, *28*(Cser), 213–220. https://doi.org/10.1016/j.procs.2014.03.027

Tejeda, J., & Ferreira, S. (2014b). Applying systems thinking to analyze wind energy sustainability. *Procedia Computer Science*, *28*, 213–220. https://doi.org/10.1016/j.procs.2014.03.027

Toke, D., Breukers, S., & Wolsink, M. (2008). Wind power deployment outcomes: How can we account for the differences? *Renewable and Sustainable Energy Reviews*, *12*, 1129–1147. https://doi.org/10.1016/j.rser.2006.10.021

Turner, B. L., Kim, H., & Andersen, D. F. (2013). RESEARCH PROBLEM Improving coding procedures for purposive text data: researchable questions for qualitative system dynamics modeling Benjamin. *System Dynamics Review*, *29*(4), 253–263.

Vennix, J. A. M. (1996). *Group Model Building: facilitating team learning using system dynamics*. *Wiley*.

Walker, G. (2008). What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy*, *36*, 4401–4405. https://doi.org/10.1016/j.enpol.2008.09.032

Walker, G. (2011). The role for "community" in carbon governance. *Wiley Interdisciplinary Reviews: Climate Change*, *2*, 777–782. https://doi.org/10.1002/wcc.137

Walker, G., & Devine-Wright, P. (2008). Community renewable energy: What should it mean? *Energy Policy*, *36*, 497–500. https://doi.org/10.1016/j.enpol.2007.10.019

Walker, W. E., Marchau, V. A. W. J., & Kwakkel, J. H. (2013). Chapter 9: Uncertainty in the Framework of Policy Analysis. In *Public Policy Analysis* (pp. 215–261). https://doi.org/10.1332/policypress/9781861349071.001.0001

Walter, G. (2014). Determining the local acceptance of wind energy projects in Switzerland: The importance of general attitudes and project characteristics. *Energy Research and Social Science*, *4*, 78–88. https://doi.org/10.1016/j.erss.2014.09.003

Warren, E. W. (2000). Policy analysis: a systematic approach to supporting policymaking in the public sector. *Journal of Multi-Criteria Decision Analysis*, *9*, 11–27. Retrieved from http://dx.doi.org/10.1002/1099-1360(200001/05)9:1/3%3C11::AID-MCDA264%3E3.0.CO;2-3

Weil, H. B. (1996). Commoditization of technology-based products and services: a generic model of market dynamics, 3887–3896. Retrieved from http://en.scientificcommons.org/730849

Westerberg, V., Jacobsen, J. B., & Lifran, R. (2013). The case for offshore wind farms, artificial reefs and sustainable tourism in the French mediterranean. *Tourism Management*, *34*, 172–183. https://doi.org/10.1016/j.tourman.2012.04.008

Wierling, A., Schwanitz, V. J., Zeiß, J. P., Bout, C., Candelise, C., Gilcrease, W., & Gregg, J. S. (2018). Statistical evidence on the role of energy cooperatives for the energy transition in European countries. *Sustainability (Switzerland)*, *10*(9). https://doi.org/10.3390/su10093339

Wilson, G. A., & Dyke, S. L. (2016). Pre- and post-installation community perceptions of wind farm projects: The case of Roskrow Barton (Cornwall, UK). *Land Use Policy*, *52*, 287–296. https://doi.org/10.1016/j.landusepol.2015.12.008

Wiser, R., Jenni, K., Seel, J., Baker, E., Hand, M., Lantz, E., & Smith, A. (2016). Expert elicitation survey on future wind energy costs. *Nature Energy*. https://doi.org/10.1038/nenergy.2016.135

Wolsink, M. (2000). Wind power and the NIMBY-myth: Institutional capacity and the limited significance of public support. *Renewable Energy*, *21*, 49–64. https://doi.org/10.1016/S0960-1481(99)00130-5

Wolsink, M. (2007). Wind power implementation: The nature of public attitudes: Equity and fairness instead of "backyard motives." *Renewable and Sustainable Energy Reviews*, *11*, 1188–1207. https://doi.org/10.1016/j.rser.2005.10.005

Wüstenhagen, R., & Menichetti, E. (2012). Strategic choices for renewable energy investment: Conceptual framework and opportunities for further research. *Energy Policy*, *40*(1), 1–10. https://doi.org/10.1016/j.enpol.2011.06.050

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. *Energy Policy*, *35*, 2683–2691. https://doi.org/10.1016/j.enpol.2006.12.001

9. Appendices

9.1. Appendix 1: Interviewees overview

TABLE 12: INTERVIEWEE CONSENT (RECORDING, TRANSCRIPT, ANONIMITY, AND CITATIONS)

Name	**Approval of recording**	**Transcript sent**	**Transcript approved**	**Citation approval**	**Anonimity**
Mirjam Roorda-Knape	Yes	Yes	Yes	Yes	No
Albert Jannsen	Yes	Yes	Yes	T.B.A.	No
Jan Willem Westra	Yes	Yes	Yes (by Albert)	N.A.	No
Maartje Pierhagen	Yes	Yes		N.A.	No
Mark Duppen	Yes	Yes		Yes	No
Anonymous 1	Yes	Yes	Yes	T.B.A.	N.A.
Gerlach Velthoven	Yes	Yes		Yes	No
Siward Zomers	Yes	Yes	Yes	Yes	No
Monique Sweep	Yes	Yes		Yes	No
Arthur Vermeulen	Yes	Yes		Yes	No
Sergej van de Bilt	Yes	Yes		Yes	No
Ineke de Jong	Yes	Yes		Yes	No
Anonymous 2	Yes	Yes		T.B.A.	N.A.
Anonymous 3	Yes	Yes		T.B.A.	N.A.
Marije Arah	Yes	yes		N.A.	No
Matthijs Oppenhuizen	Yes	yes		Yes	No
Erik van Norren	Yes	Yes		Yes	No
Geert Bosch	Yes	Yes		Yes	No
Titus Burgers	Yes			Yes	No
Rob Smit	N.A.	N.A.		Yes	No

9.2. Appendix 2: Interview intro and outro

9.2.1. Intro

Goedendag,

Ik ben Justus van Peer, master student aan de Radboud Universiteit, en onderzoeksassistent voor dr. Vincent de Gooyert en dr. Huub Ploegmakers. Allereerst zou ik U graag heel erg willen bedanken voor het vrijmaken van de tijd voor dit interview. Wij hebben vandaag afgesproken voor een interview, daarbij mijn eerste vraag, zou u het goed vinden als ik dit gesprek opneem. Dit zou mij enorm helpen met de analyse van het interview en het transcript, het zal verder anoniem blijven en niet worden verspreid.
Ik zit hier met twee doelen, enerzijds help ik met het onderzoek naar windenergie binnen de regio rivierenland vanuit het BES, anderzijds heb ik besloten om mijn master scriptie te schrijven over de energie transitie en de verschillen tussen coöperatieve bedrijven en meer institutionele investeerders. Dit gesprek heeft voor mij als doel om de wind energie markt vanuit een coöperatief perspectief beter te begrijpen. Wij hebben u gevraagd voor dit interview vanwege uw actieve rol binnen de coöperatieve energie in de regio die wij onderzoeken, en vanwege uw nauwe betrokkenheid bij de projecten vanaf de kant van de coöperaties. De dingen die wij vandaag bespreken zullen gebruikt worden voor de verbetering van een wiskundig model wat wij aan het ontwikkelen zijn over de wind energie markt binnen de regio rivierenland.
Voor het einde van de onderzoeken, zowel dat van het BES als mijn master scriptie zullen wij onze resultaten aan u

terugkoppelen. De tijdlijnen hiervoor staan nog niet volledig vast, maar wij hopen het BES onderzoek tegen Januari af te ronden, en mijn master scriptie zal ik moeten afronden voor Augustus 2019.

Voor we beginnen, heeft u nog vragen voor mij?

9.2.2. Outro

[Naam van de geïnterviewde] heel erg bedankt voor je hulp bij het verduidelijken van mijn vragen over de cooperatieve rol in de windenergie markt! Jouw hulp is van grote waarde voor de kwaliteit van ons onderzoek. Ik zal de komende week een transcript maken van het interview en de aanpassing aan de structuur van het model doorvoeren. Het zou fijn zijn als je wil controleren of ik dat gedaan heb zoals jij het bedoelde, hiervoor zal ik het in de loop van de volgende week per email sturen. Dan heb ik nog twee vragen. Ten eerste, ik wil voor mijn scriptie ook een beter beeld krijgen van hoe een wind-coöperatie werkt, zou ik jou mogen benaderen om hierover een model te bouwen? Ten tweede, voor het gehele onderzoek ben ik opzoek naar meer mensen, die mij kunnen helpen met het verbeteren van mijn kennis over de windenergie markt in de regio, zou jij mij kunnen introduceren bij 2 of 3 mensen uit jouw netwerk die mij kunnen helpen?

Nogmaals enorm bedankt voor je deelname!

9.3. Appendix 3: Interview script - General

- Introductie naam en context
- Dank voor deelname en tijd
- Doel van het onderzoek
- Doel van het interview
- Reden van selectie
- Opname
- Indien gewenst anoniem
- Mogelijkheid om vragen niet te beantwoorden
- Het gebruik van de resultaten
- Versturen transcript
- Tijdlijn onderzoek
- Email lijst

Voor we beginnen, heeft u nog vragen voor mij?

Vragen:

1. Zou je jezelf kunnen introduceren?
2. Wat voor invloed heeft het de vorm van participatie op de doorlooptijd van een energieproject? Graag zou ik de projecten waar u bij betrokken bent geweest doorlopen, en kijken naar de doorlooptijden die deze hebben behaald.

Fase	Ideefase	Bestuurlijke fase	Realisatie	Exploitatie
Inhoudelijke aspecten	Opzetten van het plan, en eventuele samen-werkingen	Structuurvisie, locatiestudie, onderzoeken, Vergunningsaanvragen, MER	Contractering, Bouw, Netwerkaansluiting	Monitoring, Verkoop energie, Uitkeren rendement

Bent u het eens met de bovenstaande categorisering?

   a. Op welke manier werd de omgeving betrokken? (procesparticipatie, financiële participatie, financiële obligaties, eigendomsparticipatie, een omgevingsfonds of een combinatie hiervan.)
   b. Wat waren positieve aspecten van dit project
   c. Wat waren uitdagingen van dit project?

3. Wat voor invloed heeft de participatievorm op de slagingskansen van een energieproject?

   a. Proces participatie
   b. Financiele participatie
   c. Eigendomsparticipatie
4. Wat voor invloed heeft de participatievorm op de doorlooptijden van een energieproject?
   a. Proces participatie
   b. Financiele participatie
   c. Eigendomsparticipatie

5. Is er een relatie tussen de slagingskansen en het lokale draagvlak voor een project?
   a. Zo ja, hoe zou je die relatie omschrijven?
6. Is er een relatie tussen de doorlooptijden en het lokale draagvlak voor een project?
   a. Zo ja, hoe zou je die relatie omschrijven?

7. Hoe vaak zijn bij uw projecten ook cooperaties betrokken? % / in aantallen
8. Wanneer/waarom ervoor gekozen om met een cooperatie samen te werken?

9. Hoe onderscheid een project met een coöperatief bedrijfsmodel zich, vanuit jouw perspectief, verschilt dat erg bij de coöperaties?
10. Welke toegevoegde waarden heeft het coöperatieve bedrijfsmodel op de projecten, verschilt dat erg per vorm van coöperaties?
11. Wat voor invloed heeft het bedrijfsmodel – Commercieel dan wel Coöperatief - op het succes van een energieproject?
12. Hoe gebruiken de wind bedrijven hun opbrengsten, is er verschil bij de verschillende projecten waarbij jij betrokken bent geweest?
13. Wat is de gemiddelde omvangen wat projecten van wind coöperaties?

- Dank voor uw hulp
- Transcript
- (evt. vervolggesprek)
- Suggesties voor andere interviewees?

9.4. Appendix 4: Interview script - Developers

- Introductie naam en context
- Dank voor deelname en tijd
- Doel van het onderzoek
- Doel van het interview
- Reden van selectie
- Opname
- Indien gewenst anoniem
- Mogelijkheid om vragen niet te beantwoorden
- Het gebruik van de resultaten
- Versturen transcript
- Tijdlijn onderzoek
- Email lijst

Voor we beginnen, heeft u nog vragen voor mij?

Vragen:

14. Zou je jezelf kunnen introduceren?
15. Wat voor invloed heeft het de vorm van participatie op de doorlooptijd van een energieproject? Graag zou ik de projecten waar u bij betrokken bent geweest doorlopen, en kijken naar de doorlooptijden die deze hebben behaald.

Fase	Ideefase	Bestuurlijke fase	Realisatie	Exploitatie
Inhoudelijke aspecten	Opzetten van het plan, en eventuele samen-werkingen	Structuurvisie, locatiestudie, onderzoeken, Vergunningsaanvragen, MER	Contractering, Bouw, Netwerkaansluiting	Monitoring, Verkoop energie, Uitkeren rendement

Bent u het eens met de bovenstaande categorisering?

Project naam	Doorlooptijd fase 1: Idee	Doorlooptijd fase 2: Bestuurlijk	Doorlooptijd fase 3: realisatie	Doorlooptijd fase 4: exploitatie	Project kenmerken: Omvang, bedrijfsmodel, bijzonderheden

a. Op welke manier werd de omgeving betrokken? (procesparticipatie, financiële participatie, financiële obligaties, eigendomsparticipatie, een omgevingsfonds of een combinatie hiervan.)
b. Wat waren positieve aspecten van dit project
c. Wat waren uitdagingen van dit project?

16. Wat voor invloed heeft de participatievorm op de slagingskansen van een energieproject?
17. Wat voor invloed heeft de participatievorm op de doorlooptijden van een energieproject?
18. Is er een relatie tussen de slagingskansen en het lokale draagvlak voor een project?
    a. Zo ja, hoe zou je die relatie omschrijven?
19. Is er een relatie tussen de doorlooptijden en het lokale draagvlak voor een project?
    a. Zo ja, hoe zou je die relatie omschrijven?

20. Hoe vaak maken jullie gebruik van financiele participatie? %
21. Waarom wordt deze vorm toegepast?
22. Wanneer wordt deze vorm toegepast?

23. Hoe vaak werkt u als project ontwikkelaar samen met een cooperatie? % / in aantallen
24. Wanneer/waarom kiest u ervoor om met een cooperatie samen te werken?

25. Hoe onderscheid een project met een coöperatief bedrijfsmodel zich, vanuit jouw perspectief, verschilt dat erg bij de coöperaties?
26. Welke toegevoegde waarden heeft het coöperatieve bedrijfsmodel op de projecten, verschilt dat erg per vorm van coöperaties?
27. Wat voor invloed heeft het bedrijfsmodel – Commercieel dan wel Coöperatief - op het succes van een energieproject?
28. Hoe gebruiken de wind bedrijven hun opbrengsten, is er verschil bij de verschillende projecten waarbij jij betrokken bent geweest?
29. Wat is de gemiddelde omvangen wat projecten van wind coöperaties?

- Dank voor uw hulp
- Transcript
- (evt. vervolggesprek)
- Suggesties voor andere interviewees?

9.5. Appendix 5: Interview script - Government employees

- Introductie naam en context
- Dank voor deelname en tijd
- Doel van het onderzoek
- Doel van het interview
- Reden van selectie
- Opname
- Indien gewenst anoniem
- Mogelijkheid om vragen niet te beantwoorden
- Het gebruik van de resultaten
- Versturen transcript
- Tijdlijn onderzoek
- Email lijst

Voor we beginnen, heeft u nog vragen voor mij?

Vragen:

30. Zou je jezelf kunnen introduceren?
31. Wat voor invloed heeft het de vorm van participatie op de doorlooptijd van een energieproject? Graag zou ik de projecten waar u bij betrokken bent geweest doorlopen, en kijken naar de doorlooptijden die deze hebben behaald.

Fase	Ideefase	Bestuurlijke fase	Realisatie	Exploitatie
Inhoudelijke aspecten	Opzetten van het plan, en eventuele samen-werkingen	Structuurvisie, locatiestudie, onderzoeken, Vergunningsaanvragen, MER	Contractering, Bouw, Netwerkaansluiting	Monitoring, Verkoop energie, Uitkeren rendement

Bent u het eens met de bovenstaande categorisering?

32. Wat voor invloed heeft de participatievorm op uw support voor energieproject?
    a. Wettelijk minimum
    b. Consultatie
    c. Beslissingsrecht
    d. Coöperatie
    e. Obligaties/aandelen
33. Denkt u dat de participatievorm op de doorlooptijden van een energieproject, zo ja wat is de impact?
    a. Wettelijk minimum
    b. Consultatie
    c. Beslissingsrecht
    d. Coöperatie
    e. Obligaties/aandelen
34. Is er een relatie tussen uw steun voor een project en het lokale draagvlak?
    a. Zo ja, hoe zou je die relatie omschrijven?
35. Is er een relatie tussen de doorlooptijden en het lokale draagvlak voor een project?
    a. Zo ja, hoe zou je die relatie omschrijven?
36. Verschilt het gebruik van de winsten bij verschillende vormen van participatie, zo ja, hoe?
37. Is het belangrijk voor uw support voor een project hoe de winsten worden geherinvesteerd?

38. Verschilt de duur dat een windmolen blijft staan volgens, als er verschillende vormen van participatie worden toegepast?
39. Is het voor uw steun van een project van belangr hoelang een windmolen blijft staan?

40. Is de omvang van een project van belang voor uw steun voor een project?
41. Verschilt de omvang van een project bij verschillende vormen van participatie?

- Dank voor uw hulp
- Transcript
- (evt. vervolggesprek)
- Suggesties voor andere interviewees?

9.6. Appendix 6: Coding comparison

TABLE 13: INTERCODER RELIABILITY

Transcript Interview Mirjam Roorda 16-01-2019_MRK.docx			
Semantic Domain:	commercial developers, community support, Cooperative participation (2), Financial participation (2), lead times...		
Code	Coder	Applied*	Units*
commercial developers			
	Justus van Peer	6	3584
	Vincent de Gooyert	11	8055
community support			
	Justus van Peer	4	6042
	Vincent de Gooyert	3	2894
Cooperative participation (2)			
	Justus van Peer	10	9410
	Vincent de Gooyert	23	22058
Financial participation (2)			
	Justus van Peer	4	4938
	Vincent de Gooyert	7	7549
lead times			
	Justus van Peer	8	5511
	Vincent de Gooyert	7	5755
participation started during initiation phase			
	Justus van Peer	0	0
	Vincent de Gooyert	4	4632
process participation			
	Justus van Peer	0	0
	Vincent de Gooyert	4	4117
Consulting participation			
	Justus van Peer	5	5348
	Vincent de Gooyert	0	0
project size			

	Justus van Peer	1	1127
	Vincent de Gooyert	2	1771
reinvestments			
	Justus van Peer	3	3042
	Vincent de Gooyert	2	2336
success chances			
	Justus van Peer	7	5034
	Vincent de Gooyert	8	6428
		Reliability Coefficient	
		Holsti Index: 51.2	
		Percent Agreement: 41.5	

9.7. Appendix 7: Survey

Start of Block: Introductie

Q1 ***Introductie*** Heel fijn dat u wilt deelnemen aan dit onderzoek! We zijn bezig met het verzamelen van inschattingen op het gebied van windenergie op land, in Nederland. Hiermee willen we de invloed verkennen van verschillende typen participatie op de slagingskansen en doorlooptijden van projecten op land. Wij schetsen een fictieve situatie en stellen u daarbij enkele vragen. Deze situatie blijft telkens hetzelfde, daarbinnen onderscheiden wij enkele vormen van participatie.

Q2 We schatten in dat de vragenlijst tussen zal rond de 20 minuten duren.

Het onderzoek focust zich op projecten die vanaf nu gaan ontwikkelen, dus is het goed mogelijk dat u zelf nog geen of weinig ervaring heeft met precies deze vorm van participatie. We vragen u bij alle vragen een zo goed mogelijke inschatting te maken. U heeft de mogelijkheid uw gekozen waarden toe te lichten.
De verantwoordelijke onderzoeker voor deze vragenlijst is Justus van Peer. Indien u vragen heeft met betrekking tot deze vragenlijst, stuur dan een email naar j.vanpeer@fm.ru.nl.

End of Block: Introductie

Start of Block: Algemene vragen

Q3 Wat is uw geslacht?

- ○ Man (1)
- ○ Vrouw (2)
- ○ Overig (3)

Q6 Wat is uw leeftijd?

20 26 31 37 42 48 53 59 64 70 75

Wat is uw leeftijd? ()	

Q4 Rollen waarin u ervaring heeft met windenergie

(meerdere opties mogelijk)

- ☐ Commercieel ontwikkelaar (1)
- ☐ Coöperatief ontwikkelaar >500 leden (2)
- ☐ Coöperatief ontwikkelaar (3)
- ☐ Adviserend (4)
- ☐ Belangen vertegenwoordiger (5)
- ☐ Overheidsmedewerker (6)
- ☐ Overige (7) _____

Q5 Vanaf wanneer bent u betrokken binnen de windenergie sector?

1985198819921995199920022005200920122016 2019

Eerste jaar actief binnen windenergie ()	

Q7 Binnen welke provincies heeft u ervaring met de ontwikkeling van windenergie projecten?

(meerdere opties mogelijk)

- ☐ Brabant (1)
- ☐ Drenthe (2)
- ☐ Flevoland (3)
- ☐ Friesland (4)
- ☐ Gelderland (5)
- ☐ Groningen (6)
- ☐ Limburg (7)
- ☐ Noord-Holland (8)
- ☐ Overijssel (9)
- ☐ Utrecht (10)
- ☐ Zeeland (11)
- ☐ Zuid-Holland (12)
- ☐ Alle provincies in Nederland (13)

End of Block: Algemene vragen

Start of Block: Casus

Q8 **De casus** Een commerciële ontwikkelaar en/of een coöperatie willen een windpark ontwikkelen. In de betreffende regio staan al enkele windmolens. Er zijn alleen plekken beschikbaar voor de bouw van windmolens in de buurt van de bebouwde kom. Sinds enkele jaren is er een duurzaamheidsvisie binnen de regio. Er is ook een windvisie opgezet, waarin een toetsingskader is opgenomen. Bij aanvang van het project, heeft u het idee dat er een meerderheid gehaald kan worden in de gemeenteraad. De lokale wethouder is een voorstander van het ontwikkelen van een windpark in de gemeente. Het college van burgemeester en wethouders lijken bij aanvang neutraal ten opzichte van een windproject te zijn. Alle partijen zijn zich er van bewust dat er energieprojecten gedaan moeten worden om de duurzaamheidsvisie te halen. Het grootste deel van de bevolking is neutraal over het plaatsen van een windpark, echter op de beschikbare locaties zijn er een paar bewoners tegen een windpark. In de omgeving heeft een

projectontwikkelaar al grondposities verworven.

Deze situatie is van toepassing op alle vragen die volgen.

End of Block: Casus

Start of Block: Vragen slagingskansen

Q9 *Hieronder beginnen de vragen over de slagingskansen van het fictieve project*

Q10 Wij maken onderscheid tussen vier vormen van participatie
Wettelijke minimum: Een commerciële ontwikkelaar volgt het wettelijk minimum. Bij deze vorm van ontwikkeling wordt er gekozen om aan de wettelijke eisen voor de project ontwikkeling te doen. Dit houdt in dat er in een lokaal dagblad informatie over de ontwikkeling en het indienen van zienswijzen wordt gegeven, tevens is er een verplichte informatie avond. Consulterende procesparticipatie: Een commerciële ontwikkelaar geeft de omgeving een consulterende rol. Bij deze vorm van ontwikkeling wordt de lokale omgeving geïnformeerd over het project en tevens wordt de lokale omgeving gevraagd om zorgen en andere belangrijke kwesties te delen. De project ontwikkelaar kan daar dan rekening mee houden. Er is geen vorm van financiële participatie. Commerciële ontwikkelaar met beslissingsrecht: Een commerciële ontwikkelaar geeft de omgeving beslissingsrecht over bepaalde keuzes in het project. Bij deze vorm wordt de lokale omgeving geïnformeerd en om raad gevraagd. Ook krijgt de lokale omgeving het recht om op bepaalde vlakken mee te beslissen, denk hierbij aan de locatie van het park, het aantal molens en de omvang van de molens. Er is geen vorm van financiële participatie. Coöperatie samen met commerciële ontwikkelaar: Een lokale coöperatie werkt samen met een commerciële ontwikkelaar. Bij deze samenwerking zijn de coöperatie en ontwikkelaar gelijkwaardige partners in het project. De coöperatie heeft nog niet eerder ontwikkeld, maar heeft een professionele houding ten opzichte van de projectontwikkelaar. Er worden binnen deze variant ook informatie avonden voor de lokale omgeving georganiseerd, hierbij wordt de bewoners ook gevraagd om hun zorgen en andere belangrijke kwesties te delen. De coöperatie en haar leden zijn eigenaar van de helft van het project en mogen hun eigen beslissingen maken (locatie, omvang, hoeveelheid van de molens, en besteding van de opbrengsten). Binnen deze variant is er voor bewoners de mogelijkheid om financieel te participeren door lid te worden van de coöperatie.

Q11 Wat is de kans dat het project uitvalt (langdurig wordt gepauzeerd) in de onderstaande fasen?

In procenten %

	Initiatief/idee fase: opzetten van het plan en indien nodig samenwerking (1)	Planologische fase: aanpassen bestemmingsplan en verstrekken vergunningen. (2)
1. Wettelijk minimum (1)		
2. Consulterende proces participatie (2)		
3.Proces participatie met beslissingsrecht (3)		
4. Coöperatie samen met commerciële ontwikkelaar (4)		

Q21 Licht uw gekozen inschattingen toe:

_____

_____

_____

_____

_____

End of Block: Vragen slagingskansen

Start of Block: Vragen doorlooptijden

Q14 Hieronder beginnen de vragen over de doorlooptijden van het fictieve project

Q13 Hoeveel maanden doet het project over het doorlopen van de onderstaande fasen? Neem hierbij aan dat het project niet uitvalt (langdurig gepauzeerd wordt).

De doorlooptijd wordt gemeten in maanden

	Initiatief/idee fase: opzetten van het plan en indien nodig samenwerking (1)	Planologische fase: aanpassen bestemmingsplan, en verstrekken vergunningen (2)	Voorbereiding en bouw: netwerk aansluiting, contractering en bouw (3)
1. Wettelijk minimum (1)			
2. Consulterende proces participatie (2)			
3. Proces participatie met beslissingsrecht (3)			
4. Coöperatie samen met commerciële ontwikkelaar (4)			

Q22 Licht uw gekozen inschattingen toe:

_____

Q18 Hoeveel jaar verwacht u dat een project wat nu begint met de ontwikkeling, energie zal leveren?

De exploitatie tijd wordt gemeten in jaren

	Exploitatie: monitoring, levering energie en uitkeren van de winst (1)
1. Wettelijk minimum (1)	
2. Consulterende proces participatie (2)	
3. Proces participatie met beslissingsrecht (3)	
4. Coöperatie samen met commerciële ontwikkelaar (4)	

Q23 Licht uw gekozen inschattingen toe:

_____

_____

_____

_____

_____

End of Block: Vragen doorlooptijden

Start of Block: Vragen herinvestering van de winst

Q19 Hieronder beginnen de vragen over de herinvestering van het fictieve project

Q20 Hoeveel rendement op het eigen vermogen denkt u dat het totale project maakt per jaar dat het draait?

In het geval een een samenwerking gaat het over het projectrendement op het eigen vermogen van de coöperatie en de ontwikkelaar samen. Idem dito voor de herinvestering.

De percentages voor de risico opslag en herinvestering en het buurtfonds hoeven samen geen 100% te zijn i.v.m. de overige kosten development kosten, en kosten van het vermogen.

	Hoeveel % rendement op eigen vermogen maakt het project per jaar? (1)	Welk gedeelte van het rendement op eigen vermogen wordt er geherinvesteerd in Nederlandse wind ? (Inclusief de risico opslag) (2)	Welk gedeelte van het rendement op eigen vermogen wordt er ingelegd in een buurtfonds? (4)
1. Wettelijk minimum (1)			
2. Consulterende proces participatie (2)			
3. Proces participatie met beslissingsrecht (3)			
4. Coöperatie samen met commerciële ontwikkelaar (4)			

Q25 Licht uw gekozen inschattingen toe:

_____

_____

_____

_____

_____

End of Block: Vragen herinvestering van de winst

Start of Block: Vraag huub

Q31 Bent u betrokken/heeft u kennis van projecten waarbij één van de onderstaande vormen van proces participatie is gebruikt? Zo ja, wat waren de projectnamen en gemeenten waar deze projecten plaats vonden?

(meerdere opties mogelijk)

☐ Consulterende proces participatie (3) _____

☐ Proces participatie met beslissingsrecht (4)

_____

End of Block: Vraag huub

Start of Block: Slot

Q30 Graag willen wij u op de hoogte houden van het onderzoek. Daarnaast zouden wij graag de mogelijkheid hebben om contact met u op te nemen, in verband met mogelijke vervolg vragen. Als u hiermee akkoord gaat, vul dan hieronder uw e-mailadres in:

_____

_____

_____

_____

_____

Q26 U kunt ervoor kiezen om anoniem deel te nemen door de onderstaande box aan te klikken.

○ Anoniem (1)

○ Niet anoniem (2)

Q27 Indien niet anoniem

Wat is uw naam?

_____

_____

_____

_____

_____

Q28 Wat is de naam van de organsatie waar u werkt?

_____

_____

_____

_____

_____

End of Block: Slot

9.8. Appendix 8: Improvements based on survey pilots

TABLE 14: CHANGES SUGGESTED IN THE PILOTS

Comment	Pilot respondent	Implemented
Provide an opportunity to share your results	Luc van Peer	Yes
Note that the survey is based on a fictive case	Luc van Peer	Yes
Change "no experience" to "little to no experience"	Luc van Peer	Yes
Remove the little block "done"	Luc van Peer	Yes
Make sure the names of the participation options is consistent throughout the survey	Luc van Peer	Yes
To avoid confusion, do not name all the possible ways of participation	Luc van Peer	Yes
Schaling for lead times should be in 12 months, so it easy to convert to years.	Luc van Peer	Yes
Don't use the 90% bandwith of certainty, it is confusing, and a lot of work	Luc van Peer	Yes
Explain the phases you disinguish	Luc van Peer	Yes
Profit percentages might prove troublesome to estimate due to external factors and the fact that it is one project	Luc van Peer	Yes

Use the word reinvestment in your question	Luc van Peer	Yes
Remember the respondent about what they are answering the question on every page.	Luc van Peer	Yes
The percentage scale from 0-100 is too detailed and hard to use	Luc van Peer	Yes
Ask about anonymity at the end of the survey, when the respondents know what you have asked for	Sergej van de Bilt	Yes
Add a note stating that multiple answer can be given at certain questions.	Sergej van de Bilt	Yes
Reconsider which forms you need to ask for. There is a lot of overlap between informing process participation and consulting participation.	Sergej van de Bilt	Yes
Provide insight in how the forms of participation you research rate on the total scale.	Sergej van de Bilt	No
Note when in the development the opinions of the municipal council are neutral, this varies massively.	Sergej van de Bilt	Yes
You provide a lot of information, it has hard to remember all of it. Try to shorten the introduction	Sergej van de Bilt	Yes
The question about which forms you would use in this case is hard to answer. Often the this changes during a project	Sergej van de Bilt	Deleted
Be clear in how you describe empowerment, the wording you have currently used is confusion to developers.	Sergej van de Bilt	Yes
The wording of success chances leaves much to interpret, as something can move one without being a success. Either give a definition or ask for the failure rate.	Sergej van de Bilt	Yes, failure rate.
Describe the phasing in the question as well to remind the respondend	Sergej van de Bilt	Yes
Reinvestment of PROFITS it difficult to answer	Sergej van de Bilt	Yes, changed to ROE.
Your current way of asking the questions takes long, and I cannot anchor my answers to oneanother, making it even slower. Consider if you can and want to ask the questions in the page.	Sergej van de Bilt	Yes
Consider shortening the survey, it is too long, we couldn't finish.	Sergej van de Bilt	Yes, combined with previous point down to 25 questions from 69
Reconsider if the survey asks about the 90% range of certainty	Sergej van de Bilt	Yes, deleted
Reconsider if the survey asks about the 90% range of certainty	Vincent de Gooyert and Huub Ploegmakers	Yes, deleted
Don't use the word 'experts' people might not consider themselves experts in this area.	Vincent de Gooyert	Yes
Note that you are only interested in Dutch wind energy developments	Vincent de Gooyert	Yes

Note that we follow this timeline with the fictive case.	Vincent de Gooyert	Yes
Be careful of noting which particular region you are interested in, this can influence respondents in their believe if they can make estimates.	Vincent de Gooyert	Yes, areas in the Netherlands with a low density of windfarms
Give respondents the opportunity to justify why they provided certain answers.	Vincent de Gooyert	Yes
Provide on option, experience in every Dutch province	Anne-Marieke Schwencke	Yes
Don't describe who does what in the partnership between Cooperative and commercial developer	Anne-Marieke Schwencke	Yes, removed
Add to the case that there are a wind vision, there are available locations, and there is a compliance document with requirements for a project	Anne-Marieke Schwencke	Yes
They are not changing policy, they are changing the zoning plan.	Anne-Marieke Schwencke	Yes
Note that the lead times are in months.	Anne-Marieke Schwencke	Yes
Ask about ROE not the profit. They use this in the SDE	Anne-Marieke Schwencke	Yes
Textual improvements	Luc van Peer, Vincent de Gooyert, Huub Ploegmakers, Sergej van de Bilt, Marieke Schwencke	Yes

9.9. Appendix 9: Shared data

9.10. Appendix 10: Survey sample descriptives

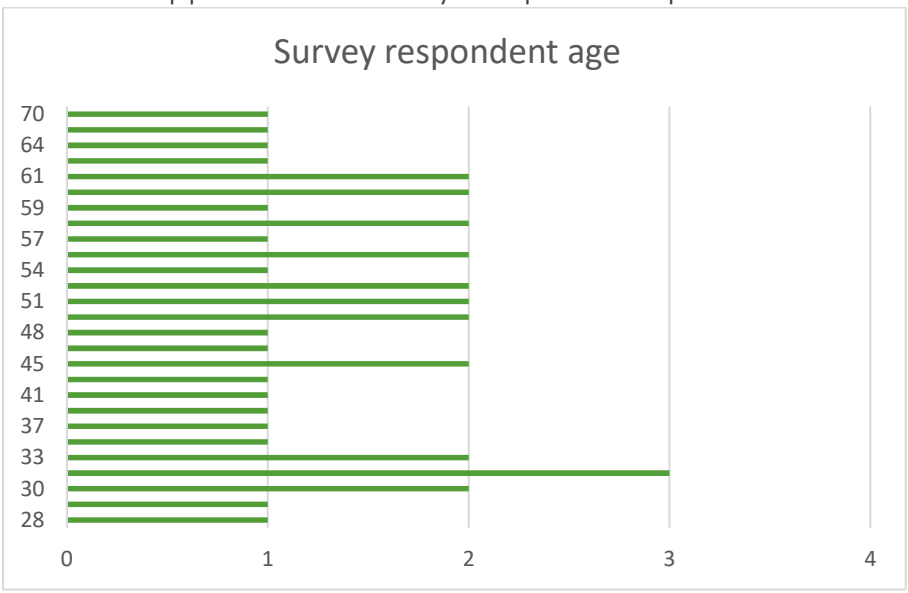


FIGURE 13: AGES OF THE SURVEY RESPONDENTS

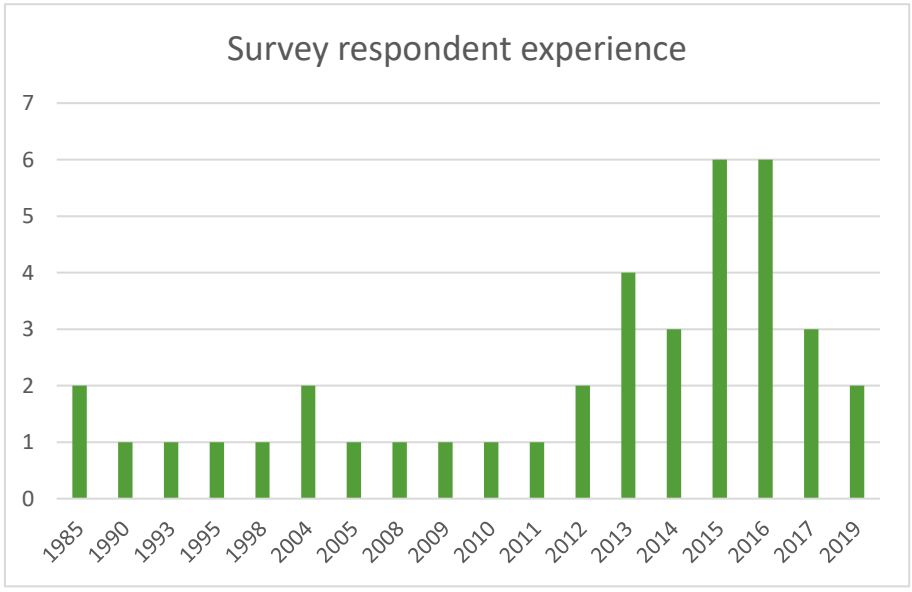


FIGURE 13: FIRST YEAR OF WORK IN WIND ENERGY (RESPONDENTS' EXPERIENCE)

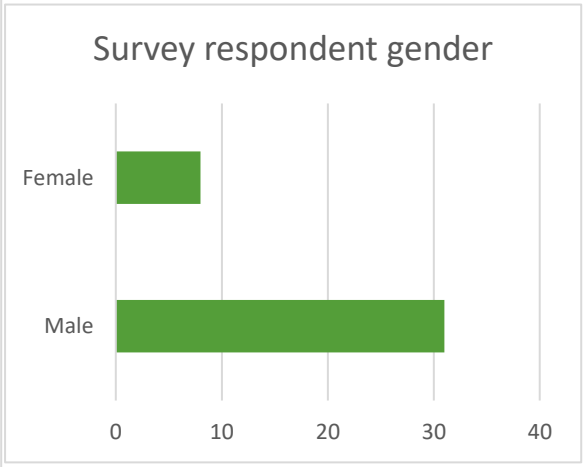


FIGURE 15: GENDER DISTRIBUTION SURVEY RESPONDENTS

9.11. Appendix 11: Correlation matrices

In checking the correlation of variables, the study compared the correlation values for the answers per variables for each of the different forms of participation identified in the survey. As expected, the correlations to the closest form(s) are usually quite high; it becomes smaller with more different forms. This tendency shows for all the variables. Generally, the correlations are quite high; this could be an indication that the forms do not have a substantial impact on the responses. The rest of this appendix contains the correlations matrices.

```
. correlate FRLM FRPC FRPE FRCC
(obs=39)
```

	FRLM	FRPC	FRPE	FRCC
FRLM	1.0000			
FRPC	0.8674	1.0000		
FRPE	0.5342	0.7760	1.0000	
FRCC	0.1167	0.3043	0.6140	1.0000

FIGURE 14: CORRELATION MATRIX FAILURE RATES

```
. correlate PLLM PLPC PLPE PLCC
(obs=30)
```

	PLLM	PLPC	PLPE	PLCC
PLLM	1.0000			
PLPC	0.8009	1.0000		
PLPE	0.7596	0.9594	1.0000	
PLCC	0.6558	0.9030	0.9717	1.0000

FIGURE 15: CORRELATINO MATRIX - PROJECT LEAD TIMES

```
. correlate PTLM PTPC PTPE PTCC
(obs=16)
```

	PTLM	PTPC	PTPE	PTCC
PTLM	1.0000			
PTPC	1.0000	1.0000		
PTPE	0.9688	0.9688	1.0000	
PTCC	0.9406	0.9406	0.9710	1.0000

FIGURE 16: CORRELATION MATRIX - CONSTRUCTION TIME

```
. correlate ROELM ROEPC ROEPE ROECC
(obs=14)
```

	ROELM	ROEPC	ROEPE	ROECC
ROELM	1.0000			
ROEPC	0.8683	1.0000		
ROEPE	0.6625	0.8031	1.0000	
ROECC	0.4603	0.5939	0.9269	1.0000

FIGURE 17: CORRELATION MATRIX - RETURN ON EQUITY

```
. correlate RNPLM RNPPC RNPPE RNPCC
(obs=10)
```

	RNPLM	RNPPC	RNPPE	RNPCC
RNPLM	1.0000			
RNPPC	0.9752	1.0000		
RNPPE	0.9294	0.9569	1.0000	
RNPCC	0.3275	0.3933	0.4703	1.0000

FIGURE 18: CORRELATION MATRIX - REINVESTMENT IN NEW PROJECTS

```
. correlate RLELM RLEPC RLEPE RLECC
(obs=10)
```

	RLELM	RLEPC	RLEPE	RLECC
RLELM	1.0000			
RLEPC	0.9548	1.0000		
RLEPE	0.8867	0.9795	1.0000	
RLECC	0.6987	0.8218	0.8543	1.0000

FIGURE 19: CORRELATION MATRIX - REINVESTMENT IN THE LOCAL ENVIRONMENT

9.12. Appendix 12: Normality test output

Normality refers to the distribution of answers to a sample. In testing the normality of the sample, this study utilises the Sharipo-Wilk statistic. This statistic has a particular strength for estimating the normality of small samples (<50).

TABLE 15: KEY OUTCOMES NORMALITY TEST

Variable name	**Score Shapiro-Wilk Statistic (Prob>z)**	**Normally distributed**
Failure rate idea phase	0.05	Yes
Failure rate urban planning phase	0.03	No
Duration idea phase	0	No
Duration urban planning phase	0	No
Duration construction phase	0	No

All but one sample of answers from the survey questions, which had a sizeable enough sample, do not satisfy the conditions for normal distribution. The lack of normality in the distribution of the samples limits the application of statistical tests to the survey data. It has no impact on the validity of the data for this study. Statistical tests could be run on the failure rate idea phase. This study chooses not to do this, as it would lack meaning without other variables to compare the results too. Furthermore, it is not a necessity for the analysis this study does on the data. Appendix 13 shows the results of the normality tests.

```
Shapiro-Wilk W test for normal data
```

Variable	Obs	W	V	z	Prob>z
FRIP	156	0.98336	2.002	1.577	0.05739
FRUP	156	0.98124	2.258	1.850	0.03215

FIGURE 20: OUTPUT SHAPIRO-WILK TEST - FAILURE RATES

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
IT	120	0.66337	32.393	7.792	0.00000
UPT	120	0.76786	22.338	6.959	0.00000
CT	120	0.70858	28.043	7.469	0.00000

FIGURE 21: OUTPUT SHAPIRO-WILK TEST – DURATONI OF THE PHASES

9.13. Appendix 13: Sphericity test output

Sphericity is the condition where the variances of the differences between the combinations each respondent's answers are equal when the condition satisfied the variances between the combinations of the respondents differ.

TABLE 16: KEY OUTCOME SPHERICITY TEST

Variable name	**Score Mauchly statistic (Mauchly's W)**	**Sphericity condition approximated y/n**
Failure rate idea phase	0.1456	No
Failure rate urban planning phase	0.2001	No
Duration idea phase	0.0561	No
Duration urban planning phase	0.0585	No
Duration construction phase	0.0015	No

The results from the survey questions, which had a sizeable enough sample, do not satisfy the conditions of sphericity. The lack of normality in the distribution of the samples limits the application of statistical tests, particularly ANOVA regressions, to the survey data. It has no impact on the validity of the data for this study. This appendix shows the results of the sphericity tests.

Mauchly's W.	Chi2.	d.f.	P-value.	Epsilon_gg.	Epsilon_ff.	Lower-bound
0.1456	70.7598	5	0	0.4878	0.5024	0.3333

FIGURE 22: MAUCHLY TEST - FAILURE RATE IDEA PHASE

Mauchly's W.	Chi2.	d.f.	P-value.	Epsilon_gg.	Epsilon_ff.	Lower-bound
0.2001	59.0838	5	0	0.5119	0.5292	0.3333

FIGURE 23: MAUCHLY TEST - FAILURE RATE URBAN PLANNING PHASE

Mauchly's W.	Chi2.	d.f.	P-value.	Epsilon_gg.	Epsilon_ff.	Lower-bound
0.0561	79.8572	5	0	0.4719	0.4891	0.3333

FIGURE 24: MAUCHLY TEST - DURATION IDEA PHASE

Mauchly's W.	Chi2.	d.f.	P-value.	Epsilon_gg.	Epsilon_ff.	Lower-bound
0.0585	78.6959	5	0	0.5034	0.5251	0.3333

FIGURE 25: MAUCHLY TEST - DURATION URBAN PLANNING PHASE

Mauchly's W.	Chi2.	d.f.	P-value.	Epsilon_gg.	Epsilon_ff.	Lower-bound
0.0015	180.2579	5	0	0.3474	0.3489	0.3333

FIGURE 26: MAUCHLY TEST - DURATION CONSTRUCTION PHASE

9.14. Appendix 14: Statistical syntax

```
import excel "C:\Users\justu\Dropbox\BES MT Justus\Survey\Definitive survey results V0.2.xlsx", sheet("Raw data") firstrow clear

* Overview and correlation Failure rates

summarize FRLM FRPC FRPE FRCC

tabulate FRLM

tabulate FRPC

tabulate FRPE

tabulate FRCC


correlate FRLM FRPC FRPE FRCC


* Overview and correlation Project lead times

summarize PLLM PLPC PLPE PLCC

tabulate PLLM

tabulate PLPC

tabulate PLPE

tabulate PLCC


correlate PLLM PLPC PLPE PLCC


* Overview and correlation Project lead times

summarize PTLM PTPC PTPE PTCC

tabulate PTLM

tabulate PTPC

tabulate PTPE

tabulate PTCC


correlate PTLM PTPC PTPE PTCC


* Overview and correlation ROE

summarize ROELM       ROEPC ROEPE ROECC

tabulate ROELM
```

```
tabulate ROEPC
tabulate ROEPE
tabulate ROECC

correlate ROELM         ROEPC ROEPE ROECC

* Overview and correlation RNP
summarize RNPLM       RNPPC RNPPE RNPCC
tabulate RNPLM
tabulate RNPPC
tabulate RNPPE
tabulate RNPCC

correlate RNPLM         RNPPC RNPPE RNPCC

* Overview and correlation RLE
summarize RLELM       RLEPC RLEPE RLECC
tabulate RLELM
tabulate RLEPC
tabulate RLEPE
tabulate RLECC

correlate RLELM         RLEPC RLEPE RLECC

*using a sheet with different ordering of the data
*FRIP = Failure Rate Idea Phase
*FRUP = Failure Rate Urban Planning Phase
*ID = respondent ID
*PF = participation form
import excel "C:\Users\justu\Dropbox\BES MT Justus\Survey\Definitive survey results V0.2.xlsx", sheet("Anova")
firstrow clear

swilk FRIP FRUP
xtset ID
mauchly FRIP, m(PF)
mauchly FRUP, m(PF)

*IT = time idea time
```

*UPT = urban planning time

*CT = construction time

```
import excel "C:\Users\justu\Dropbox\BES MT Justus\Survey\Definitive survey results V0.2.xlsx", sheet("Anova2")
firstrow clear


swilk IT UPT CT

xtset ID1

mauchly IT, m(PF1)

mauchly UPT, m(PF1)

mauchly CT, m(PF1)
```

9.15. Appendix 15: SFD

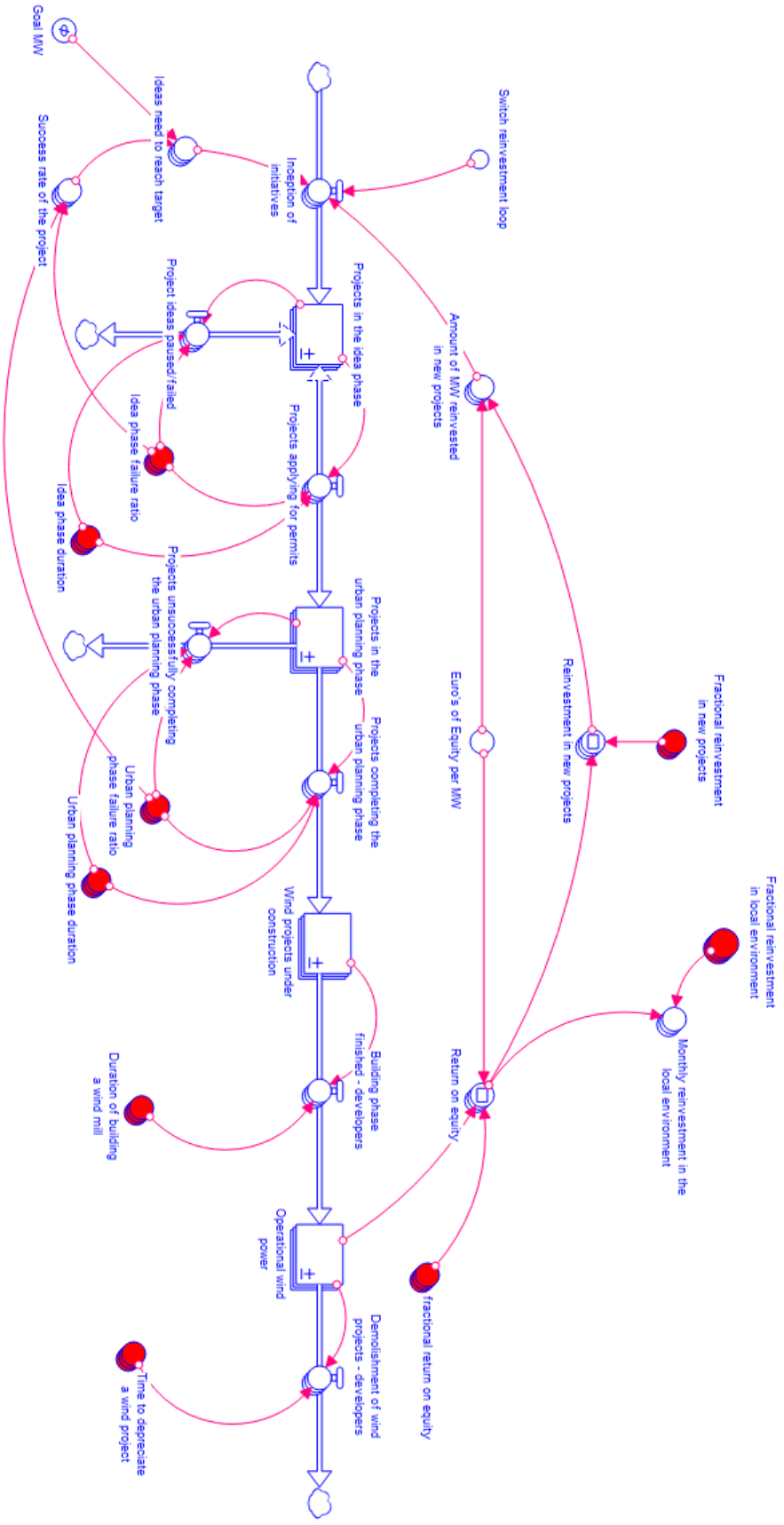


FIGURE 16: STOCK AND FLOW DIAGRAM (FIRST ORDER DELAY)

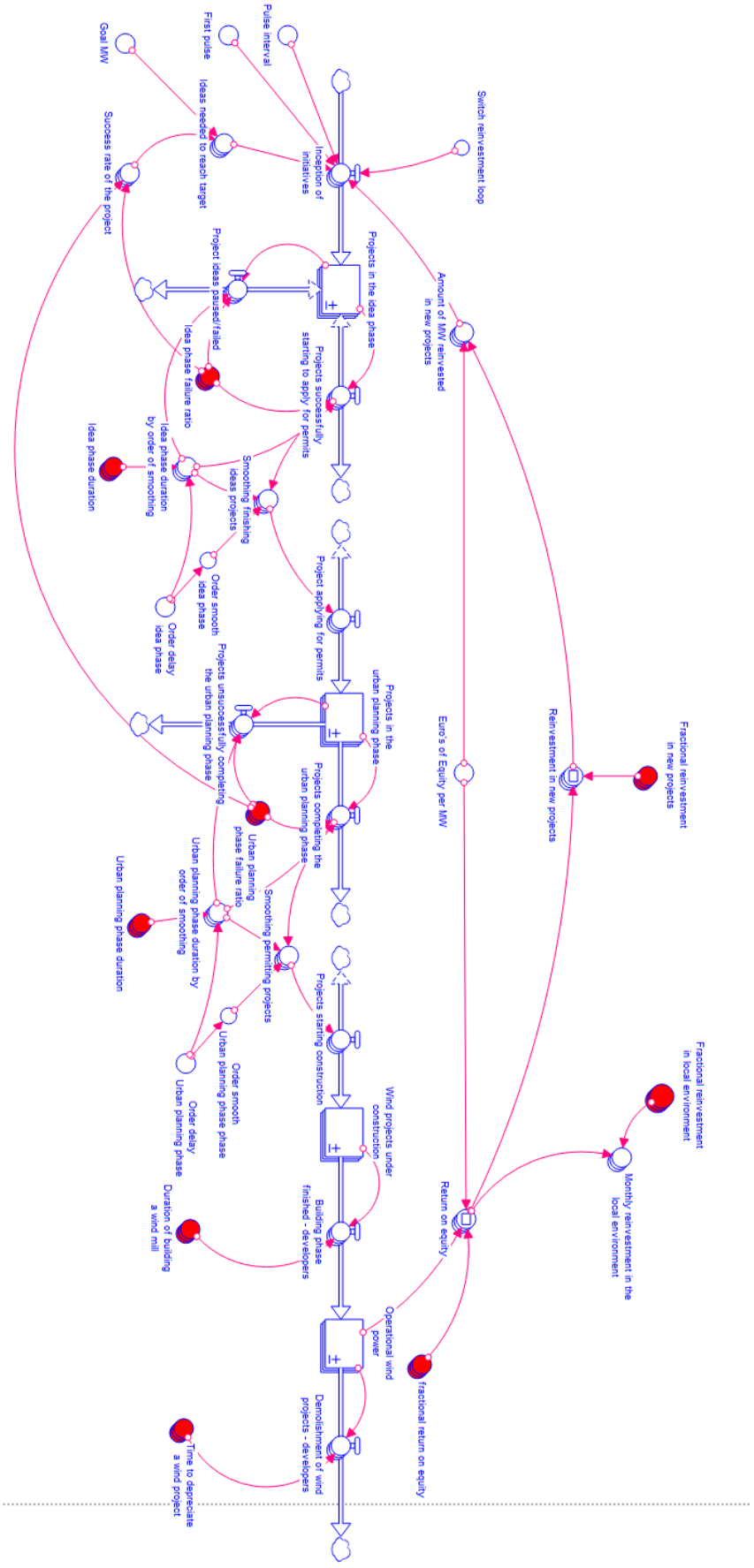


FIGURE 17: STOCK AND FLOW DIAGRAM (HIGHER ORDER DELAY)

9.16. Appendix 16: Model documentation

TABLE 17: MODEL DOCUMENTATION

Variable name + equation	Unit	Sources
The model was run in arrayed fashion for the scenario analysis, all the equations have can be based on the 9 input variables.		
Operational_wind_power[Sort_of_participation](t) = Operational_wind_power[Sort_of_participation](t - dt) + ("Building_phase_finished_-_developers"[Sort_of_participation] - "Demolishment_of_wind_projects_-_developers"[Sort_of_participation]) * dt INIT Operational_wind_power[Sort_of_participation] = 0.001	MW	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
"Building_phase_finished_-_developers"[Sort_of_participation] = Wind_projects_under_construction[Legal_minimum_normal]/Duration_of_building_a_wind_mill[Legal_minimum_normal] {UNIFLOW}	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
"Demolishment_of_wind_projects_-_developers"[Sort_of_participation] = Operational_wind_power[Legal_minimum_normal]/Time_to_depreciate_a_wind_project[Legal_minimum_normal] {UNIFLOW}	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Projects_in_the_idea_phase[Sort_of_participation](t) = Projects_in_the_idea_phase[Sort_of_participation](t - dt) + (Inception_of_initiatives[Sort_of_participation] - Projects_successfully_starting_to_apply_for_permits[Sort_of_participation] - "Project_ideas_paused/failed"[Sort_of_participation]) * dt INIT Projects_in_the_idea_phase[Sort_of_participation] = 0	MW	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Inception_of_initiatives[Sort_of_participation] = PULSE(Ideas_needed_to_reach_target[Legal_minimum_normal], First_pulse, Pulse_interval)+Amount_of_MW_reinvested_in_new_projects[Legal_minimum_normal]*Switch_reinvestment_loop {UNIFLOW}	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Projects_successfully_starting_to_apply_for_permits[Sort_of_participation] = (Projects_in_the_idea_phase[Legal_minimum_normal]*(1-Idea_phase_failure_ratio[Legal_minimum_normal]))/Idea_phase_duration_by_order_of_smoothing[Legal_minimum_normal]	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
"Project_ideas_paused/failed"[Sort_of_participation] = (Projects_in_the_idea_phase[Legal_minimum_normal]*(Idea_phase_failure_ratio[Legal_minimum_normal]))/Idea_phase_duration_by_order_of_smoothing[Legal_minimum_normal]	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Projects_in_the_urban_planning_phase[Sort_of_participation](t) = Projects_in_the_urban_planning_phase[Sort_of_participatio	MW	(Rijksdienst voor Ondernemend

n](t - dt) + (Project_applying_for_permits[Sort_of_participation] - Projects_completing_the_urban_planning_phase[Sort_of_participation] - Projects_unsuccessfully_completing_the_urban_planning_phase[Sort_of_participation]) * dt INIT Projects_in_the_urban_planning_phase[Sort_of_participation] = 0.001		Nederland, 2016) and interviews
Project_applying_for_permits[Sort_of_participation] = Smoothing_finishing_ideas_projects[Legal_minimum_normal]	MW/Months	(Sterman, 2000)
Projects_completing_the_urban_planning_phase[Sort_of_participation] = ((Projects_in_the_urban_planning_phase[Legal_minimum_normal]*(1-Urban_planning_phase_failure_ratio[Legal_minimum_normal]))/Urban_planning_phase_duration_by_order_of_smoothing[Legal_minimum_normal]) {UNIFLOW}	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Projects_unsuccessfully_completing_the_urban_planning_phase[Sort_of_participation] = ((Projects_in_the_urban_planning_phase[Legal_minimum_normal]*(Urban_planning_phase_failure_ratio[Legal_minimum_normal]))/Urban_planning_phase_duration_by_order_of_smoothing[Legal_minimum_normal]) {UNIFLOW}	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Wind_projects_under_construction[Sort_of_participation](t) = Wind_projects_under_construction[Sort_of_participation](t - dt) + (Projects_starting_construction[Sort_of_participation] - "Building_phase_finished_-_developers"[Sort_of_participation]) * dt INIT Wind_projects_under_construction[Sort_of_participation] = 0.001	MW	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Projects_starting_construction[Sort_of_participation] = Smoothing_permitting_projects[Legal_minimum_normal]	MW/Months	(Sterman, 2000)
"Building_phase_finished_-_developers"[Sort_of_participation] = Wind_projects_under_construction[Legal_minimum_normal]/Duration_of_building_a_wind_mill[Legal_minimum_normal] {UNIFLOW}	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Amount_of_MW_reinvested_in_new_projects[Sort_of_participation] = Reinvestment_in_new_projects[Legal_minimum_normal]/Euro's_of_Equity_per_MW	MW/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Duration_of_building_a_wind_mill[Legal_minimum_normal] = 16.6429	Months	Survey
Euro's_of_Equity_per_MW = 1200000*.2	Euros/MW	1 MW costs approx 1,2 million euro, the

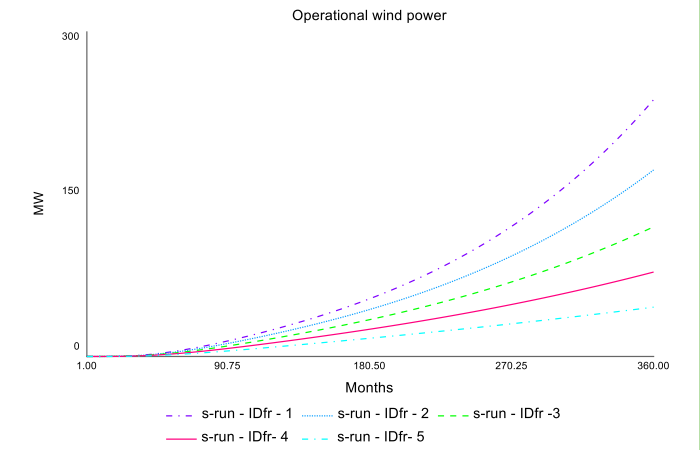
		company equity investment in a single mill usually is 20%. Leading to an own equity investment of 240000 euros. This is based on Eindadvies Basisbedragen SDE+ 2018 (Planbureau voor de leefomgeving, 2018)
First_pulse = 1	Months	
Fractional_reinvestment_in_local_environment[Legal_minimum_normal] = 0.04111/12	1	Survey
Fractional_reinvestment_in_new_projects[Legal_minimum_normal] = .527778/12	1	Survey
fractional_return_on_equity[Legal_minimum_normal] = 0.115714/12	1/Months	Survey
Goal_MW = 50	MW	Interview 1
Idea_phase_duration[Legal_minimum_normal] = 15.8571	Months	Survey
Idea_phase_duration_by_order_of_smoothing[Sort_of_participation] = Idea_phase_duration[Legal_minimum_normal]/Order_delay_idea_phase	Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Idea_phase_failure_ratio[Sort_of_participation] = 0.531538	1	Survey
Ideas_needed_to_reach_target[Sort_of_participation] = Goal_MW/Success_rate_of_the_project[Legal_minimum_normal]	MW	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Monthly_reinvestment_in_the_local_environment[Sort_of_participation] = Return_on_equity[Legal_minimum_normal]*Fractional_reinvestment_in_local_environment[Legal_minimum_normal]	Euros/Months	(Sterman, 2000)
Order_delay_idea_phase = 3	1	(Rijksdienst voor Ondernemend Nederland, 2016)
Order_delay_Urban_planning_phase = 5	1	(Rijksdienst voor Ondernemend Nederland, 2016)
Order_smooth_idea_phase = Order_delay_idea_phase-1	1	
Order_smooth_Urban_planning_phase_phase = Order_delay_Urban_planning_phase-1	1	
Pulse_interval = 10000	Months	
Reinvestment_in_new_projects[Sort_of_participation] = SMTH1(Return_on_equity[Legal_minimum_normal]*Fractional_reinvestment_in_new_projects[Legal_minimum_normal], 12, 0)	Euros/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews

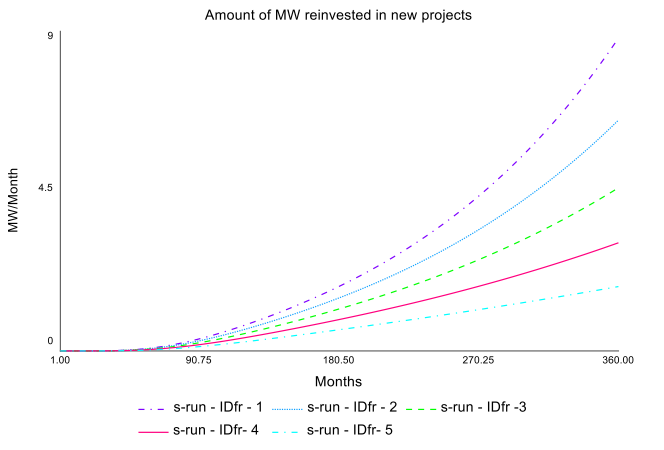
Return_on_equity[Sort_of_participation] = SMTH1(Operational_wind_power[Legal_minimum_normal]* Euro's_of_Equity_per_MW*fractional_return_on_equity[Legal_minimum_normal], 12, 0)	Euros/Months	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Smoothing_finishing_ideas_projects[Sort_of_participation] = SMTHN(Projects_successfully_starting_to_apply_for_permits[Legal_minimum_normal], Idea_phase_duration_by_order_of_smoothing[Legal_minimum_normal], Order_smooth_idea_phase)	MW/Months	(Sterman, 2000)
Smoothing_permitting_projects[Sort_of_participation] = SMTHN(Projects_completing_the_urban_planning_phase[Legal_minimum_normal], Urban_planning_phase_duration_by_order_of_smoothing[Legal_minimum_normal], Order_smooth_Urban_planning_phase_phase)	MW/Months	(Sterman, 2000)
Success_rate_of_the_project[Sort_of_participation] = (1-Idea_phase_failure_ratio[Legal_minimum_normal])*(1-Urban_planning_phase_failure_ratio[Legal_minimum_normal])	1	(Rijksdienst voor Ondernemend Nederland, 2016) and interviews
Switch_reinvestment_loop = 1	1	(Sterman, 2000)
Time_to_depreciate_a_wind_project[Legal_minimum_normal] = 272.733	Months	Survey
Urban_planning_phase_duration[Legal_minimum_normal] = 32.5	Months	Survey
Urban_planning_phase_duration_by_order_of_smoothing[Sort_of_participation] = Urban_planning_phase_duration[Legal_minimum_normal]/ Order_delay_Urban_planning_phase	Months	(Sterman, 2000)
Urban_planning_phase_failure_ratio[Legal_minimum_normal] = 0.645128	1	Survey

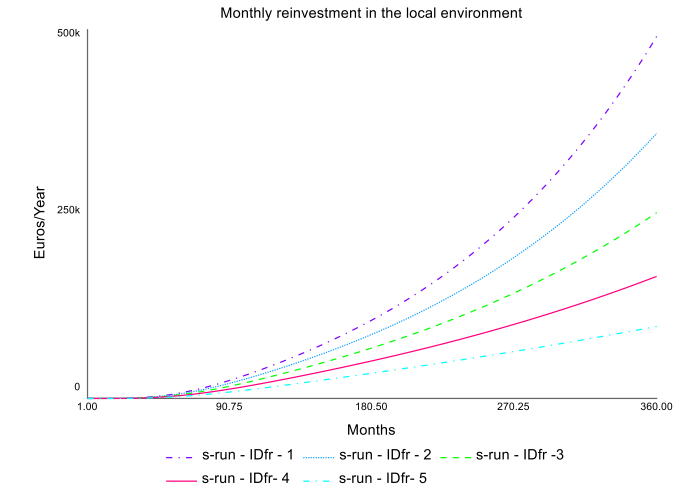
9.17. Appendix 17: Sensitivity analysis

TABLE 5: SENSITIVITY ANALYSIS BY VARIABLE

Sensitivity analysis – Idea phase failure ratio

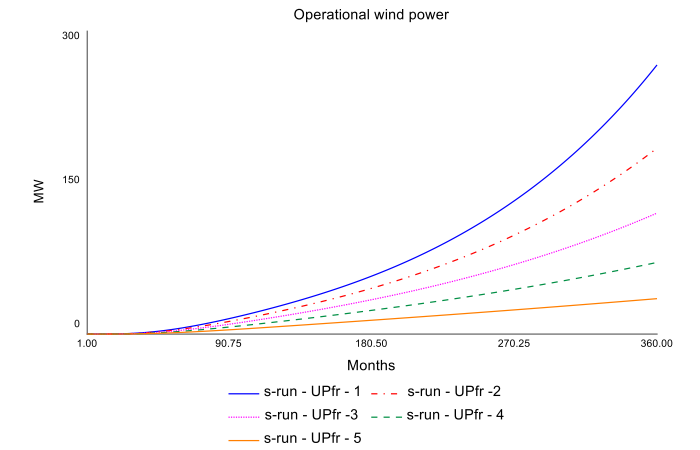


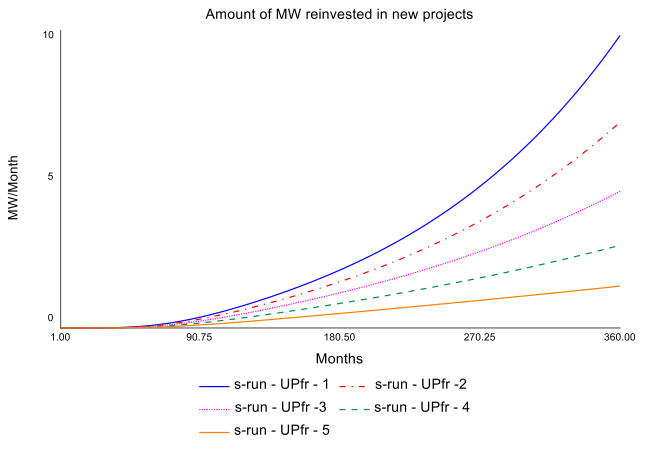


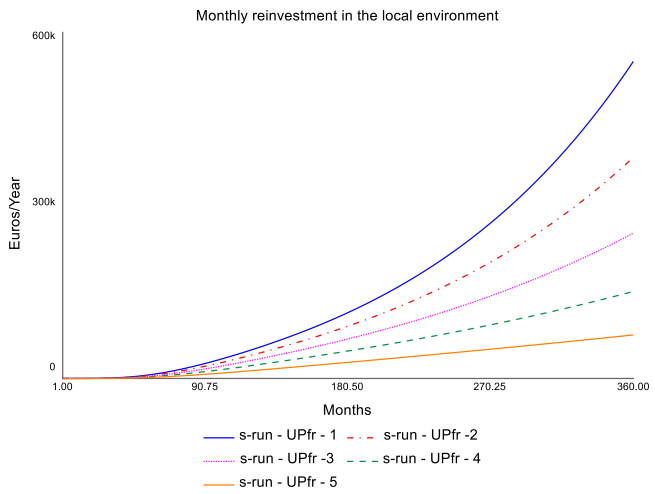


The model shows to be highly sensitive to changes in the failure rate of projects during the idea phase. There is a remarkably sizable variance between the lower bound, mean, and upper bound outcomes. The amount of MW reinvested in new projects per year, grows larger and larger. Logically the reinvestment in the local environment correspondents to the amount of wind power installed.

Sensitivity analysis – Urban planning phase failure ratio

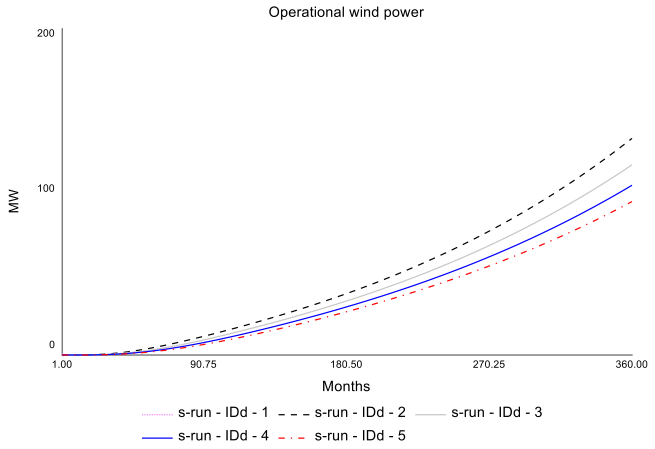


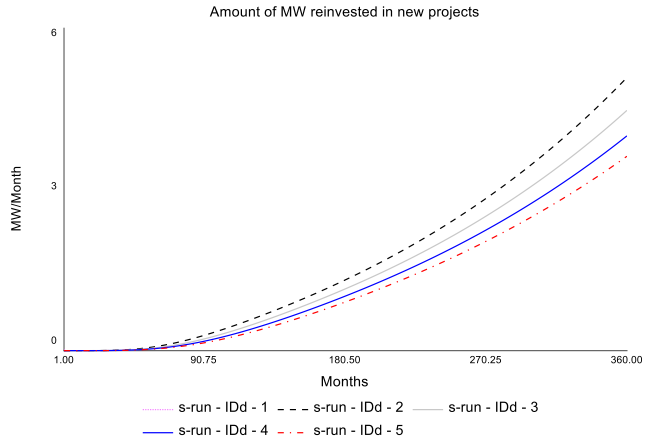


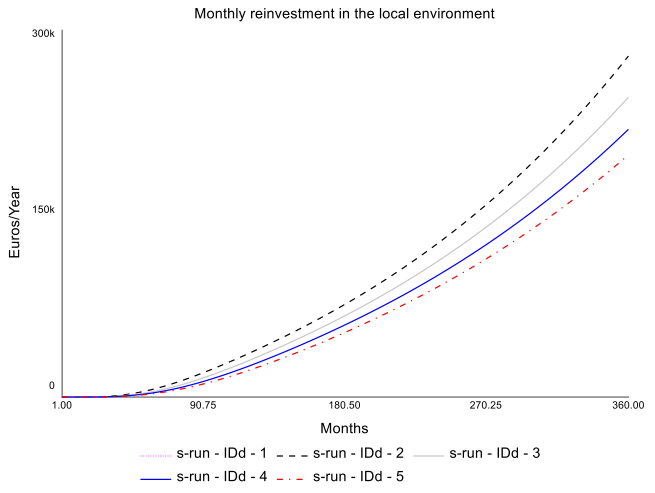


Similar to the failure rate in the idea phase, the model shows to be highly sensitive to changes in the failure rate of projects during the urban planning phase. There is a remarkably sizable variance between the lower bound, mean, and upper bound outcomes. The amount of MW reinvested in new projects per year, grows larger and larger. The reinvestment in the local environment correspondents to the amount of wind power installed.

Sensitivity analysis – Idea phase duration

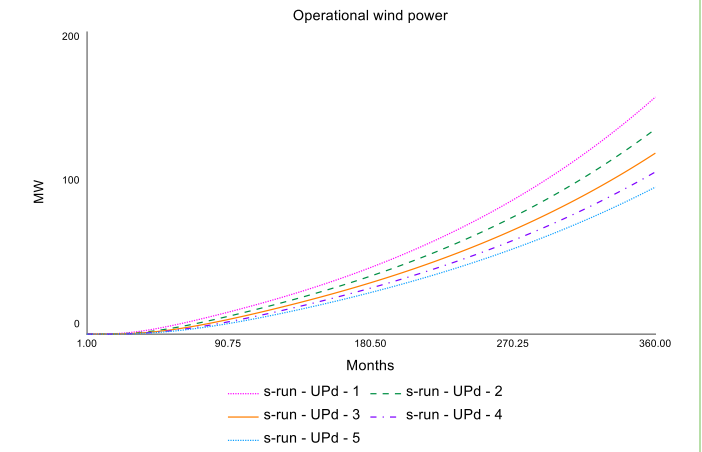


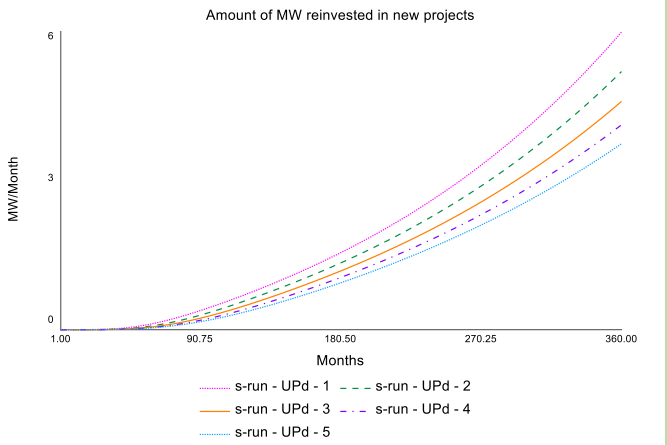


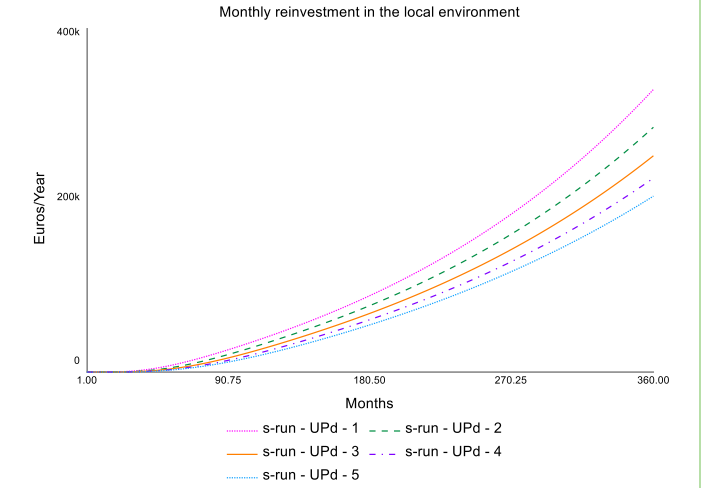


The original value proposed for the lower bound was too low for the ranging possible within the model. The lower bound, mean minus one standard deviation results in -4.9 months; the sensitivity analyses used the value 0 instead. The model shows much less sensitivity to the length of the Idea phase than it does to the failure rates. The lower sensitivity translates to the reinvestments in new projects and the reinvestments in the local environment. The results also lead to lower outcomes.

Sensitivity analysis – Urban planning phase duration

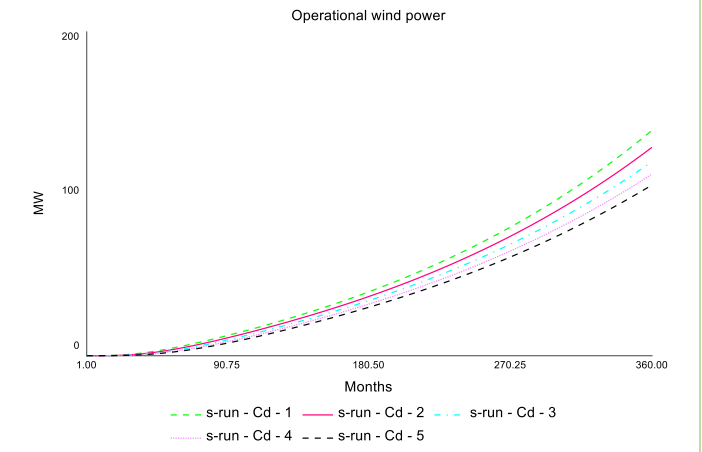


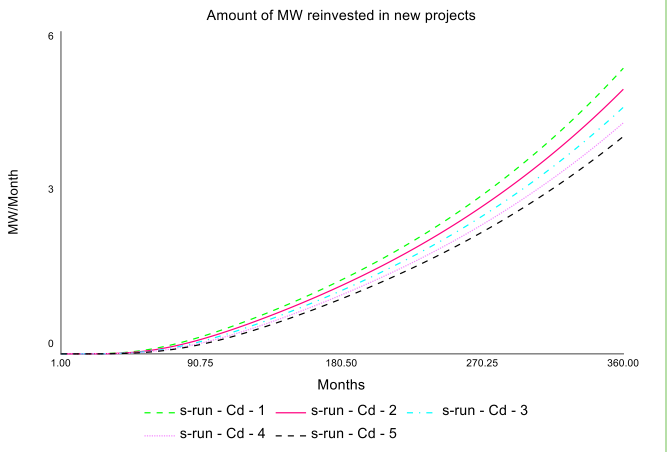


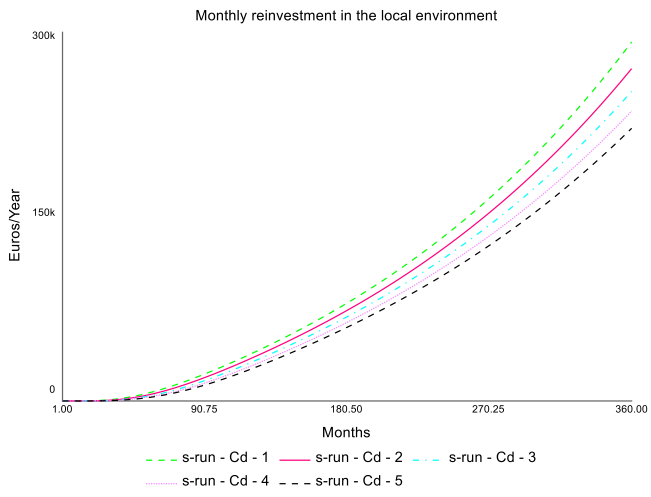


The model shows much less sensitivity to the length of the Urban planning phase than it does to the failure rates. Comparative to the lead times in the idea phase, the model is more sensitive to the possible changes in variance in the urban planning phase. The lower sensitivity translates to the reinvestments in new projects and the reinvestments in the local environment. The results also lead to higher outcomes than the changes of the lead times in the idea phase. The higher results and larger sensitivity originate from the higher success chances during the urban planning phase compared to the idea phase.

Sensitivity analysis – Construction phase duration

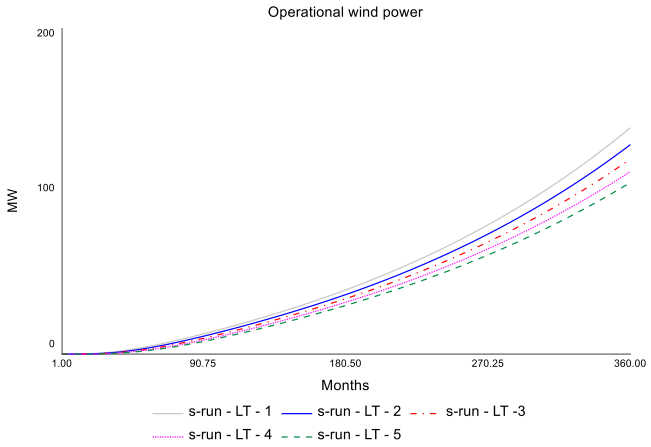


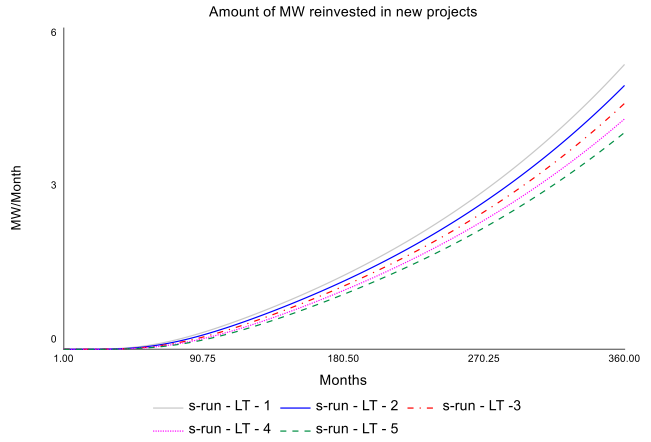


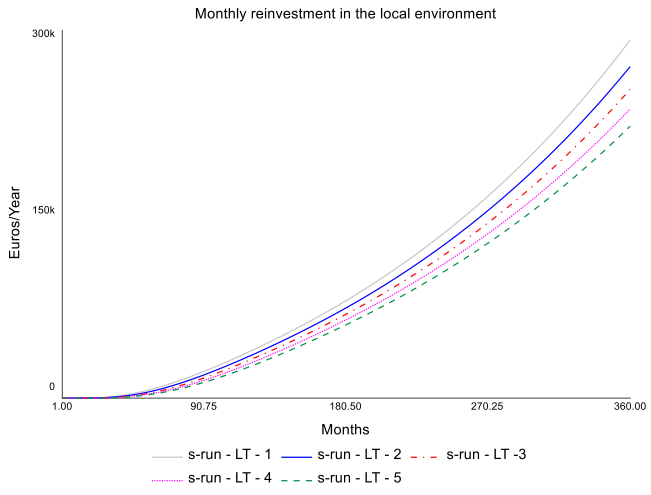


The model shows much less sensitivity to the length of the construction phase than it does to the failure rates. Comparative to the lead times in the idea phase and urban planning phase, the model is less sensitive to the possible changes in variance in the urban planning phase. This is likely the case because the construction phase is shorter than the idea phase and the urban planning phase. The lower sensitivity translates to the reinvestments in new projects and the reinvestments in the local environment.

Sensitivity analysis – Lifetime

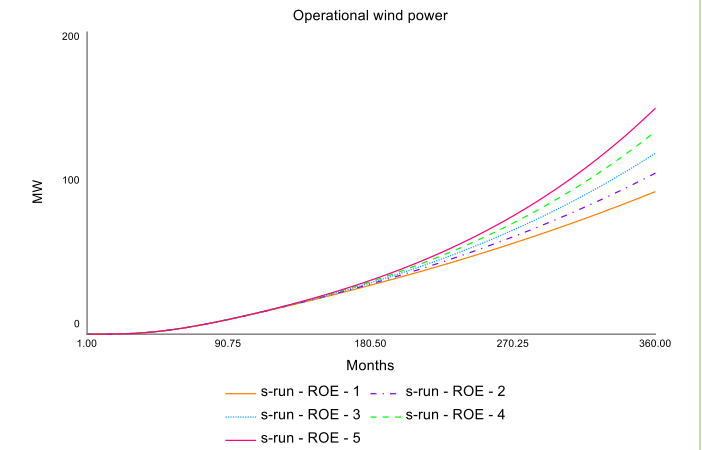


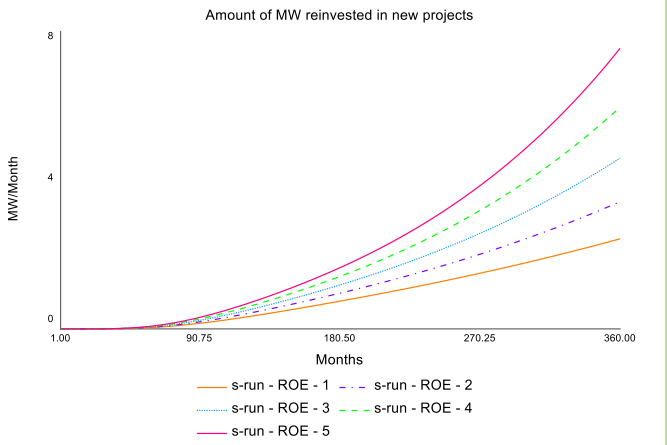


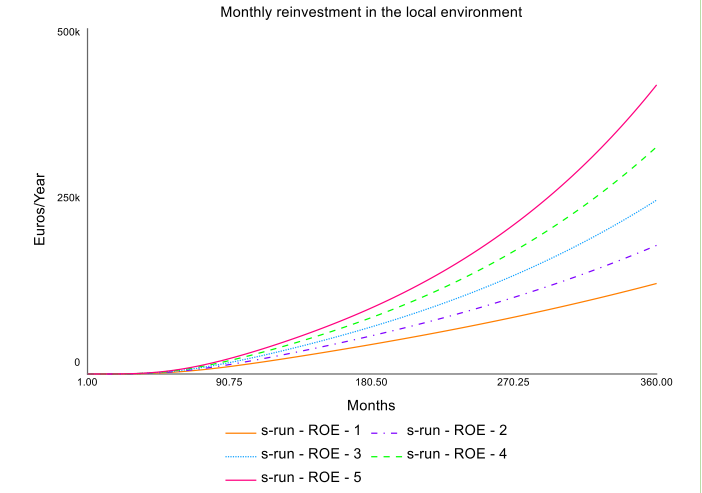


The model shows much less sensitivity to the length of the windfarm lifetime than it does to the failure rates. Comparative to the lead times in the idea phase, urban planning phase construction time, the model seems sensitive to the possible changes in variance in the windfarm lifetime. The low sensitivity can be explained by the smaller percentage variance in the responses to the expected lifetime. The standard deviation for the lifetime of a windfarm only approximates 15% of the mean, where it has been closer to 30% and 50% for the success chances and other lead times.

Sensitivity analysis – Return on equity

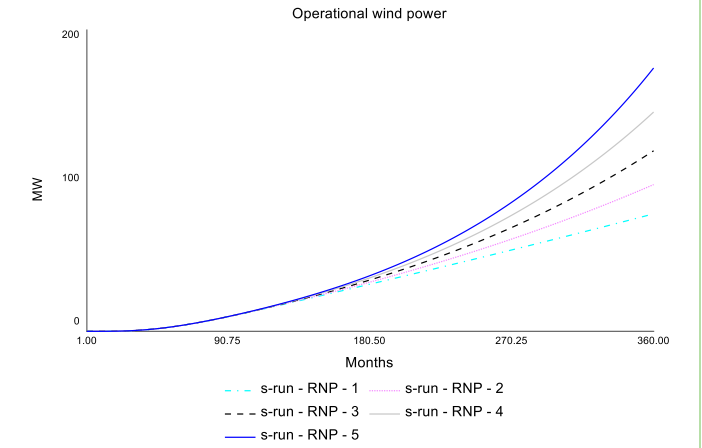


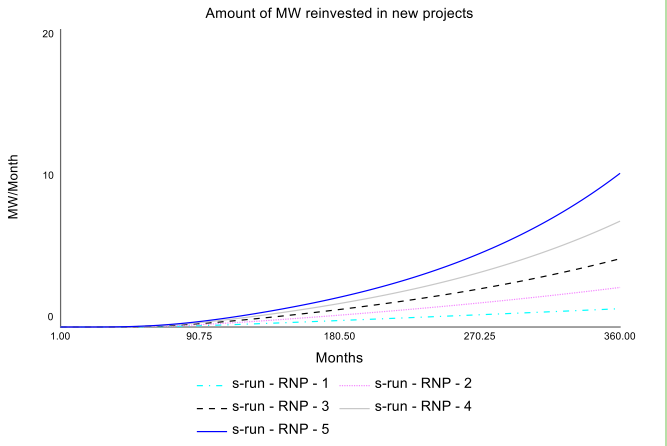


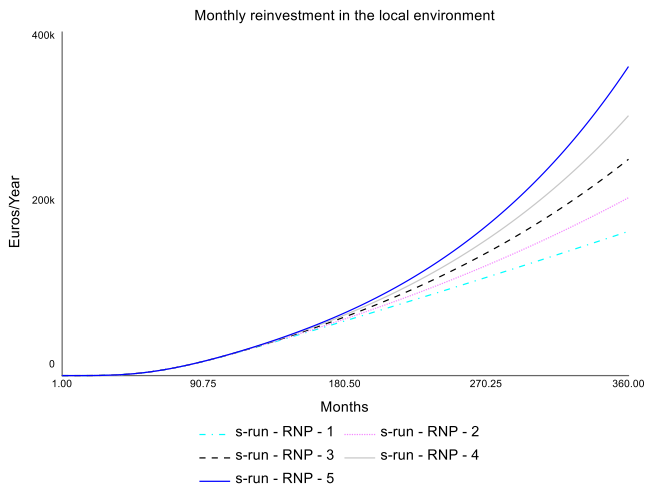


The model shows a small sensitivity to changes in the return on equity. When compared to the other variables discussed, the most important thing is that the changes started showing after approximately 150 months. The late diverging behaviour makes sense, as wind farms only start contributing to new projects once they have been built than it still takes a while before real changes become visible. Once the differences become visible, the variance proliferates. The results also lead to higher outcomes than the changes of the lead times in the idea phase. The higher results and more considerable sensitivity originate from the higher success chances during the urban planning phase compared to the idea phase.

Sensitivity analysis – Reinvestment in new projects

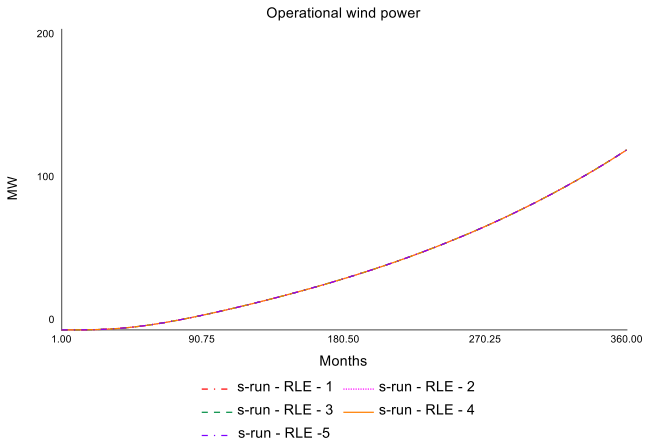


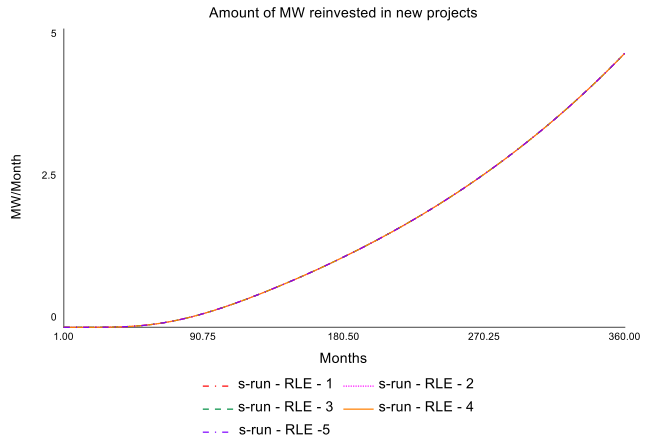


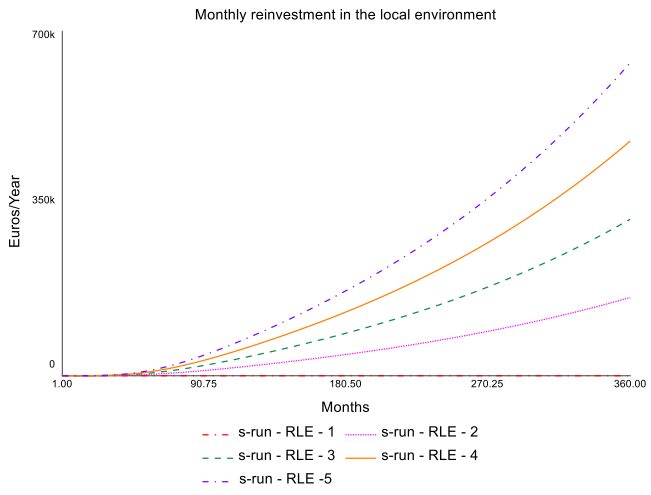


The model shows a reasonable sensitivity to changes in the reinvestment in new projects. Similar to the return on equity the changes started showing after approximately 150 months. The late diverging behaviour makes sense, as wind farms only start contributing to new projects once they have been built than it still takes a while before real changes become visible. Once the differences become visible, the variance proliferates. The results also lead to higher outcomes than the changes of the lead times in the idea phase. The higher results and more considerable sensitivity originate from the higher success chances during the urban planning phase compared to the idea phase.

Sensitivity analysis – Reinvestment in the local environment







The lowest value for reinvestments in the local environment according to the standard deviation should have been -0.0505, as this is impossible within this model, as such the value has been fixed to 0. The reinvestment into the local environment does not affect a feedback loop in the model. Therefore, the only change is the investment in the local environment, this change is quite significant.

9.18. Appendix 18: Input values sensitivity analysis

TABLE 6: OVERVIEW SENSITIVITY BOUNDARIES

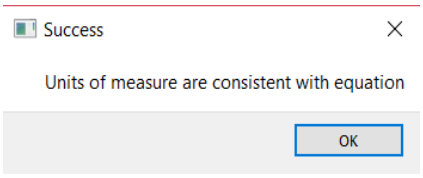
	FR idea	FR UP	Time idea	Time UP	Time construction	Life time	ROE	Reinvestments NP	Reinvestments LE

St.Dev.	27.82	26.83	21.57	21.38	10.85	52.7499763	3.13	25.08	14.32
Observation count	156	156	120	120	120	60	56	41	40
Upper bound	74.15	78.50	40.29	47.55	25.11	327.549976	13.31	69.81	24.95
Mean	46.33	51.67	18.72	26.17	14.26	274.8	10.18	44.73	10.63
Lower bound	18.51	24.84	-2.85|0.0	4.79	3.41	222.050024	7.04	19.65	-3.70|0.0

**The red values had lower bound values below zero, they have been altered to 0.*

9.19. Appendix 19: Model validation

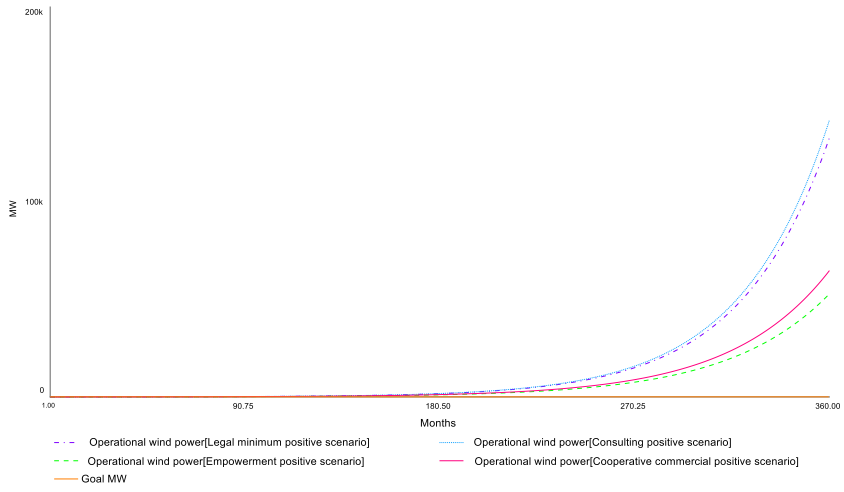
TABLE 20: MODEL VALIDATION TESTS

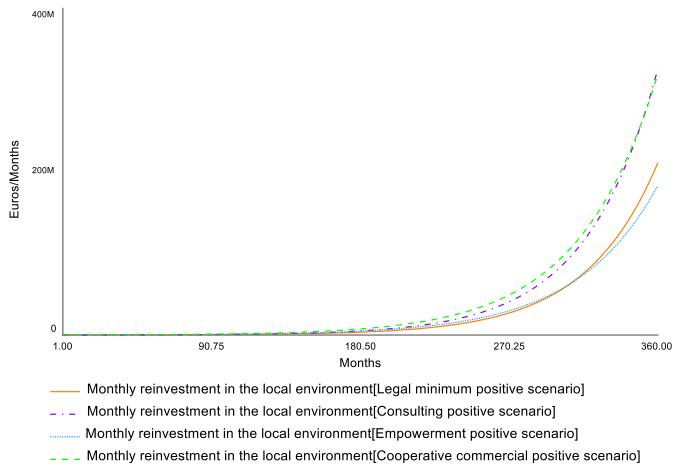
Test name	**Purpose of the test**	**Outcomes**
Structure confirmation	Is the model structure consistent with the existing knowledge of the system? Is the level of aggregation correct for the purpose?	Based on the information shown in the model documentation, primarily information from the Rijksdienst Voor Ondernemend Nederland and the interviews conducted in this study. The structural correctness can be confirmed.
Parameter confirmation	Are the values of the parameters consistent? Do all the parameters have real-world counterparts?	The values of the parameters have been established using the survey. Based on the interviews and particularly the pilot sessions of the survey, the parameters were determined. They are allowing this study to be confident in its parameters.
Direct extreme conditions	Do all the equations resemble reality, even under extreme conditions.	Due to the high standard deviations of the survey outcomes, this was tested. None, of the equations performed out of the ordinary for any of the extreme values. It has been a deliberate choice to not use negative values, as these do not occur in reality,.
Dimensional consistency	Are all the equations dimensionally consistent without using parameters that have no real-world counterpart?	Yes, the model is unit consistent. 
Extreme conditions	Does the model respond plausibly when subjected to extreme conditions?	Due to the high standard deviations of the survey outcomes, this was tested. The model responds plausibly to variations in any of the variables.
Behavioural sensitivity	Do the numerical values change significantly when assumptions about parameters, boundary, and aggregation are varied over the plausible range of uncertainty?	This is part of the sensitivity analysis. The sensitivity analysis is addressed in … and Appendix …

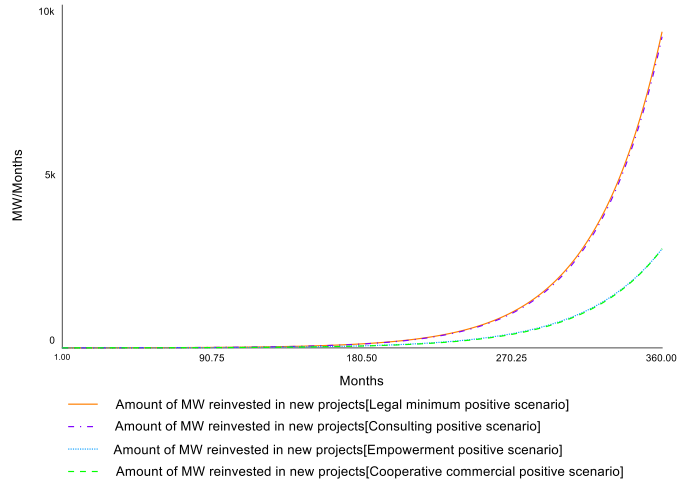
Integration error	Are the results sensitive to the choice of DT or integration method.	Not beyond what is expected, the model makes sure to use a DT smaller than 1/4th of the smallest delay.
Behavior reproduction	Does the model reproduce the behaviour of interest in the system?	There was no reference mode to compare the behaviour to. The area of analysis is has too little data to build a reference mode.
Symptom generation	Does the model generate the symptoms of difficulty motivating the study?	Yes, the model indeed delivers the symptoms of slow behaviour towards the goal.
Boundary adequacy	Are the important concepts for addressing the problem endogenous to the model? Do the policy recommendations change when the model boundary is extended?	The concepts important for this analysis are addressed endogenously where possible, however the relations between the form of participation and the local support, and the local support and the success chances and lead times would be interesting to understand better. The policy recommendations towards the outcomes of this model would be likely to change when the proximity of a community enters the scope of the model.

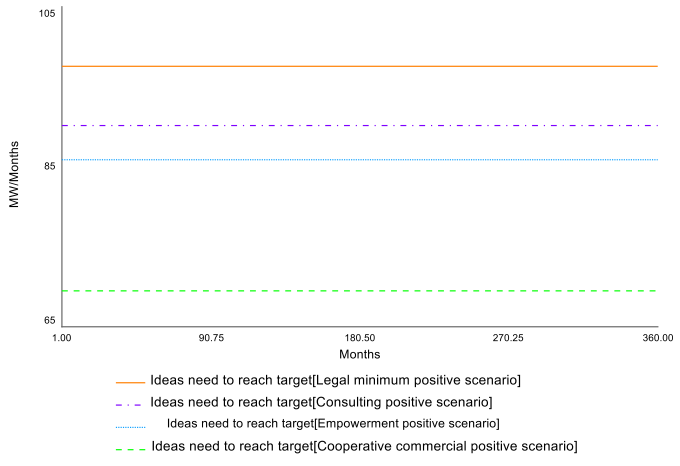
9.20. Appendix 20: Extended scenario analysis

TABLE 21: BEST CASE SCENARIO – OUTPUT AND ANALYSIS

Beste case scenario




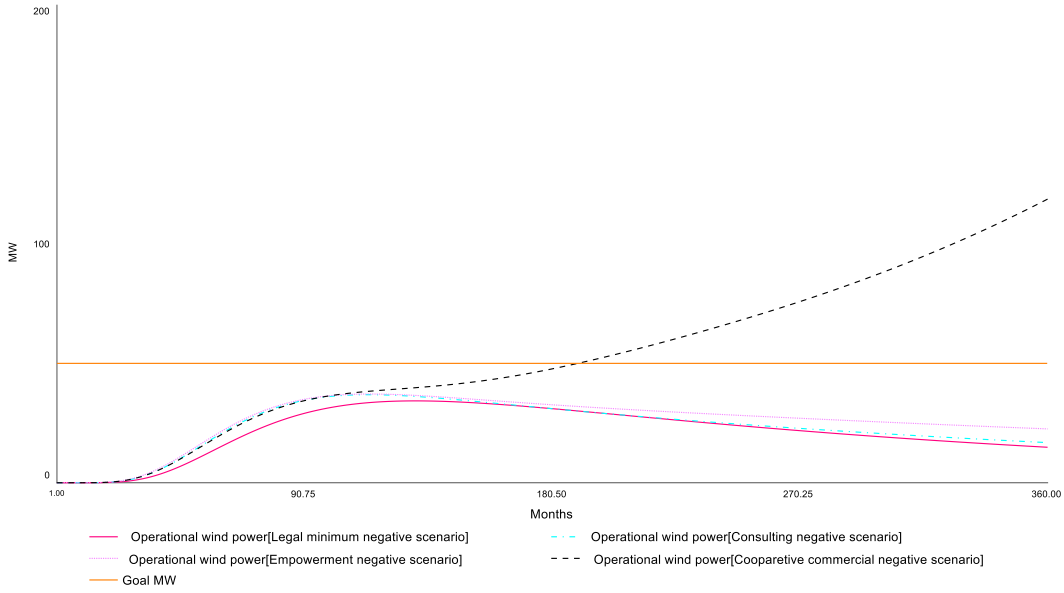


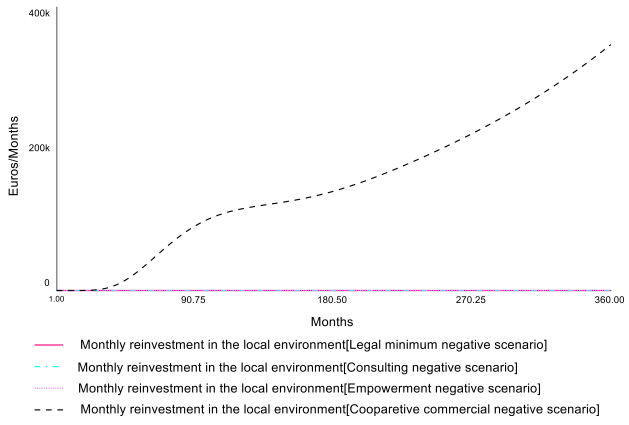


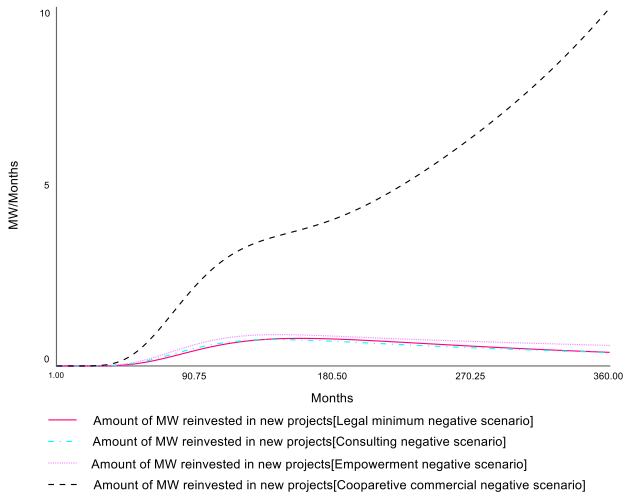
Outcomes from the best case scenario differ substantially from the mean scenario, and even more substantially from the worst case scenario. The Consulting approach yields the highest operational wind power, which is caused by the higher reinvestment. The cooperative commercial partnernship still holds gives the most to the local environment (in total) however, a slightly different time scale would change this result. The amount of projects needed to achieve the the set goal, is much lower in every case. The relationship between the different forms of participation here is similar to the mean model. Appendix 21 contains the data used to run this scenario.

Table 23: Worst case scenario – output and analysis

Worst case scenario





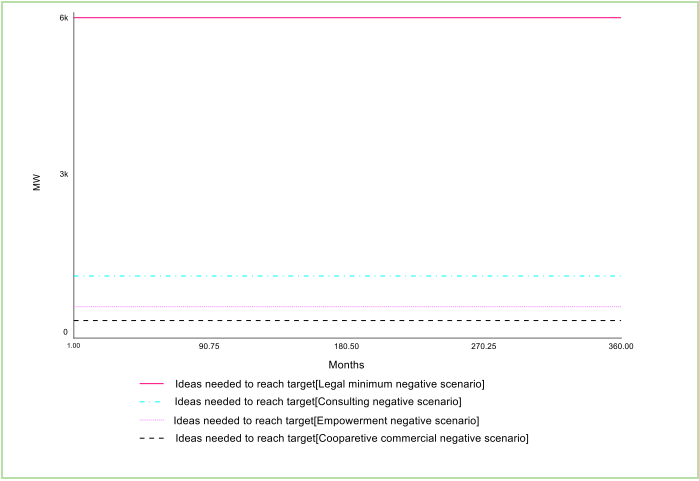


Outcomes from the worst case scenario differ substantially from the mean scenario, and even more substantially from the best case scenario. The cooperative approach yield the highest operational wind power, and it shows to be the most resilient to the change. The cooperative commercial partnership is the only form of participation that is able to reinvest enough to continue growing. There seems to be a path-dependency for being able to grow or not, based on the success chances of reinvestments, and the initial goal.

The cooperative commercial partnership has the largest reinvestment in new projects, this exceeds the other forms which are not able to grow, but shrink in operational wind power over the tiem scale.

The reinvestments in the local environment from all but the cooperative commercial partnership equal zero, hence the large gap between the cooperative commercial partnership and the other variables.

The differences in the project idea needed to achieve the provincial goal are not proportional to those in the mean or best case scenario.



9.21. Appendix 21: Extended scenario analysis data

TABLE 7: BEST/WORST SCENARIO VALUES FAILURE RATES

Variable name	Legal Min SC IP	Legal Min SC UP	Consultation SC Ip	Consultation SC UP	Empowerment SC IP	Empowerment SC UP	CC SC IP	CC SC UP
Count	39.000	39.000	39.000	39.000	39.000	39.000	39.000	39.000
St Dev	0.314	0.300	0.275	0.260	0.246	0.224	0.250	0.204
Average	0.532	0.645	0.488	0.555	0.451	0.491	0.382	0.376
Positive scenario	0.217	0.345	0.214	0.295	0.205	0.267	0.131	0.172
Negative scenario	0.846	0.945	0.763	0.816	0.697	0.715	0.632	0.580

TABLE 8: BEST/WORST SCENARIO VALUES PROJECT DEVELOPMENT DURATION

Variable name	Legal Min Duration IP	Legal Min Duration UP	Legal Min Duration CP	Consultation Duration IP	Consultation Duration UP	Consultation Duration CP	Empowerment Duration IP	Empowerment Duration UP	Empowerment Duration CP	Partnership Duration IP	Partnership Duration UP	Partnership Duration CP
Count	28	28	28	28	28	28	28	28	28	29	29	29
St Dev	20.622	25.324	17.524	21.488	21.572	6.555	21.163	17.612	6.541	22.884	17.598	7.112
Average	15.857	32.500	16.643	19.643	27.714	14.536	21.107	26.500	14.679	22.793	25.034	14.966
Positive scenario	1.000	7.176	7.990	1.000	6.142	7.981	1.000	8.888	8.137	1.000	7.437	7.853
Negative	36.479	57.824	34.167	41.131	49.286	21.090	42.270	44.112	21.220	45.677	42.632	22.078

scenario															

*The red 1.000's were values below zero which is not feasible in reality, they were correct to 1

**The red 7.990 was a value below zero, the average from the other parameters was used to establish the lower bound.

TABLE 9: BEST/WORST SCENARIO VALUES OPERATING LIFETIME

Variable name	PTLM	PTPC	PTPE	PTCC
Count	15	15	15	15
St Dev	56.194	56.194	51.747	45.705
Average	272.800	272.800	272.800	280.800
Positive scenario	328.994	328.994	324.547	326.505
Negative scenario	216.606	216.606	221.053	235.095

TABLE 10: BEST/WORST SCENARIO VALUES RETURNS AND REINVESTMENTS

Variable name	ROELM	RNPLM	RLELM	ROEPC	RNPPC	RLEPC	ROEPE	RNPPE	RLEPE	ROECC	RNPCC	RLECC
Count	14	9	9	14	9	9	14	9	9	14	10	9
St Dev	0.0333	0.2496	0.0645	0.0298	0.2409	0.0915	0.0263	0.1812	0.1606	0.0274	0.2350	0.1892
Average	0.1157	0.5278	0.0411	0.1079	0.5044	0.0644	0.0971	0.5222	0.1111	0.0864	0.3950	0.2111
Positive scenario	0.1490	0.7773	0.1057	0.1377	0.7454	0.1560	0.1234	0.7034	0.2717	0.1138	0.6300	0.4003
Negative scenario	0.0824	0.2782	0.0000	0.0781	0.2635	0.0000	0.0708	0.3410	0.0000	0.0590	0.1600	0.0219

*The red values were values below zero, they have been corrected to zero as negative values are impossible.

9.22. Appendix 22: Research ethics

9.21.1. Interview ethics

It is imperative that the interviewees understand how the study uses the information they provide. As such, this section will elaborate on the ethical guidelines upheld in this thesis.

All the interviews are voluntary, in approaching the interviewees, it was made clear that there is always the option to back out of the interview. Furthermore, at the start of the interview, the interviewer made the participants aware of the opportunity not to answer the questions asked. The interviewer also offered the interviewees the opportunity to be anonymous in the correspondence, and the opportunity to check the citations before publication, both for this thesis and possible subsequent publications.

The introduction to the interviews always followed a pre-written set of bullets, addressing all ethical points; this is part of all the interview script (Appendix 2, Appendix 3, Appendix 4, Appendix 5):

- Interviewers name, and the context of the research
- The names of fellow researchers
- Gratitude for the willingness of the interviewee to participate
- The purpose of the research
- The purpose of the interview
- The reason for selecting the interviewee
- Permission to record the interview
- The use of the interview results

- Follow up: for data analysis, the interviewees if they consented the recording of the interview for transcription and coding purposes. In the case that they agreed to the recording of the interview, they were supplied with the complete transcript of the conversation. There was no case of interviewees preferring not to be recorded.
- The interviewer also provided an opportunity for the interviewees to indicate if they would like to receive more information on the research throughout the research process. In the case that they would appreciate this, their email addresses will be added to a mailing list that is intended to share the most recent progress. On occasion, a newsletter regarding the study was sent to this mailing list.
- By the end of the interview, the interviewer thanked the interviewees for their participation.
- The interviewer also asked for referrals, other experts on the topic (snowball method).
- They will again be made aware that the transcription will be emailed in due course, for them to check.

9.21.2. Survey ethics

Ensuring the quality and ease of answering the questions in this survey, the study conducted six pilot sessions. One pilot with a non-expert about the appearance of the survey. Two pilots with, in total three quasi-experts, discussing the form of the survey. Lastly, two pilots with experts to check if all the question were feasible as well as to control the relevance of the questions. Their documentation of their suggestion is an appendix (Appendix 8).

The introduction of the survey iterated the voluntary nature of the response. The accompanying email used in sharing the link to the survey was very clear of requesting help by providing estimations. The survey allowed respondents to fill in their preference, on whether or not they would like to be anonymous. 54% of the respondents who finished the survey preferred their response to be anonymous, while 46% of the respondents preferred their response not to be anonymous. The survey places this question in the final section of the questionnaire, on the advice of one of the pilot experts. Asking the question about the anonymity at the end allows the respondents to gauge the questions, and be confident on their decision. In order to avoid the sharing of personal information of respondents who did not finish the survey, personal details such as the respondent's name, email address and employer were asked at the end of the survey.

Before publishing and sharing data, the study anonymised all the responses. The study documented any sharing of data, see appendix 9. Appendix 7 contains the final version of the survey.