Master's Thesis Bas Kramer S4345126 on the spatial policy implications of the energy transition.

by Bas Kramer

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Actor Networks Enabling the Energy Transition

Mapping out actor networks in energy transition initiatives to develop a fitting provincial governance policy

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Actor Networks Enabling the Energy Transition:
Mapping out actor networks in energy transition initiatives to develop a fitting provincial governance policy

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Summary

Climate change is presenting a challenge for humanity in the battle against the rising temperature of the planet. The challenge orbits around the principle that the degree of fossil fuel usage should drastically decrease along with the increase of green energy generation and usage. This should prevent further damage to the environment and will secure a cleaner future. This challenge is also felt in spatial planning, where the role of the energy transition which is needed to counter climate change is changing the way in which spatial planning should design the environment. Landscapes as we know it will come to disappear, due to the increasing number of wind-turbines and solar panels dispatched throughout the scenery. To realise such a change, policies throughout the entire society should adapt to the integrality of the energy transition and accept the changes which will inevitably be a part of this. However, this is rather new, as well as the policies which are to be developed. Much is still unclear about the energy transition, for example, how does the energy transition affect spatial planning and how can policies be addressed such that it facilitates positive developments in the best possible way?

Several researches state that the current degree of integrality in policies is insufficient, especially in the Netherlands. They are one of the lowest rated countries in Europe considering their climate target progress, which shows a lacking focus. The lacking awareness of the urgency to change also seems to be having a negative effect on the coming decades, where lots of plans still focus around fossil fuels and electric transport is still a long way to go. Concluding, the energy transition is not a prominent point on the agenda yet, which it should be and that must change.

Even though the Netherlands are falling behind on their ambition and on that of international agreements, the degree of awareness and urgency seems to be changing. With the new '*Omgevingswet*', a spatial planning law framework, the focus on integral development and faster procedures shape a proper setting to give the energy transition the needed boost. In this context, this research has set out to investigate how the energy transition in the Province of Gelderland is currently being treated, how the actor networks in projects are set up and how policy from the province should facilitate this. By conducting twelve interviews along with a vast research on existing policy documentation on a set of two case studies, this research has concluded several recommendations and points of discussion to the province of Gelderland to change their policy regarding the energy transition.

One of the most important recommendations that follows from the multiple case study research is that the degree of awareness and urgency of the energy transition must be spread more throughout society, including awareness on the changes it will make on the environment. Comparing it with mobility, the need for highways is known and its influence on nature and our environment is accepted, though the same questions which are raised in the energy transition, are not raised in mobility projects. The other recommendations for provincial policy change are that 1) citizen participation should be done as soon as possible, in a partner relationship, 2) communication inside the province must be clearer by developing blueprints for the demands to projects which always need to be met, so that the actor network in the project cannot be surprised by additional demands and 3) show commitment as a province to the projects.

Along with these recommendations, the research gives insight in how complex actor networks are built up and which roles per category of actors there are. In terms of must, want and can, each actor group is defined, through which this research can conclude the policy for provincial interference with energy transition actor networks should change for the better.

Preface

In front of you lies my master's thesis about the energy transition in the Dutch province of Gelderland. After five months of hard work, I am proud to present my report to you and I hope that reading it will help you as a reader to gain some insight in the topics I have discussed.

Since the start of the master on Spatial planning at the Radboud University, I was challenged to start thinking about a topic for my master thesis. A number of ideas came to mind throughout the first semester, of which one got stuck in my head. My preferences concerning interesting topics have always been about topical and current issues regarding actual problems or developments in the playing field of spatial planning. This search for a tangible subject started with the *'Omgevingswet'* as a basic principle. I wanted to combine the *'Omgevingswet'* to a topical subject to give it more body. In this search, I stumbled upon the province of Gelderland, who were looking for someone to do research on the energy transition in relation to spatial planning and the environment. This provided the perfect opportunity for me to do research on a relevant topic to help the province, and at the same time combine that with the interest I had in the *'Omgevingswet'* and its implications for the practice of spatial planning.

Armed with a bag full of pre-acquired knowledge on the *'Omgevingswet'* due to my bachelor thesis being written on this, I started on my journey to do my master thesis research on the energy transition within the boundaries of the province of Gelderland. At first, I was in doubt whether the energy transition as a topic would prove to be too much of a physics related subject, I was positively surprised as to how much it related to spatial planning without it drifting away to a land of physics and chemistry. The journey has taken me to all corners of Gelderland, speaking with a variety of people all of which had their own views on policy and the purpose of the energy transition. From their experience and their views, I have been able to learn a lot on the subject, for which I would like to thank them. All interviewees which have enthusiastically responded to my call for aid, generously sharing their thoughts, ideas and experiences with me. I would also like to thank my mentor Peter Ache from the Radboud University for helping me get into contact with the province of Gelderland and for guiding me throughout the period. Finally, I want to give my special thanks to thanks my mentor from the province of Gelderland, Mark Kemperman, to provide me with the opportunity to deploy my research in the province of Gelderland and with helping me writing my thesis, and to Carel Bolt for giving me the opportunity to delve deeper into one of my case studies by inviting me to multiple meetings and providing feedback on my progress.

This research marks the end of my student-life and the end of my time at the Radboud University. I hope that by reading this, you will learn some interesting things about the energy transition, its relationship with spatial planning and that for the province of Gelderland, the recommendations will prove to be useful in the formulation of their policy.

Nijmegen, 5 August 2017.

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Abstract *The 21st century is presenting human kind with the challenge to preserve the earth and the environment as we know it. Our current way of living and our dependency on fossil fuels is harming nature and requires a change. The swap from fossil fuels to a society focussed on green energy is called the energy transition. This research focuses on the energy transition in the Dutch province of Gelderland, where a fitting policy for energy transition management is to be developed. To do so, this research focuses on two cases concerned with the energy transition; Cleantech Icon A1 and wind-park Deil. Within these cases, the actor networks have been mapped to get a clear overview of the interests that are present in the project to develop a fitting provincial policy according. According to interviews with experts and relevant actors, several policy recommendations have been formulated which, fitting into the framework of the 'Omgevingswet', should help the province of Gelderland reach their 2050 energy neutrality ambition.*

KeyWords Energy transition · Actor Networks · Gelderland · Omgevingswet · Policy Recommendations

1. Introduction

The energy transition. A noble cause, a necessary change and a complex process. A future landscape full of windmills and solar panels to provide our supply of energy, but with the side note of the potential loss of open landscapes and other sensitive subjects. The alternative? Fossil fuels. Polluting the environment, causing stench, unhealthy air and consequently disrupting the climate by excessive CO2 emissions (Garvey, 2008).

The Netherlands are working on the complex matter of the energy transition. A topic which has been getting increasingly more attention in worldwide climate conventions resulting in an increased awareness of the need for green energy sources (Gooyert, Rouwette, Kranenburg & Breen, 2014 P. 3). In a time of global warming as a direct result of human intervention, but moreover human presence in general, we have been seeking to resolve the issues that came because of our usage of fossil energy (Garvey, 2008 P. 17-23). This energy supply is lacking sustainable alternatives on a grand scale. In this development and general discussion, the role of spatial planning is becoming increasingly important after having been pushed to the background in previous decades (Gooyert et al, 2014; Provincie Gelderland, 2015; Faller, 2015 P. 87-88). The discussion is predominantly focused on technological development towards direct incentives of green energy generation. This is gaining the complementary interest of how urban housing and transport policies amongst changes in social practices might contribute to this shift (Coutard & Rutherford, 2010 P. 711). According to Coutard (2010), some decades ago the role of spatial planning was set as a standard presence in energy generation issues. The general acceptance of spatial planners' interference in the allocation of resources and spaces for the generation of energy was a top-down process. The governmental agency concerned with the specific area of interest set out the vision and the basic framework for development, to be implemented in cooperation with private investors (Hendriks, 2008; Faller, 2015 P. Ruiken et al, 2015). The following decades were generally focused on the use of fossil fuels. The role of spatial planning was driven to the background, as its role became less relevant. However, recent trends in means of energy generation and awareness concerning the effects of burning fossil fuels, have resulted in an increasingly focused mind-set on green energy sources to be derived from sources such as: capturing solar power, harvesting wind energy, adopting geothermal heat as an energy source or using the classic form of hydro powered energy. The government needs to address the principle of collaboration within the field of energy generation once again. The government became a passive actor in this network in terms of spatial planning, because spatial planning was driven to the background. The wake-up call of the 21st century energy transition will challenge governments to take on an active

role again in encouraging collaboration and actively seeking space for the development of aforesaid modes of energy generation (Provincie Gelderland, 2015; Ruiken et al, 2015; Faller, 2015).

In the struggle against global warming and the threat this is posing to the future of both nature and man, the Netherlands are lagging compared to the general developments in Europe, being unable to meet most of the European goals for environmental issues and struggling to change this situation (Gooyert et al, 2014, Pp. 3-4). Meeting the most basic goals, for instance 16% sustainable energy generation by 2020, is already proving to be hard (Gooyert et al, 2014 P. 3). Within this struggle, the province of Gelderland is searching for meaning and incorporation of green energy in the spatial policy. The province of Gelderland has defined the goal of energy neutrality by 2050 (Provincie Gelderland, 2015; Ruiken et al, 2016). Under the slogan of '*Alone you go faster, but together you reach further*' (Ruiken et al, 2016) the province tries to support collaboration in the fields of the energy transition by encouraging cooperative endeavours and developing long terms visions for an energy neutral Gelderland.

Increasingly occurring events of developments point towards a positive reaction from the grand public with more and more initiatives of sustainable energy generation popping up all over the province (Provincie Gelderland, 2015; Ruiken et al, 2016). These initiatives not only focus solely on the development of spaces for the generation of green energy, but also incorporate the implementation of sustainability into (existing) structures. The role of the government, in this case the province, is one which is generally of a supportive nature, steering development into the frames of the encompassing vision. However, with the large amounts of initiatives towards sustainability and the uncertainty within the province as how to carry out governance in this respect, a blind spot in knowledge needs to be addressed. The relationship between space and the energy transition is vague, a so called grey area. This relevance for the province of Gelderland forms the origin of this research and forms the cornerstone for the eventual results that will be derived from it.

1.1 Research problem statement

The problem statement for this research is based on the problematics of the case of the Dutch province of Gelderland, which is the leading actor of this research. Through a conversation with Mark Kemperman, strategist at the province of Gelderland, and according to visionary documents such as the *Omgevingsvisie* (Environmental vision) Gelderland, the relevance for a research points towards the need for mapping out networks of actors in energy transition collaborative endeavours.

Furthermore, the role of the province in terms of governance needs to be addressed to help develop guidelines for governance in energy transition networks. On top of that, the contextual framework of spatial planning in terms of law and regulations is about to change in the form of the '*Omgevingswet*' (Environment law) (Rijksoverheid, 2016). The Netherlands is on the brink of a large-scale modernisation of the *Omgevingsrecht*, a term to encompass the law based framework of spatial planning in The Netherlands (VNG et al, 2015). The modernisation of the *Omgevingsrecht* is much needed to adjust to the complex reality of modern day planning. This is translated into a new law bundle called the *'Omgevingswet'*. Since the year 2011, the national ministry of Infrastructure and Environment (I&M) has been working on the development of the *'Omgevingswet'*, hereby looking closely on how to tackle the challenges posed by modern day society (VNG et al, 2015; Provincie Gelderland, 2016). The ministry of I&M aims to simplify law, increase participation and digitalisation of spatial planning in this *'Omgevingswet'*. This makes it evident that the developing *'Omgevingswet'* needs to be incorporated into all future visions or governance structures for any form of

recommendation to be applicable for a longer period, and not render it irrelevant on a short notice. The problem statement thus adds up to the following:

The lacking insight of the province of Gelderland in the scope of actor networks of sustainable energy initiatives results in a blind spot in knowledge for the province, not knowing how they should ideally contribute (if at all) in terms of active governance. The future development of the 'Omgevingswet' to serve as a legal framework for such collaborative enterprises is also unclear, as well as its potential value to energy transition.

The problem statement that forms the basic outline for this research is specifically focused on the province of Gelderland. The origin of the topic at hand is derived from the need of gaining insight for the province, in collaboration with the interest for an in-depth research into the energy transition, network mapping and general influence of the *'Omgevingswet'*.

1.2 Research aim and research questions

The research aim and questions translate the problem as stated in paragraph 1.1 into the focus areas on which this research will proceed. Following Verschuren & Doorewaard (2007, P. 10), a research topic is always part of a broader context. To slim the topic down, the research aim here is defined in such a way that its borders become visible and clear.

The research aim is defined as followed:

To identify the networks of sustainable energy initiatives in the province of Gelderland, to address their scope, define their relations and find a fitting form of governance for possible government contribution within the projected framework of the 'Omgevingswet'.

The research problem and the corresponding research aim show a clear trifold focus of research into the field of energy transition. This focal point has been determined via scans in existing literature and the contractor from the province of Gelderland.

- First, the focus will be on the identification of the scope of actor networks of sustainable energy initiatives. In the search for this purview, I will select two cases which will be addressed to serve as a mould and an example as to show to what extent such networks can reach. An insight which is currently lacking.
- Second, the role of the government will be examined in terms of governance for the development of a vision to deal with energy transition initiatives. This comes on top of knowing where to manoeuvre the relevant governmental agencies into the existing networks. 'Good governance' is a key concept here (Graham, Amos & Plumptre, 2003).
- Third, the contextual framework of the *'Omgevingswet'* which is going to change the legal boundaries and networks as well as the opportunities given by the government to incentives from individuals, is relevant to address the appropriate form of governance in these networks. In this, the interesting part is to look at how this change can provide chances but also how it might restrict development (Which is a projected outcome, since the *'Omgevingswet'* is still under development (Rijksoverheid, 2016)).

Apart from what was stated in the research problem and the research aim, this report will start with the topic of 'socio-technical systems approach' as a way of understanding the sudden mass emergence of sustainability initiatives by looking at the relationship between technological innovation development and human behaviour. This results in a fourth focus of research as the basis for the other three focus points:

- To explain the sudden emergence of sustainability initiatives by looking at the relationship between technological innovation and human behaviour, and vice versa. This is needed for a deeper understanding of the energy transition and to place the actor networks and their incentives in a better context.

For the sake of developing a general focus to tackle the problems mentioned above and developing a general framework for the province to adopt in energy transition networks, this research will be formed around the following central research question:

How extensive are energy transition actor-networks in the province of Gelderland and what role for the province is desirable in terms of 'good governance' in these actor-networks considering the changing development of the legal framework of spatial planning by the 'Omgevingswet'?

The definition of this central research question purposely follows the order of the identification of actor networks first, then the role of good governance and lastly the impact of the *'Omgevingswet'* in this trajectory. This is also the order of importance of relevance to the province of Gelderland, the initial contractor for this research. Dissecting the central research question into sub-questions for the further elaboration is needed because the scope is currently too wide to be answered directly. The simplification of this into multiple sub-questions results in the following:

1. *What is the relationship between technological innovation and human behaviour in explaining the recent energy transition boom?*
2. *How extensive are energy transition actor-networks in the province of Gelderland?*
3. *What is the ideal and socially desirable practice of 'good governance' for the province of Gelderland to effectuate to support energy transition actor-networks?*
4. *How does the 'Omgevingswet' change the relevant framework of energy transition and how can it offer opportunities to enhance collaboration in these networks?*

1.3 Scientific and societal relevance

The goal of this research is of an explorative nature, driven by the need to gain insight into the blind spot of the energy transition and the extent to which its actor networks reach (Gooyert et al, 2015; Faller, 2015). Addressing this blind spot opens the opportunity for the province of Gelderland (and possibly other Dutch provinces too) to develop good governance practices in tune with the actor network. Academically spoken, the research must be legitimized by addressing the scientific relevance and the societal relevance which is done below.

1.3.1 Scientific relevance

Even though in academic literature a lot of attention has been, and currently is, being paid to the energy transition, the perspective and the role of 'spaces' is widely underestimated (Faller, 2015; Coutard, 2010; Binz, 2014). Faller (2015) points out that even though a lot of research is being done about the techniques and the technological challenges of energy transition, the role of space is neglected in mainstream research. The scientific relevance of the research presented here is found in addressing the blind spot of energy transition in relation to spaces, in combination with looking at the changing framework of the *'Omgevingswet'* and the role of governance in networks (Provincie Gelderland, 2016; Rijksoverheid, 2016; SCP, 2016). The fact that the topic of energy transition is considered to still be a blind spot, also in Gelderland, opens room for interpretation of this role and the general search for modes of governance in guiding energy transition initiatives in a spatial context. Furthermore, the understanding between the implementation of a governance strategy in an actor network is also scientifically interesting (Graham, 2003; Hawkins et al, 2015). The relevance of this research in scientific terms is the explorative nature into the blind spot which still exists, forming a direct assessment of the spatial implications of the energy transition.

At the basis of this scientific relevance is the perspective of the energy transition concerning actor networks and their behaviour (Faller, 2016; Binz, 2014; Frantzeskaki, 2012). Theories such as the socio-technical systems perspective focus on the relationship between individual behaviour and technological developments, but have neglected the role of networks of individuals (Adil, 2016; Geels, 2004). As transitions generally need to be carried throughout the whole of society in order to succeed, the role of actor networks in the energy transition requires attention and can help in creating an understanding on how transitions can be supported to succeed from higher entities such as the province.

1.3.2 Societal relevance

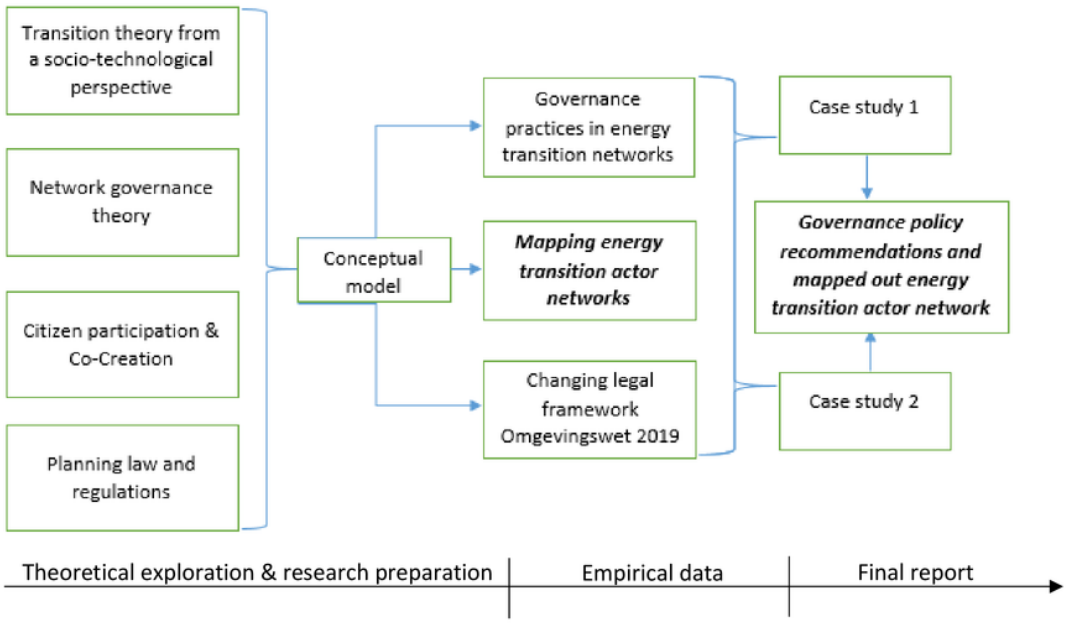
Whether we like it or not, fossil fuels are a threat to our environment in terms of pollution (Garvey, 2008). Whether oil reserves are predicted to run out or not, the initial dependency on and use of it is harmful in multiple ways. Overall awareness on climate change points towards the need to undertake action now, to prevent future problems of becoming irreversible. The shift towards more sustainable forms of energy is generally accepted, in which individual efforts play an important role, but collaborative efforts make the biggest difference (Ruiken et al, 2016). Developing a proper governance structure for the encouragement of energy transition initiatives might very well be needed to optimize the collaboration of these networks. The societal relevance is therefore derived from the urgent need of integrating sustainability into more fields of spatial planning - which is also in line with one of the key aspects of the *'Omgevingswet'* - and the direct assessment of the topic by the province of Gelderland.

The research focuses on giving insight in how the province should deal with energy transition actor networks in existing projects in Gelderland and investigate how they can apply a mode of 'good governance' (Graham et al, 2003) in this network to improve the transition. Relevant for societal use is the way in which the province of Gelderland can use the outcomes of this research to develop a governance policy to deal with actor networks in the energy transition. This research can finally also be used as a reference work to help develop governance policy and justify choices.

1.4 Research design

The research design, see figure 1.1, serves as a basis on which the research is structured. In general thought, the research design is the first conceptualisation of how the research aim as defined previously is thought to be reached. The research design is a schematic and strongly visual presentation of the steps that generally need to be done to reach the projected goal (Verschuren, 2007; Boeije & t Hart, 2009). It is therefore not a decisive blueprint, but rather a mode of getting grip on the subject at hand.

Figure 1.1: Research model for mapping out the energy transition actor network and the according mode of governance interference. Source; Own elaboration.



The research model shown here is dissected into three phases, namely the theoretical exploration & research preparation phase, the empirical data gathering phase and the formulation of the final report in recommendations. This model will serve as the basis for the rest of the research. First, the theoretical exploration & research preparation will unfold in the theoretical framework and methodology chapters. Afterwards, the empirical data gathering starts which will be the beginning of mapping out the network of actors in the energy transition in which simultaneous attention is paid to look at the ways in which these actors would prefer modes of governance to interfere in the discussed actor networks. This is however still a rather unclear field, due to the state of progress as of now. Finally, the report combines the empirical findings and the theoretical data into a recommendation for governance practices on top of the actor network map as second result of this research.

1.5 Reading guide

The current chapter has presented the central theme of this research. It has furthermore discussed both the scientific and societal relevance and their characterisations. With this, the research questions and research aims are concretized and legitimized through which the problem statement can be tackled. To do so, the second chapter provides the necessary theoretical knowledge to analyse the situation of the energy transition in the framework of spatial development. The main theme in this theoretical knowledge framework is the relationship between network behaviour and technology, fitted into transition management to develop a proper governance policy.

The chosen research strategy is discussed in chapter 3. This includes discussing the modes of data gathering and the strategy to use the analyse the data. Chapter 4 presents the province of Gelderland and their energy transition policy, after which two case studies within the province of Gelderland are introduced in chapter 5.

The empirical data is presented in chapter 6, showing how the actor networks are built up and what the empirical data states on the various topics of the central research question. This includes their recommendations for good governance and its applicability to the province of Gelderland. Chapter 7 reinterprets these recommendations and presents the final recommendations alongside some points of discussion. Chapter 8 finalises this research by concluding and answering the research question. Additional information such as topic lists, coding schemes and references are found in the appendices.

2. Theoretical framework

The theoretical framework is the first step in creating a solid base for the deeper understanding of the energy transition and the actor networks which are the central unit of research. In this chapter, a deeper construct to understanding the framework starting from the *socio technical systems approach* will be used to support the rest of the theory. This approach explains the relationship between technological innovation and human behaviour, setting the basis for the growing societal movement in energy transitional enterprises. After laying the basis for the research in this concept, the focus moves *to transition management theory*, which will help to understand how transitions should be managed to realise society wide changes, something which is an inherent goal in the energy transition. On the building blocks of transition management and the socio technical systems approach, paragraph 2.3 focuses on the second focus point of the research; the formulation of a provincial policy recommendation. This is done by considering *'good governance'* as a good/bad practice conceptualisation of policy. This policy recommendation will be enhanced with the perspectives of *citizen participation and co-creation* as a part of good governance practices, something which has been outlined as a policy ambition by the province of Gelderland (Provincie Gelderland, 2016). Finally, the theoretical framework will be extended with a chapter on law and the development of the *'Omgevingswet'* which forms the framework for any policy recommendation to be relevant for the province on the long term.

The bridge between theory and methodology is built in paragraph 2.6 with the operationalisation of the theory into measurable and comprehendible concepts. These concepts can then be worked out in the methodology to acquire the full analysis framework for the empirical data gathering phase. Paragraph 2.7 finally gives an overview of the building blocks of theory after which chapter 3, the methodology, addresses the next step of this research.

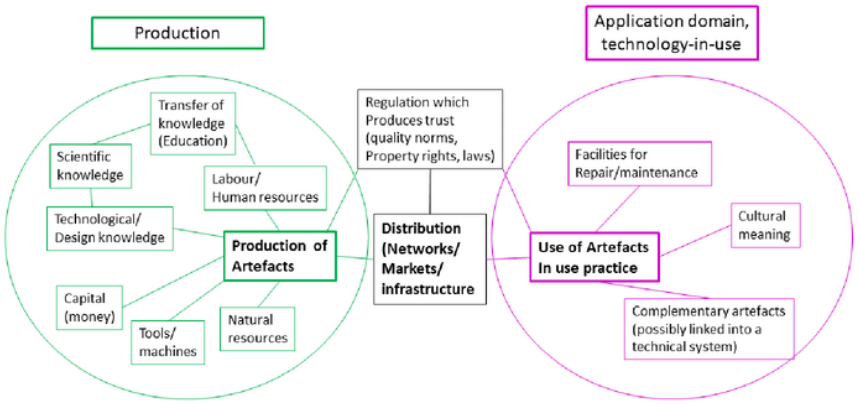
2.1 The socio technical systems approach

Energy transition adoption processes can be characterised as socio-technical systems (Kaghan, 2001. P 254), which links the socio-technical systems perspective of transition management to the energy transition (Kern, 2008). The socio-technical systems perspective is a rather classical theory, which addresses complex organizational work design that recognizes the interaction between people and technology in the same networks. This interaction between people and technology can be translated to the network of actors in big infrastructural projects concerned with the implementation of sustainability techniques in the field of green energy generation. Moreover, the acknowledgement that technologies in society shape behaviour is also present in the field of green energy generation, as better modes of individual energy generation technology can result in a change in individual behaviour, shifting from a passive to an active approach towards sustainability (Singh, 2013. P 6). A simple example to sketch this shift is the improved technology of solar panels, which are becoming both more efficient in use and cheaper to adopt (Singh, 2013). For the individual, adopting solar panels is therefore more interesting and their behaviour might change.

The reason for discussing the relationship between technology and human behaviour through the socio technical systems approach is to reach a deeper understanding as to why there is a sudden emergence of energy transitional initiatives. By finding the driving forces behind a societal wide transition such as the energy transition, the formulation of a policy recommendation becomes more evident. Looking at systems innovation, the starting point is usually found in societal functions,

meaning that the incentive to innovate comes from a problem or an issue in our society which needs an application to be tackled. Societal functions come in different flavours and are addressed in the frame of the Dutch environmental policy. They distinguish between generic functions, intermediary functions and end-user functions. Transitions are big changes in how societal functions are utilised. In these societal functions, the utilisation of a function is in the first place done by a socio technical system. Geels (2004) defines a socio technical system as a cluster of elements and their connections that make a societal function work. In this, the following elements are relevant: science, technology, regulation, user practices, markets, cultural meaning, infrastructure, production and delivery networks. However, a socio technical system can only work because people and organisations make it work. It is the link between the social and technical side of society, in which people adopt a societal function and use it (Paredis, 2009. P. 16). It is therefore not self-governing but it exists solely in relation to a network of actors and social groups. The more complex a society becomes; the more social groups play a role in a socio technical system. Consequently, the more a policy aims for an integral perspective on development, the more complex a socio technical system becomes. In general, a socio technical system looks as presented in figure 2.1 in which the basic elements and resources are included.

Figure 2.1. The elements and resources of the socio technical systems approach. Source: Geels, 2004. P. 4.



The elements of the socio technical systems approach distinguish between the user practices (soft values) on the right side, and the product (technology, hard values) dimension on the left. The middle is where the socio technical system comes together, as hard and soft values intertwine and create human group behaviour. The energy transition is also a form of group behaviour, as it represents a large-scale change in thinking and in acting. So how deep does this relationship go?

2.1.1 Socio technical systems in an energy transition context

The classical socio technical system is divided into two domains, namely the production domain on the left and the application domain on the right. The production side on the left is the technical aspect in which innovations emerge whereas the application domain represents the social, or rather the user aspect of the socio technical system. In the centre, these domains come together in the distribution and adoption of innovations into society (Geels, 2004. P. 5). Figure 2.1 exemplifies the socio technical systems approach for standard innovations and their adoption. It puts emphasis on the way in which innovations are produced and what regulations are needed to steer innovations into the right suit. Furthermore, the use of the technology is elaborated in the application domain in which meaning and

utility are mixed. However, in the case of the energy transition it seems this model is falling short of capturing the entire scope. Since regular innovation is driven by both human desire, utility in use and the production side focused on profits and distribution (Paredis, 2009; Pisano, 2010. P 466), the energy transition is somewhat more characterised by an ethical domain.

Innovation in the energy transition context, so shifting from fossil fuels to green energy sources, is not mainly driven by profit margins or the utility for the consumer, because energy is energy and the source of that energy doesn't change that fact. The simplest way to obtain energy is still the burning of fossil fuels. However, the driving force in the energy transition innovation side is considered to be a shared acknowledgment of the fact that we need to start being more sustainable in order to counter climate change and global warming (Provincie Gelderland, 2016; Kern, 2008; Verbong & Geels, 2007). The ethical motivation of innovation along with regulations and agreements made in, for instance, the Paris climate agreement in 2016 drive innovation in energy technology to new horizons. In figure 2.2, the mix of the ethical driving forces and the initial basic elements of the socio technical systems forms the framework in which this research can be placed.

Figure 2.2, the socio technical systems approach in an energy transition framework. Source: Geels, (2004) & own elaboration.

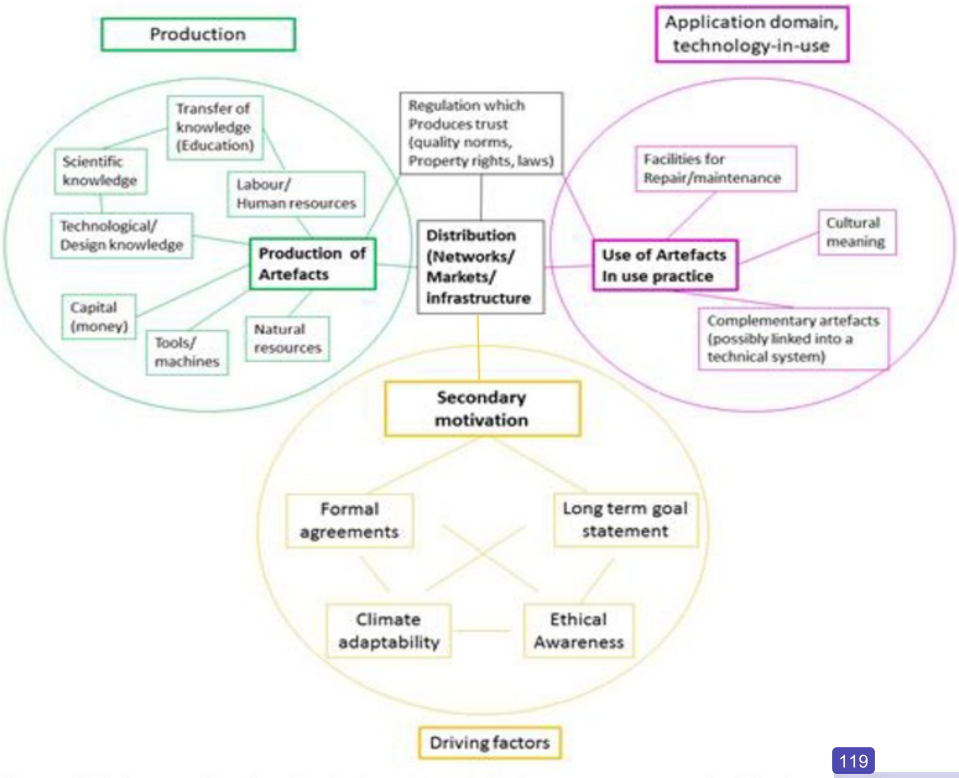


Figure 2.2 shows why the classical socio technical systems approach fall short in the context of innovations in energy transition, due to the lack of ethical movement behaviour in the scope, which has been added in figure 2.2. Unlike normal technology, green energy and the energy transition in general are driven by the need for change rather than the desire for change (Roelofsen, 2016). This difference is subtle though crucial, because it emphasises externalities such as climate change in the role of socio technical systems. Ethical awareness and climate adaptability are translated into formal

agreements and long-term goal statements which form the external motivation of adopting green energy innovation as well as developing green energy innovations. Furthermore, an important factor to consider is the discussions which exist about the energy transition either being an opportunity or a cost for society. Some argue that the energy transition, and sustainability in general always pays off, both environmentally and economically while others oppose this idea and state that the production of for instance a windmill costs more energy than it generates (Roelofsen, 2016). Whilst this is unclear, at the same time a lot of people 'go green' anyway, driven by the conviction that it is needed from an ethical point of view. This explains the third dimension of external motivation in the socio technical systems approach of the energy transition. To analyse how actors in energy transition actor networks are related, their incentive to act as well as their incentives to develop and adopt must be combined (Leendertse, 2016). Figure 2.2 provides that combination and will serve as a guide for further analysis.

2.1.2 Criticism on the socio technical systems approach

The link between behaviour and technology in the socio-technical systems perspective is not unchallenged. Frequent criticism pointed out certain flaws in the system and proposed improvements to make the theory more resilient and applicable to real cases (Kaghan, 2001. P. 256). The basic instinct of the interdependence of social and technical systems of organizations, or in this case society, was one of the core insights of the theory, which is now routinely accepted in both organization and management theories. However, criticism points out the outdated focus on industrial production and industrial relations in the origin of sociotechnical systems approach. The approach was not developed to be applied to a society where technological development in general fields of the market such as sustainability issues could be translated into a change in behaviour and vice versa (Kern, 2008 P. 4094). This provides for an interesting connection to the energy vision of the Province of Gelderland, which states that the individual change in behaviour is falling short to make large scale changes to the sustainability goals. This also raises the question as to how the socio-technical systems approach is related to networks and actor networks within the case of the energy transition more specifically. However, one can argue that group behaviour is the sum of individual behaviour. By having individual behaviour change, can group behaviour be encouraged to change too?

Another interesting point of criticism towards the socio technical systems approach condemns the utility of a rationalist/functionalist approach associated with institutional and evolutionary economics and so called "neo-rational choice" approaches (Kaghan, 2001; Anderson, 1999; Spender, 1996). The assumption, in many economical system theories, is made that an actor in the network is a rationalist par excellence which suggests that all actors will adopt an innovation purely based on rationality and not on gut feeling or on an ethical basis, as figure 2.2 suggests. However, even though one can argue that the underlying assumption of a homo economicus is unrealistic, it does not rectify the utility of the figure of the basic elements of the socio technical systems approach, neither does it tackle the argument that innovation influences behaviour and vice versa. In this context, the socio technical systems approach is still applicable for understanding the energy transition. This will be linked with transition theory in chapter 2.2, to understand how this approach can be placed in the energy transition which is discussed.

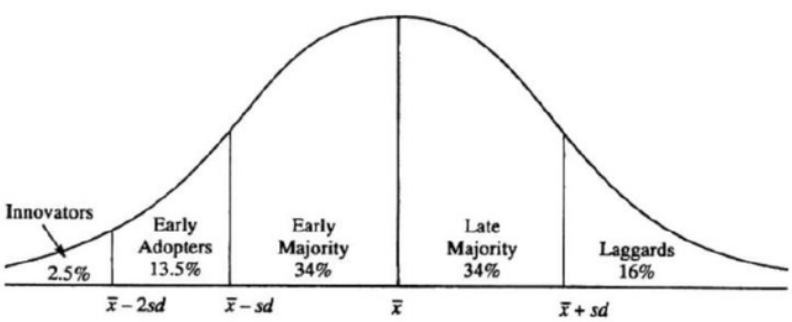
2.1.3 Relating the socio technical systems approach to actor networks

The socio technical systems approach is mainly focused on explaining individual behaviour influenced by innovations and in the case of the energy transition also by ethical drivers. However, in order to place the socio technical systems approach in the actor networks which are being discussed and mapped in this research, there is a need for another perspective.

A perspective one might think about is the relationship between individual behaviour and group - or rather network - behaviour. By seeing how these two relate, we might be able to establish a link between the socio technical systems approach and actor networks. For this perspective, the relationship between individual behaviour and network behaviour (Nisula, 2015; Geels, 2004; Kaghan, 2001) in the adoption of innovations (say technological advancement) can be explained with the help of Rogers' model of the diffusion of innovation (Rogers, 2003).

Looking at the relationship between individual behaviour and group behaviour, tendencies point in the direction of the individual as a shaping factor for group behaviour, rather than the other way around. Even though energy transition policies are developed for the implementation on larger scales, as also stated in the vision documents laid out by the province of Gelderland (Provincie Gelderland, 2015), the individual behavioural change is the offset point on which the actual diffusion of the innovation takes place (Rogers, 2003). The diffusion of the innovation throughout society, or specific groups of society, is transferred from one person to the next. Nisula (2015, P. 433) argues in this respect that individuals, or reserved groups of individuals are always the founders who initiate, promote, modify and ultimately implement innovations. This starts in close proximity and slowly stretches out to more people. Rogers' famous diffusion of innovations model shows this process as seen in figure 2.3.

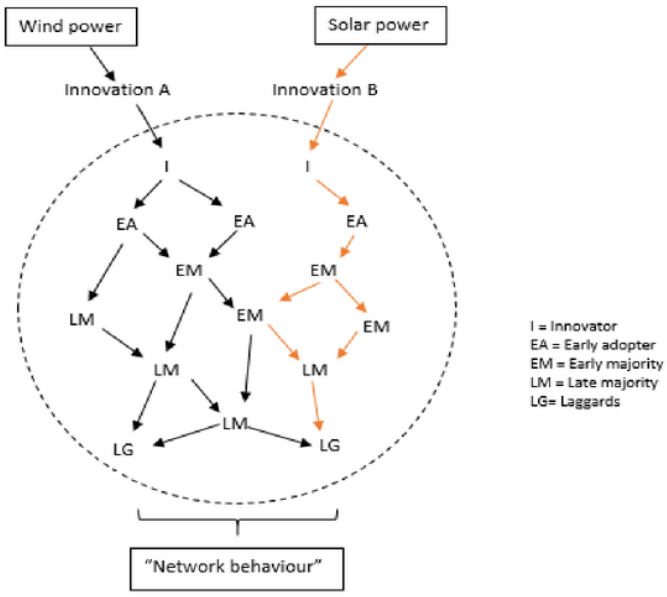
Figure 2.3. The diffusion of innovation in stages of adoption: Source: Rogers, 2003 P. 38.



The individuals who are, according to Nisula (2015), the initiators, promoters, modifiers and ultimately implementers of innovations can be seen as the innovators, the first category of 2.5%. These people set the tone for the rest of society to also start adopting an innovation. From there, the early adopters, the early majority, the late majority and the laggards in turn adopt the innovation as time goes by. This process is called the diffusion of innovations (Rogers, 2003). In this respect, the model shows how a group of people behaving and adopting technology is shaped by the innovators: the individual shaping the group (Rogers, 2003; Nisula, 2015 P. 434). Translating this process back to the socio-technical systems approach and its relationship to group behaviour rather than individual behaviour, we see that the link between those entities is simply the individual as a shaper of the group rather than the other way around. In the adoption of innovations, figure 2.4 (Based on Nisula, 2015; Rogers, 2003; Geels, 2004 & Kahgan, 2001) shows how the process of the diffusion of an innovation (in an energy

transitional context) can move through a group of people, in this; the innovation being the lead influencing factor of actor network behaviour though indirectly related through individual behaviour.

Figure 2.4. Network behaviour as a result of technological innovation through individual choices: The diffusion of innovation. Source: Own adaptation



With figure 2.4, the link between the socio technical systems approach and network behaviour is made, in which the energy transition can be linked to the way in which actor networks behave. Figure 2.4, shows the starting point of two innovations which are adopted by two innovators in a network. These innovators influence the early adopters further downward with their choices and this in turn results in a snowball effect of people influencing each other through the adoption of innovations. The arrows represent one person influencing the others behaviour. The collective outcome of the adoption of innovations in this group of people can be typified as network behaviour consisting of both wind power and solar power minded people. Concluding, the socio technical systems approach serves as a means to frame the energy transition in a link with actor networks and their behaviour. Now the focus shifts towards transition management.

The change of network behaviour resulting from innovation implies a transition from A to B. This transition can be subject to guidance from higher authorities with a certain goal in mind, being able to steer development into a certain direction. This can be translated into transition management.

2.2 Transition management

The theory of transition management is generally applicable in various fields of societal change. In this case, the field of spatial planning and the energy transition, transition management is used as a policy model of guiding transitions in their optima forma. Transition management *"aims at influencing structural change in socio-technical systems alongside system optimisation by a set of coherent policy initiatives (Kern, 2008. P. 409)"* The model was initially developed to overcome structural problems of the lack of sustainability in traditional short-term policy approaches, not only in the field of energy

but also in construction, mobility and agriculture (Loorbach, 2007; Kern, 2008). The transition management model helps us to understand how structural change in energy systems is politically difficult, an insight which is particularly relevant for the province. Attention is drawn to the fact that the role of any governmental agency in governing transitions is inherently political and that a legitimate form of agency is key to make proper choices about sustainability. The interplay between government and the public complicates the transition due to the variety of insights and opinions in the grand public (Smith, Stirling & Berkhout, 2005). To manage transitions, we need to understand transitions and their complexity. First however, we will consider the implications of transition management as a mediator between goal statement and incremental process development.

2.2.1 Transition management mediating between goals and process

Every transition consists of processes of co-evolution involving changes in wants, needs, cultures, practices and institutional frameworks. According to Kemp (2007), sustainable development requires radical change not only in government policy but also in systems of governance as well as functional systems. The processes of co-evolution are deemed relevant when the interaction between multiple sub-systems of society influences the dynamics of singular societal subsystems leading to irreversible patterns of change (Kemp, 2007. P. 80). In this way, change is society wide since its implementation is carried by society itself. Proper transition management however tries to dim this irreversible change down to make change flexible and leave room for mistakes.

The core of transition management is to deal with a variety and multiplicity of activities steered by several actors, different instruments and different mechanisms and driving socio-technical activities (such as the energy transition) into a desired direction. Since the players in the field may change their role over time as being part of a development process, the transition is both internally as well as externally dynamic. To take an example by Kemp (2007, P. 83), an oil company might decide to become an energy company in the middle of a transition. The shift in actor system dynamics, actor configurations, altered power constellations and institutional arrangements can be driven by transition management, in which a selected environment can mature more easily if the focus is there (Loorbach, 2007). As transition management is a policy strategy, table 2.1 shows how it differs from classic policy strategies such as incrementalism on the one hand and (master)planning on the other.

Table 2.1 Goal oriented modulation. Transition management as a mediator between incrementalism and planning (Source: Kemp, 2007; Own elaboration)

	Incrementalism	**Planning**	**Transition management**
Key actors	Private and public actors	Bureaucrats and experts	Private and public actors in collaboration with experts
Steering philosophy	Partisan mutual adaptation learning by doing	Hierarchy	Modulation of developments to collectively chosen goals. Government facilitates and mediates
Role for anticipation	Limited (no long-term goals)	Blue print planning	Long term goal setting by incremental step specification

Type of learning	Learning from quick fixes	First order learning	Rethink following problem structuring
Mechanism for coordination	Markets and emergent institutions	Clear top down, influence based hierarchy	Markets and network management
Degree of adaptivity	Adaptive	Resilient	Highly adaptive through institutionalised evaluation and re-evaluation of goals
Role for strategy and plans	Limited role	Plans with predetermined steps	Important role for goals and strategic experiments for exploration.
Things against which policies are evaluated	Individual goals, short term gains	Predefined outcomes	Policy goals and learning goals, helping to determine what to do next.
Interest mediation/conflict resolution	Individual gains for everyone	Little mediation.	Rewards for innovators, phasing out of non-sustainable practices through markets and politics.
Policy integration	Minimal	Narrow if at all present	Important but evolving
Type of change that is sought	Incremental non-disruptive change	Predetermined outcomes	System innovation and improvement.

Basically, transition management is a strategy of governance. Governance gives body to the theory by being the actual implication of transition management not just as a mediator between incremental process development and long-term goal statement but by presenting itself as a third approach (Table 2.1). The table shows that transition management is not simply a mix between incrementalism and planning but a distinctive approach, at least to some degrees. Kern (2008) argues that the possibility to correct mistakes with low costs gives policy makers the opportunity to adjust the route and prevent a lock in. Also in the energy transition, where the need to act sustainable now is linked to the fact that sustainability developments in energy generation technologies are still in progress. The chance of stepping in the wrong direction on a larger scale by for instance choosing the wrong path of energy focus is relevant due to every changing trade-off in sustainability concerning wind efficiency versus solar efficiency (Kemp, 2007). To sustain a certain degree of sustainability potential in the physical environment, transition management mediates between goal setting and incremental development. Transition management tends to rely on markets and network management to combine elements of long-term planning with incrementalism. Transition management is therefore referred to as 'directed incrementalism' *(Grunwald 2000)*.

2.2.2 Transition management in the energy transition

The link between transition management and the energy transition, and sustainable development in general, is made simply by acknowledging the fact that the energy transition needs to be managed in a way which is neither inapplicable to solely an incremental approach or a (blueprint) planning

approach (Loorbach, 2007). This acknowledgement, on top of the obvious terminology of the energy *transition* and *transition* management, results in the need for an energy transition management approach which will ultimately be formulated in a policy recommendation. The energy transition as perhaps the primary example of a complex system requires a transition management approach in understanding how to deal with the transition in the first place by making a link to the mode of governance, a term which will be addressed in chapter 2.3 into more detail.

Transition management is the approach made to translate a shift in society into an adequate strategy which can be adopted by governments as a form of governance. Kemp (2007) underlines this by stating that transition management is a co-evolutionary form of governance meaning that the process of co-evolution is enabled by the development of an innovative governance contextual approach to transition management. Kern (2008) also supports this by stating that transition management is about organizing a sophisticated process in which elements of a cyclical transition might co-evolve. These elements are the shared problem identification, ambition, experiments, agenda and the monitoring of this through a process of learning about innovations and modern systems.

A big problem for large scale, society wide transitions in general is the dynamic political system which societies deal with. According to Geels (2005), transitions in the past have shown that a generic transition in a socio-technical system takes a generation or even more than one, which encompasses a variety of political cycles. The way in which transitions are formed need to be flexible enough to cope with change and to be able to prevent lock-in situations, while on the other hand a transition needs to be robust and resilient enough to withstand short-term political change. Generally, the only solution for this is for policy makers to accept this and for politicians to accept that their ideals might not be realised during their cycle, whilst at the same time new politicians must accept transitions from predecessors as their own. For this to happen Kemp (2007 P. 82) argues that they must be convinced that a problem needs fundamental change and that this requires time. In the case of the energy transition however, this is expected to not be a problem since the urgency is widely accepted, at least on the policy developer level. Transition management here also focuses on making that switch from policy development towards policy implementation. This policy recommendation is then translated into an approach defined for governmental agencies such as municipalities or provinces and is captured in the mode of 'governance' they practice.

2.3 (Good) Governance

The term 'governance' can be interpreted in a variety of ways, since governance is always case dependant. No two governance policies are 1 on 1 comparable due to differences in culture, site and people in the organisation. It is possible though to compare general guidelines in good practices of governance to a different organisation. The practices of good governance have been challenged in previous research and theories (Graham, 2003; Grindle, 2011; Hawkins, 2015; Hendriks, 2008) regarding the do's and don'ts of governance practices but more importantly the underlying mechanisms of governance and the way in which the different facets of governance come together. Governance as a concept as well as the definition of governance is an issue which is generally quite complex to get clear, as definitions tend to differ in terms of specificity and normativity. However, the definitions are always in line with the implication of institutional process and outcomes as a result of governmental action (Grindle, 2011. P. 201). The awareness of the importance of governance as a key player in determining societal well-being is becoming more and more evident (Graham, 2003). Already

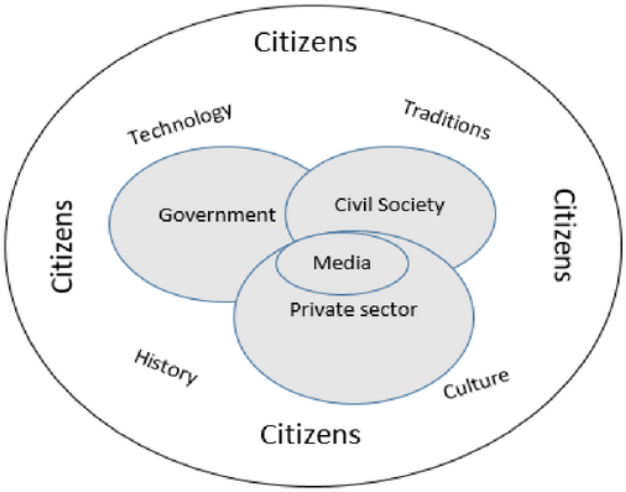
since the 2000s, the role of governance in determining the outcome of development and the eradication of poverty has been acknowledged. However, governance is not good governance per sé. Good governance is a more normative interpretation of governance in which governance is more applied to what 'ought to be'. As a policy ambition, however, good governance should always be a preferred statement (Hawkins, 2015).

A frequent misconception is the relationship between governance and government. They are not the same. One is rather the outcome of the other, the one being governance, which is the term to encompass how the other, being governments and other social organisations, interact and how their decision processes are formed in relationship with citizens. One could say that governance is the active all-encompassing policy of government (Graham, 2003; Hendriks, 2008). To apply 'good governance' practices though, is a very challenging question since modes of governance vary from government to government which makes the mode of governance good in one case, but bad in the other. The principle of 'Good governance' is thus case dependant. Also, because the power relations between the actors in the governance network vary from case to case, governance is widely considered as being split into a part of good practices which are generally applicable and a part of custom tailored implication of governance relevant to the network at hand (Graham, 2003). To see how 'good governance' is applied to networks and to see the range and case applicability of governance as a mould for developing other governance implications, we need to see how power relations are structured and how it is applied to the energy transition topic at hand.

2.3.1 The ranges and case applicability of governance

In principle, governance is the practice of policy management by governments. The way in which this is utilized is case dependant, but it generally encompasses the same authorities and the same levels of society. Graham (2003) describes governance in this respect a way in which the players of society can be captured within an overarching systems approach. The four sectors of society situated among citizens at large are; business, institutions of civil society, government and the media. Figure 2.5 exemplifies these relations. The sizes of the sectors as illustrated in the figure provide a rough clue to the influence each player in society has, considering general power relations in a generic western country. The borders overlap due to the organisations being intertwined and the borders in general being very porous.

Figure 2.5, the four sectors of society in terms of governance practices. (Source, Graham; 2003)



The sectoral overview of governance practices in society as illustrated in figure 2.5 gives a generic insight to what actors are part to be taken into consideration when discussing governance. Within this overview, Graham (2003) as well as Hendriks (2008) regard the topic of the zones governance as a relevant conceptualisation of governance. Governance is namely not just about where to go, but also about who should be involved and to what capacity. In this respect, the case applicability of governance is again rendered questionable.

To address the issue of the case applicability of good governance practices, many researchers have tried to make an overview of the key elements of 'good' governance as a distinctive feature as opposed to 'regular' governance. For instance, Hawkins & Parkhurst (2015, P. 7) distinguish between eight key elements of good governance: It is participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law. Graham (2003, P. 3) in turn distinguishes between five principles of good governance: legitimacy & voice, direction, performance, accountability and fairness. Of these frameworks, that of Hawkins & Parkhurst (2015) is the most recently developed framework derived directly from the UN economic and social commission. This framework of eight principles of good governance can serve as a starting point to develop a governance policy, but also to be able to critically address current modes of governance according to their applicability with good governance.

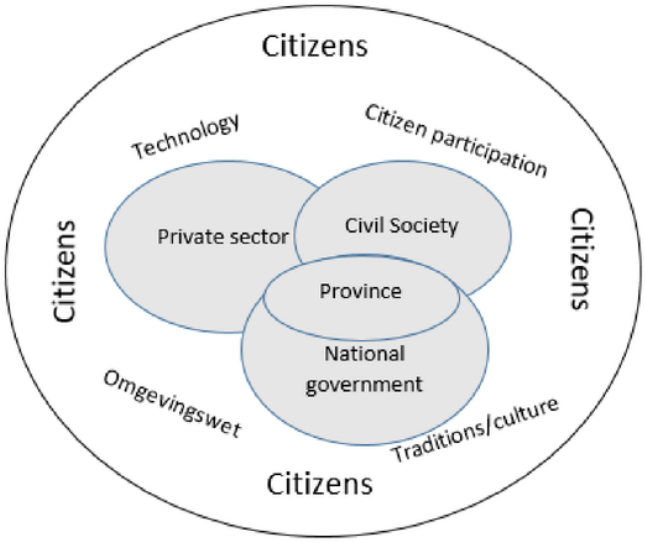
2.3.2 Applying Good governance to the energy transition

The application of Good governance to the energy transition reverts to the chapters on the socio technical systems approach and the transition management. The energy transition identified as a socio technical system development framed into the theory of transition management as a tool for addressing the transition of this socio technical system, is in the practice of spatial planning translated into a policy. It is necessary to underline the mechanisms at the root of the energy transition to understand the way in which governance should be practiced. In this sense, governance is the end-product of a properly managed transition of this socio-technical system.

The distinctive zones of governance which encompass certain forms of collective action, also go into the role of governance in 'national space' (Graham, 2003. P. 2). He states that Governance in national space is understood as *"The exclusive preserve of government, of which there may be several*

levels: national, provincial or state, indigenous, urban or local". In this national space, governance tends to how actors such as civil society organizations may play a role in taking decisions on matters of public concern. This actor perspective of governance leads back to the main question posed in this research, namely what the role of actor networks are in the energy transition and how the province should play a role in facilitating the transition in these networks. A proper mode of governance seems to be the key here, and developing such a governance policy requires key insight in the actor network itself, into the power relations between the actors, the ambition of the governmental body relevant to the case and the way in which the transition is or is not societally wide carried (Hendriks, 2008). Looking back at figure 2.5, we can develop a framework more applicable to energy transition as a way of analysing the role of different sectors in the energy transition (Figure 2.6).

Figure 2.6. The sectors of governance policy in an energy transition framework (Source: Own elaboration, 2017)



From this scheme of governance policy in energy transition, but also from figure 2.5, it becomes apparent that the role of the public is grand. Citizens in both policy development as well as citizens in policy implementation are key elements in deciding the 'goodness' of governance. 'Spatial planners plan for citizens, so we should plan with citizens' (Innes, 2000). Interesting in this respect is to look at how the role of the citizen in spatial planning is situated. In existing academic literature on the role of the citizen in spatial planning practices, the role of the citizen has been both cast out of scope (Moothe, 1997; Innes, 2000), but more recently getting the acknowledgment of fulfilling a key role (Selter, 2012; Rijksoverheid, 2016).

2.4 Citizen participation & Co-creation

Citizen participation and co-creation are two concepts which are much alike. Where citizen participation is more about the implementation of a process focused implementation of citizens in developing a plan on the level of steering and guidance, the concept of co-creation goes deeper into

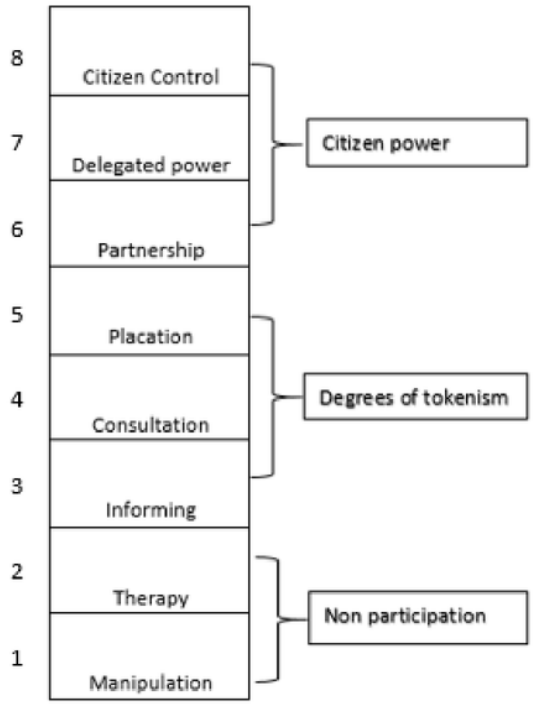
collaborative enterprises where actual plan development is a shared and mostly equal process between client (or citizens) and other actors; for instance, the government or private investors (Leendertse, 2016; Van de Ven, 2016). Co-creation is therefore a part of citizen participation.

The apparent role of citizen participation in the shaping of actor networks and in the adoption of energy transitional movements is deemed critical for a transition to succeed. This is because a transition, as discussed in the transition management chapter (Kemp, 2007; Loorbach, 2007), needs to have society wide support to succeed. In the case of energy transition, even though provinces have stated that individual changes are not enough to achieve large scale changes in sustainability issues, the individual needs to be incorporated in every project and the degree of involvement needs to reach all the way into individual households. However, citizen participation is not that straightforward, and a lot of research has gone into the implications of proper modes of citizen participation (Innes, 2000; Schweizer, 2016), of which Innes is the most critical, stating that citizen participation in the 20th century has failed gradually, hereby defining the challenges for the 21st century in terms of proper citizen participation. The question is, how can citizen participation and co-creation support the sustainable development of the energy transition on a larger scale and how should it be incorporated in a governance policy?

2.4.1 Citizen participation

One of the ground thinkers on citizen participation theories is Sherry Arnstein (1969). Citizen participation as a concept is firstly introduced by her quoting that *"The idea of citizen participation is a little like eating spinach: no one is against it in principle because it is good for you."* (Arnstein 1969, p. 216). The perspective on citizen participation is this sense is positive, since it; 1) can improve transparency of decision making, 2) Improves robustness and integrity of developments due to the increased grassroots participation and 3) Early citizen involvement can result in a in a direct integration of consumers into the future processes (Schweizer, 2016, P. 207). However, ever since citizen participation became a element in spatial planning, the debate has been going on as to whether citizen participation is tokenistic, lacking the required degree of delegated authority to make citizen participation meaningful (Lane, 2005). The difference between citizen participation being meaningful and it being an empty ritual lacking actual implementation power is heavily debated as well, since it is commonly appointed as a responsibility of citizens and their incentive to properly participate, as well as it is appointed as a responsibility of the planner in properly facilitating participation opportunities (Sandercock, 1994). This debate tends to look at citizen participation as either it being a form of non-participation, tokenistic participation or citizen powered participation. The first conceptualisation of this was made by Arnstein (1969) in the form of a participation ladder (Figure 2.7).

Figure 2.7; The ladder of citizen participation. (Source; Arnstein, 1969; Own elaboration)



The ladder of citizen participation assumes a certain order of the degree of participation in which the highest step of participation in the ladder, citizen control, is the best mode of participation (Arnstein, 1969; Lane, 2005). As you move along the ladder upward, the degree of influence of citizens increases until you reach the top of the ladder, which generally symbolises the optimal stage of any ladder. Much criticism on this rather simplified way of looking at participation has focused mainly on the case-dependant preference of citizen participation (Crispin, 2012; Morrisey, 2000;) which is unlike the ladder of participation suggests, not always citizen power, on top of the ladder of citizen participation being provocative in its general presentation of the relationship between community and government (Crispin, 2012). This provocative writing style has led to the participation ladder being revisited and taking on a more neutral approach to the stages of participation.

The participation ladder remains in a sense of suggestive framing of participation where more power to the citizens is deemed better indefinitely. However, among others, Frantzeski (2012), Morrisey (2000), Geurtz (2012) and Schweizer (2016) tend to argue otherwise. In making participation work, it should be case-specific (Geurtz, 2012), it should attend to citizen's interests (Geurtz, 2012) and it should be inclusive (Schweizer, 2016). In some cases, this will lead to a situation in which the degree of citizen participation would fall under the category of consultation, in which citizens work together with planners to develop ideas which can then be implemented, a form of citizen participation which is deemed tokenistic by Arnstein (1969) (See figure 2.7). The case-specificness of citizen participation not only ensures tailored processes for participation but it also prevents participation to become an empty ritual for the planner, due to it being the same again and again. It is also necessary due to the changing expertise in the planning case at hand, where sometimes consultation is the only sensible outcome of participation, whereas in other cases, the degree of initiative as well as the knowledge within society is of such significance that it should be met with a likewise degree of authority.

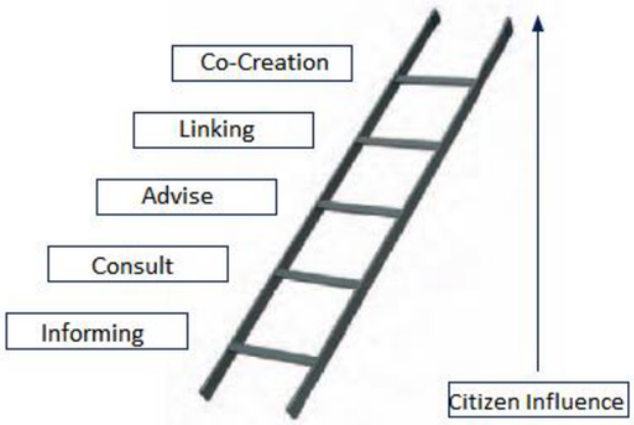
Developing a practice of citizen participation is more difficult than presented here, with a clear overview of the levels of participation as well as the elements of participation which work best. This is pointed out by Innes (2000). She states that according to her observations on participation in the 20th century, we as planners should face the fact that legally required methods of citizen participation have failed gradually over time. They fail to achieve genuine participation and lack the satisfaction of members of the public that they are being heard (Innes, 2000). Sandercock also points this out (Sandercock, 1994) by stating that participation has seldom improved decisions made by public officials and planners and it often results in pitting citizens against each other as they struggle to get their points across. Citizens get discouraged and this results in participative exhaustion. Due to overly complicated law and regulations and the number of actors within generic projects, citizen participation as a legally required element of plans has often been regarded as a side issue which could be dealt with swiftly and insignificantly to make the process easier (Innes, 2000; Sandercock, 1994). Also, citizens not only bear the potential to help develop plans, but they can also impede planning processes. Protest movements from citizens against infrastructure planning normally point at the fact that: 1) citizens are expected to forego personal conveniences to favour the benefit of the community at large, 2) the purported benefit to the community is a matter of controversy. In a globalized and individualized society, it is becoming increasingly difficult to portray community benefit in a manner that everyone accepts, 3) citizens directly influenced by a project perceive decision making as being intransparent, inscrutable or even corrupt. This is associated to planning being the complexity and plurality of political planning processes (Schweizer, 2016).

More recent developments in citizen participation especially in the Netherlands have been going towards facilitating a bigger role for citizens to incorporate initiatives in their own environment as well as them being able to bring decisive advice/decisions into the field. This development is part of a larger package called the new Dutch "*Omgevingsrecht*" (Environment Act) which will overhaul the Dutch legal framework of planning and has defined citizen participation as one of its six major ambitions (Stibbe, 2015). This environment act will be implemented in 2019, which will raise the importance of citizen initiatives, as well as the focus of development in the context of co-creation.

2.4.2 Co-creation

Co-creation and citizen participation are intertwined, since co-creation is a practical application of the theory of citizen participation. Co-creation is the idea of collaborative development of plans between all stakeholders, reaching consensus and a shared satisfaction about the outcome. In this collaboration, presumed is that private developer, citizens and government are equals in shaping the plan regardless of the division of influence and power. Looking at the participation ladder of Arnstein, Connel et al. (2011) argue that co-creation falls under the top 2 categories of participation according to the degree of influence of citizens. Co-creation puts a lot of emphasis on the role of the citizen, where the initiative for development in co-creation can also come from the citizens since they are equal to the government (Connel et al, 2011). Latching on to critics on the ladder of participation of Arnstein (1969), Connel et al (2011) developed their own framework of participation for the government to employ in co-creation ambitions (Figure 2.8).

Figure 2.8, The ladder of citizen influence in planning processes (Source: Connel et al, 2011; Own elaboration)



The ladder proposed here by Connel et al (2011) presents a more dimmed down visualisation of the degrees of citizen participation where one step represents a different mode of participation with varying modes of citizen influence, rather than a hierarchy in which the higher step is always the better step like the suggestive ladder of participation by Arnstein (1969).

The definitions of the steps are as following (Connel et al, 2011 P. 36)

- Informing: The public ministry informs the citizen
- Consult: The public ministry dictates to a large degree the agenda. Citizens can give input, for instance through participation or citizen polls. The results of these polls can be taken into the policy but they are not binding in terms of following through with it in policy development.
- Advise: The citizens can give advice on the content by discussing terms in groups of citizens. The ministry is again not bound to the results of the advisory trajectory but provides feedback to the citizens as to what is done with the input.
- Linking: The public ministry and the citizens make an agenda together and work towards solutions together. On top, everyone gets his own role and responsibility in which they work on a product.
- Co-creation: Shared influence, equal roles and a shared responsibility for the end-product for both citizens and public ministry. The citizens help in decision making, which causes a situation of entangling interests.

For co-creation, the shared influence, equal roles and a shared responsibility for the end-product requires some degree of devotion from society to fill in this role. Citizens need to attend to these matters and find a way to combine this with their normal lives. In general, in participation trajectories in which citizens are entangled, the citizen works on a free basis as a volunteer to the project (Leendertse, 2016). This means that apart from their work, social lives, hobbies and families, citizens need to invest time and effort into these projects. A matter which is being contested in general thought about participation theories and policies (Van den Broek, 2016; Connel et al, 2011). Co-creation is a noble cause; however, the degree of feasibility is a much-debated topic.

In terms of co-creation in the energy transition, we see the need for a strong and resilient basis of support in infrastructural developments. From the bottom, a lot of protest is generally present in the development of for instance windmill-park development, due to the negative external effects that are present. So how can co-creation fit into the energy transition, and how do other modes of participation rhyme with the policy of integrating bottom up initiatives in decision making?

2.4.3 Citizen participation and co-creation in the energy transition

The link between citizen participation and co-creation to the energy transition is the topicality of both in present-day planning. The increased emphasis on citizen participation and co-creation in multiple levels of both plan development and as decision making processes lead to a more integral way of working. This, in turn, connects to the shared acknowledgment of academics and energy specialists that to realize and, more importantly, sustain society wide (energy) transitions, there is a need for society wide support which might only be achieved through participatory trajectories (Leendertse, 2016; Schweizer, 2016 P. 208; Selter, 2012). Individual enterprises to enhance the level of green energy usage fall short to realise big steps in sustainability goals. The realisation to enhance green energy initiatives to group levels and bring them in a society wide transitional context has generally landed (Coutard, 2010; Provincie Gelderland, 2015; Gooyert et al, 2014). Realisation however is just the first step. The energy transition does not only pose challenges to society in terms of embracing change and accepting the transition at hand, but it also poses challenges to governance and planning infrastructure (Schweizer, 2016).

Challenges and disadvantages are inherent to transitions and are also generally associated with participation processes. Proper inclusiveness of participation processes is not guaranteed. Furthermore, individual local solutions might not fit the bigger picture as envisioned by policy makers. Schweizer (2016) exemplifies this by taking the German energy transition as case, stating that the rationale behind the interconnecting parts of the energy transition can be made explicit to the involved actors in the process through means of citizen participation. The process can highlight how the integrated structure of the energy transitional system is made up out of various elements which fit together. The insight given from this can address consensus about the need for, the costs of and the gains from the energy transition in general (Gooyert et al, 2014).

There is a link between citizens and the energy transition as the need for sustainable development is high. For planners, this link to the energy transition is the same. The need for the integration of citizens in the energy transitions can also be found in the negative approach towards planning; which are protest movements from bottom up. Protest movements from citizens against infrastructure planning have targeted the following issues. 1) Citizens are expected to forego personal conveniences to favour the benefit of the community at large. 2), the purported benefit to the community is a matter of controversy. In a globalized and individualized society, it is becoming increasingly difficult to portray community benefit in a manner that everyone accepts. 3) Citizens directly influenced by project perceive decision making as being intransparant, inscrutable or even corrupt (Schweizer, 2016). This is associated to the complexity of planning and the plurality of political planning processes.

Regarding the need for citizen participation in the realisation of the energy transition on a society wide scale raises the question how policy can be adjusted accordingly. The framework of law, policy and ambition in which planner's manoeuvre is largely influencing the guidance process. Law both allows and prevents certain developments, policy steers action and ambition straightens the overall working direction. Looking at the Dutch case, this framework is about to change considerably in the form of the *'Omgevingswet'* (Environment Act). Any policy regarding citizen participation in the energy transition will need to fit in this framework.

2.5 Planning law

Now that the elements of the energy transition in terms of perspective, underlying mechanisms and policy adaptation in terms of governance have been discussed in the theoretical framework, the final relevant element to be discussed is the juridical framework of planning. Planning is framed by law and jurisdiction, both allowing, steering and preventing certain developments. The first framework in Dutch spatial planning dates back to 1965 and was called the Wro (Wet ruimtelijke ordening; From here EA - Environmental Act). The EA has since been revised numerous times, ultimately being overhauled into the second EA of 2006. This legal framework is however once again scheduled for maintenance. Due to an overcomplex system of law bundles, articles and policy boards, the Ministry of Infrastructure and Environment (I&M) decided to overhaul the system once again to simplify law, shorten bureaucratic processes and make planning more efficient and effective (Rijksoverheid, 2016; Stibbe, 2015). What this encompasses is the complete riddance of the current regulatory law framework and the instalment of a completely new planning law act, the *'Omgevingswet'* (OW). Stibbe (2015) points out that the main reason for the development of the OW is the need for simplification. By combining 26 articles into a single environmental vision, and scrapping 5000 laws to be re-interpreted into 350 laws, a lot of unnecessary bureaucratic mazes can be avoided in favour of efficiency, effectivity and administrative decision space (Rijksoverheid, 2016). The revision of the entire framework of planning law will inevitably change the practice of planning, but how? And how does this relate to transitions, energy and policy making in terms of governance?

2.5.1 Omgevingswet

The role of law in spatial planning has always been to mediate between juridical stability and practical flexibility. This trade-off is traditionally characterized by a swinging equilibrium, swinging from more flexibility to more stability back and forth (Needham, 2012). The OW represents the swing going more towards flexibility. So, what does the OW represent, apart from the simplification of law?

The following four goals are the cornerstones of the OW, which have been set out to achieve on the long run (Stibbe, 2015 P.6; Rijksoverheid, 2016).

1. Improving the overview, predictability and the user friendliness of planning law.
2. Realising cohesion in approaching the physical habitat, decision making processes, policy and regulations as interrelated entities
3. Enhancing the administrative decision space by allowing an active and flexible approach for reaching goals for the physical environment.
4. Accelerating and improving decision-making in projects about the physical environment.

The first point is improving the overview, predictability and the user friendliness of planning law. The current EA consists of 26 articles of spatial planning and more than 5000 laws to frame spatial planning's legal side (Rijksoverheid, 2016; Stibbe, 2015). Current zoning plans are relatively narrow in their spectrum, since they mostly cover a single aspect of the physical environment. Moreover, rules for water, infrastructure, construction, nature, sustainability etc. are being combined into a single zoning plan. Combining multiple fields of spatial planning to realise a more integral policy also helps to improve the integrity, the predictability as well as the use friendliness of law (Van den Broek, 2016; Rijksoverheid, 2016).

Secondly, achieving cohesion and approaching the physical habitat, decision making processes, policy and regulations as interrelated entities. The integration of multiple fields of spatial planning allows for a holistic perspective. The Dutch government is hereby stating that by decentralizing spatial planning throughout the Netherlands, it wants municipalities and provinces to write their own Environmental vision (Rijksoverheid, 2016). This vision must incorporate all the relevant fields of spatial development, also including semi-spatial developments such as the energy transition and sustainable development in general. Vision development in this respect puts an increased emphasis on the relationship between the role of the citizen and the private investor as main sources of initiative in society. Developments from the bottom should become the norm, and the municipality/province/government should be a facilitator.

Thirdly, enhancing the administrative decision space, an ambition which is closely related to the ambition of achieving cohesion in the physical habitat and in decision making processes, since administrative decision space gives policy makers the opportunity to deviate from regulatory frameworks to some degree to contribute to 'good spatial planning'. This is about more than just deviating from the zoning plan (Wro, 2006). It is also about approaching soft values as important factors in decision making. Take for example the development of a windmill near a house. Law and regulations state that a windmill should be equipped with a so called 'stopping device' when a windmill is within twelve times the diameter (of 90 meters) of the rotor blades to a house (so within 1080 metres) (RVO, 2017). Say, that due to geographical externalities and other issues, the furthest it can be built away from a house is 900 metres. The administrative decision space states that "If all the stakeholders agree, which includes the citizens who deal with the external effects of the windmill, to the construction of the windmill despite its incoherence to law and regulations, it can be built nonetheless". Of course, these decisions need to consider changing actors and cannot deviate too much from law, but it does exemplify the flexibility of the system.

Finally, the acceleration and improvement of decision-making in projects about the physical environment. This can be seen mostly as a contraction of the three earlier stated goals, as it encompasses the simplification of law, the enhancement of administrative decision-making room and the user friendliness of EL. The result is all about improving spatial planning, which can be achieved by utilizing this toolbox to its maximum potential (Van den Broek, 2016; Stibbe, 2015). (Side note: this is a projected potential, since there are no definitive forecasts)

For the realisation of these four goals, the ministry of infrastructure and environment formulated six key instruments. First, the *environmental vision*, a holistic strategic plan for the physical environment. Second, the *program*; a package of policy ambitions which serve to realise environmental norms or targets in the physical environment and to sustain these. Third, the *environmental plan* of the municipality; this is a combination of the water regulation and the environmental regulation of the province, in which the decentralised commission fixes general rules and legal requirements of permits. Fourth, *General rules of the national government* for activities in the physical environment. Fifth, the *environmental permit* and finally the *project resolution*, a generic regulation for decision making about projects with a public interest. (Stibbe, 2015; P.8)

2.5.2 Omgevingswet as an energy transition framework

The link between the *'Omgevingswet'* and the energy transition can be found in combining the linkages between paragraphs 2.1 through 2.4, and their relation to energy transition. The *'Omgevingswet'* is the toolbox in which spatial planning will need to redevelop but more importantly re-identify processes of collaboration and spatial planning policy. This toolbox encompasses the way in which future energy

transitional initiatives will be implemented (Van den Broek et al, 2016), will change the way how co-creation and participation trajectories are executed and the way in which governance policy should operate (Stibbe, 2015).

The OW is thus the all-encompassing framework in which spatial planning (including the relationships between behaviour and technology, transition management, governance and participatory trajectories) will need to find a way to facilitate the energy transition. Sustainability is key in the societal goals of the OW (Van den Broek et al, 2016; Stibbe, 2015). The transition to an energy neutral society has its influence on the physical environment. This transition hits the national government, which puts emphasis on the relevance of the energy transition for the national environmental vision. As discussed in the previous paragraph, the integral vision development for the physical environment is also one of the key aspects of the OW, which means that through participation and consensus based decision making processes, the OW allows bottom up initiatives to incorporate green energy into society. Tensions in the energy transition due to a lack of support from citizens manifest themselves predominantly on the local level, for instance during the development of windmill parks. By combining the focus on sustainability throughout all policies and by integrating citizens in decision making, the OW aims to overcome such issues (Van den Broek et al, 2016; Rijksoverheid, 2016).

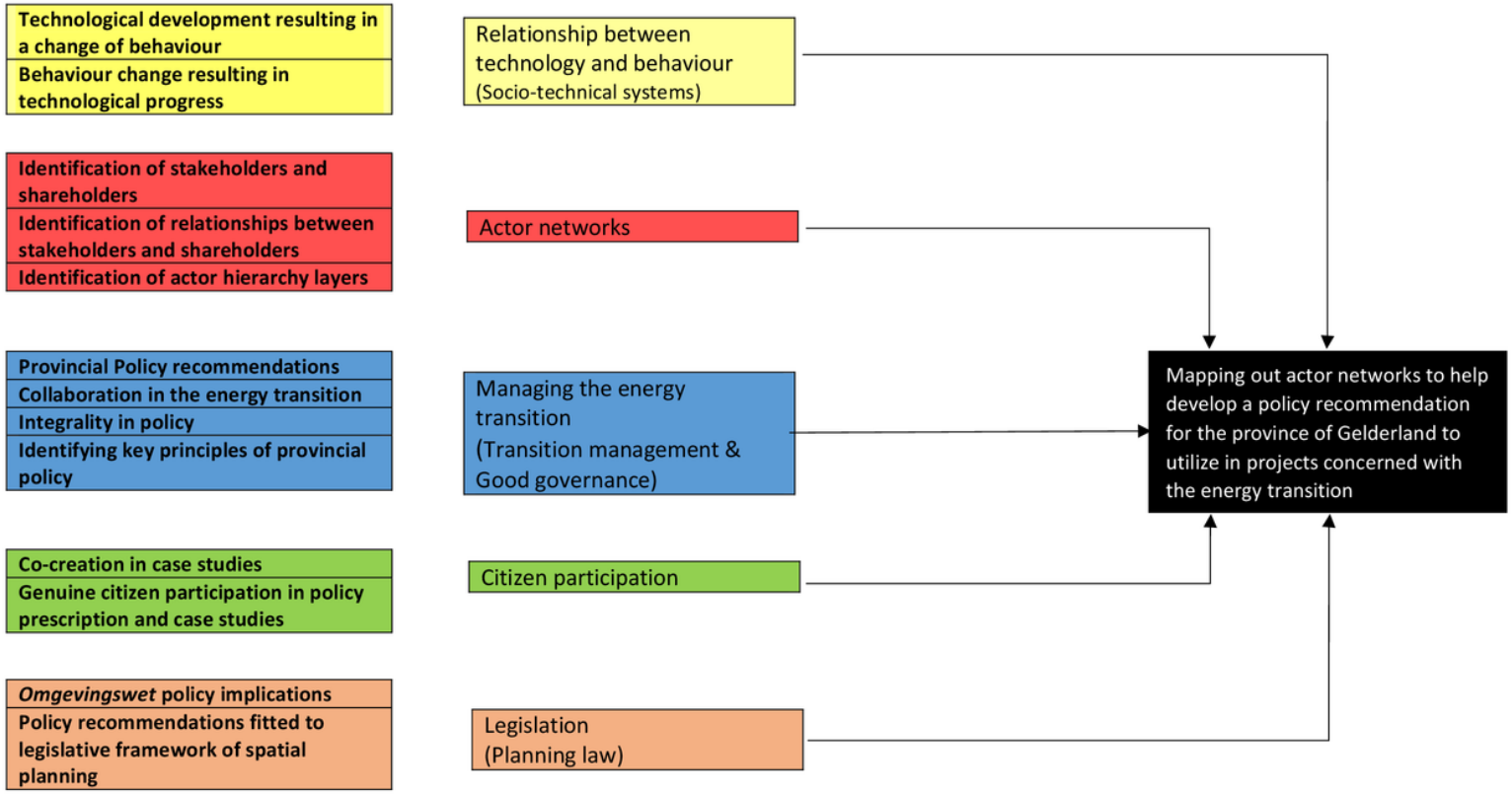
2.6 Operationalisation & Conceptual model

The operationalisation of theory into practice encompasses the translation of complex theoretical concepts into a measurable or manipulatable variable (Table 1). These complex theoretical concepts are also known as constructs, which are concepts of such an abstract level that they cannot be observed (Boeije, 2009. P 143). These constructs are placed in a theory to better understand a series of phenomena in their context and explain it. This is considered the only way to gather knowledge on concepts, because constructs on itself are per definition not observable. For example, one cannot observe how the energy transition is integration is society, but one can observe how windmill parks or solar panels influence our energy supply. From observations like this, a researcher can draw conclusions through inductive generalisation. The central concepts in this research are: '*Socio technical systems*', '*Actor Networks*', '*Citizen Participation*', '*Transition Management*', '*Good Governance*' and '*Planning Law*'. These concepts can be dissected into segments, shining more light on the role of each concept in the end-product of this research. Note that Transition management and good governance are combined into managing the energy transition. Figure 2.9 presents this graphically. The colours represent the different concepts and their components, and the arrows represent the concepts being part of the grand picture of the research goal as stated on the right.

Table 1, Concept operationalisation

Central concept	Operationalisation
Socio technical systems	The analysis of human behaviour concerning the adoption of sustainable measures resulting from technological developments in the energy sector and vice versa to explain the growing amount of energy initiatives through bottom-up incentives. Does technological development change human behaviour?
Actor Networks	A collective overview including the relationships of all stakeholders, shareholders and initiative-takers concerned with the development of an energy transitional project. Relationships in terms of money, positional power, contracts or knowledge that shape the way in which actor's influence each other and steer the project.
Citizen participation	The degree of inclusion of citizens in the processes of plan development and plan implementation, both in terms of allowing bottom-up initiatives as well as actively engaging citizens in more top-down processes.
Transition Management	Shines light on the role of the government in the guidance of the energy transition which combines the strategies of incrementalism and master planning through transitional policies. This is measurable through analysing policy documentation and visions in terms of their compliance to the socio technical systems approach.
Good Governance	Government policy focused on the energy transition in terms of supporting, allowing, facilitating or actively steering the energy transition in projects. This also includes the role of the government in the actor network
Planning Law	The whole of law as a framework from the implementation of the '*Omgevingswet*' for the energy transition in terms of allowing, disallowing and/or supporting actor networks in their energy transition initiatives.

Figure 2.9. A conceptual model of the operationalised theory.



3. Research Methodology

Giving a decent answer to the research questions requires the translation of theory to empiricism. This chapter provides the research methodology which is central to this translation, hereby following up on the operationalisation given in chapter 2. The auditability of the research increases by justifying all considerations, decisions and steps taken in the collection and processing of data (Korzilius, 2008 P. 31). In paragraph 3.1 the research strategy will be discussed, in which the arguments for using a qualitative methods approach are justified, consisting of interviews and a plural case-study. Paragraph 3.2 in turn will shine light on what kind of data-material was needed to answer the research questions. Paragraph 3.3 thereafter discusses how the data has been analysed and in paragraph 3.4 the validity, representativeness and reproducibility of the research are discussed.

3.1 Research strategy

The choice for a certain research strategy is one of the most decisive choices within the trajectory of an investigative project. A research strategy is defined as *"a coherent set of interlinked choices about the way in which you will carry out the research. In this execution, the most important aspect is mainly the collection of relevant material and the processing of this material into valid answers to the research questions."* (Verschuren & Doorewaard, 2010 p. 159). It Is important to match the strategy to the research question due to the large dependency on the research strategy as a leading factor for realising proper results. As a reminder, the research questions are presented below.

Central research question

How extensive are energy transition actor-networks in the province of Gelderland and what role for the province is desirable in terms of 'good governance' in these actor networks considering the changing development of the legal framework of spatial planning by the 'Omgevingswet'?

Sub questions

1. *What is the relationship between technological innovation and human behaviour in explaining the recent energy transition boom?*
2. *How extensive are energy transition actor networks in the province of Gelderland concerning the scope of actors and the relationships between the actors?*
3. *What is the most ideal and socially desirable practice of 'good governance' for the province to implement, to support energy transition actor networks?*
4. *How does the 'Omgevingswet' change the relevant framework for the energy transition and how can it offer opportunities to enhance collaboration in these networks?*

The selected research strategy needs to comply with the information required and must provide the right tools to do so. Consequently, in choosing a strategy one must know what knowledge is needed to answer the research questions. This process can be typified as back casting; by looking at what knowledge needs to be found first, and then looking at the process of which strategy delivers the right tools to do so (Boeije, 2009).

3.1.1 Interview based research

Mapping out the actor networks of energy transition initiatives requires an approach which can both help to identify the actor-networks, as well as identify the role and degree of power in terms of

hierarchical structure between the actors. The second focal point is the development of a governance strategy for the province of Gelderland as how to act as a mediator/guide/facilitator in such a network. An approach is needed which consist of an in-depth identification of the actor network tool and the relations in these networks but also discuss provides the option to discuss governmental interference and the preferences of the actors for such a collaboration.

This research will conduct several interviews to map out an actor network in an infrastructural project concerned with the energy transition. The discussion of a variety of topics and providing the possibility to ask follow-up questions that go more in depth on certain (potentially) sensitive topics corresponds with the chances provided by interviews. The advantage of the qualitative approach of interviews compared with a quantitative approach which utilizes surveys, is that interviews allow follow-up questions, whereas surveys merely scratch the surface (Boeije, 2009). Furthermore, the interviews have been aimed at discussing topics of relationships between the actors in the network and finally the role of the government in such networks has been addressed, it either being the province, the municipality or even the national government.

3.1.2 Desk research

A stand-alone interview based approach is not enough to address the entire scope of the research. Since conducting research is like standing on the shoulders of giants, one should prevent inventing the wheel over and over again. Instead one should rather lay the next stepping stone, building on the discovered knowledge of those before him. This is what is known as desk research, to provide a basic understanding of the topic at hand and to use documents other than empirical data. The main outcome of desk research is the theoretical framework. A degree of desk research to stand at the basis of the empirical part of data gathering part is necessary in every research. For this research, the basic parts of the actor-networks can be addressed by tapping into policy documents. A degree of desk research is generally a rather large part of any research as it sets the basis of the empirical research part.

For this research to be completed, the mapping of actor networks can be started by simply investigating documented policies and public agreements between actors. The *"Gelderse Energie Akkoord"* (GEA; Gelderland Energy Agreement) is an example of a public agreement between actors which shows 100+ parties that have signed a provincial energy deal. This deal declares time stamped ambitions concerning energy neutrality and climate neutrality. The lacking information from desk research was added through interviewing relevant actors. In this research, such information will target the relationships between actors and their instruments of power/influence. Furthermore, to discuss the topic of governance and the role of the province, the interviews will add an in-depth insight as to what actors wish and require from the province, again a topic which cannot be addressed by doing merely desk research.

Desk research is however not only aimed at addressing the topics which have also been discussed in the interviews, but the desk research also provides information for chapter 2, namely the theoretical framework. The linkages between theory and practice are founded in theory, which in addition supports the empirical part of the research and give meaning in an academic perspective. In this sense, the basis of the research is desk based, and the further implications were built on top of this.

3.1.3 Multiple case study research

The goal of the second sub question is to get a clear overview of the networks of two specific cases in infrastructural development. To this end, the ambition is to design a governance policy for provincial

interference in energy transition initiatives. In the implementation of this research, there is no actual difference in chronology between case study research, desk research and interviews since they are all intertwined. Since the interviews are done with actors in the networks of respectively the projects of 1) Cleantech Icon A1 and 2) Wind turbine park Deil, the interviews are inherently part of the case studies.

Why these two case studies? The reason to select the project of the A1 highway and the Deil wind turbine park is made because of the differences between these projects. The case studies provide a zoomed in perspective on the actor network of the entire province of Gelderland. Analysing the entire actor network in detail according to the GEA, is too all-encompassing to fit with a proper research on the relationships between all the actors in terms of instruments of power. Therefore, the idea is to implement the perspective from two cases which provide just a small fragment of the whole, but show how such networks are constructed in detail. This research delves into the actor networks by identifying which instruments of power the actors have, how they use these and what their mutual relationships the actors. Furthermore, the case also looks at the role of the province in these actor-networks. How can the province work towards helping to improve the energy transition initiative and again, which instruments should be used for this?

A case study is characterized by the fact that this research strategy investigates a certain concept from different perspectives in a detailed manner (Vennix, 2010, P.103). When a research requires more in-depth information for details to a project, a case study is a good addition to doing interviews (Vennix, 2010, P103), or in this case a good vehicle to conduct interviews and get the empirical research started. To develop proper recommendations to the province of Gelderland in terms of governance, it is necessary to collect detailed data about the way in which the role of the province is envisioned by actors in their respective projects. The kind of information they would require to effectuate the best mode of collaboration between private and public sector is the starting point in this discussion. Due to a limited time frame and the grand scope of the province, it is self-evident not to take the entire province as a case but zoom in two smaller cases.

Creswell (2007, P. 73) states that the research subject needs to be defined by a demarcated system such as a process, an activity, an event, a program or an individual. If this is not the case, a lot of discussion may occur about whether to include some elements in the research. Since the cases here are demarcated by the actors, individuals which are concerned in the case networks, these projects can be considered appropriate research subjects.

3.1.4 Qualitative research

This research consists of interviews and case studies as units of research for empirical data gathering. The combination of these tools is known as qualitative research. In a broad sense, qualitative research is concerned with elucidating human environment and human experiences within a variety of conceptual frameworks. This encompasses the entire process from defining research question to the analysis and interpretation (Hay, 2010. P. 5). Qualitative research answers two fundamental questions which are either concerned with social structures or with individual experiences. This dualism can be hard to disentangle, but is of crucial importance to explaining certain issues. Individual experiences and behavioural characteristics might not be determined by their personal characteristics but by their position in a social structure, a network. Hay (2010) takes the question "*What is the shape of societal structures, and by what processes are they constructed, maintained, legitimized and resisted?" (P. 5)* as an example for qualitative research. This example is very much alike the central research question

of this research, concerning the social construction of the energy transition in Gelderland in terms of actor networks.

To dissect such a network and look at the relationships between the actors, interviews can shed light on such questions. A disadvantage of quantitative research, where the number of people that can be questioned is higher, is that the degree of detail of the information is lagging. Hay (2010, P. 13) and Boeije (2009, P. 250) state that the main reason for utilizing the potential of qualitative research is the gained understanding of social structures which can be realised with this approach. Furthermore, knowledge from one interview can be applied in other interviews, either for validation purposes or for more clarification purposes. This enhances the validity and with that the quality of the research.

3.2 Data collection

The data collection part of the research forms the central embodiment for the formulation of conclusions and recommendations. Combining existing knowledge with new knowledge creates new insights (Boeije, 2009). The data collection will be done through a variety of tools. First, the literature study (desk research) will be used to collect present knowledge and create an overview for the starting point of implementing empirical field research. Afterwards, interviews will be conducted both at the province of Gelderland to get initial insight in the field of the energy transition in Gelderland. Finally, the actor network field of the case study areas of the A1 and Wind-park Deil will be mapped out via once again interviews.

3.2.1 Literature study

Prior to the process of gathering empirical data, the base needs to be constructed in existing scientific literature. The database of the Radboud University Nijmegen both through online data sets and the use of the University library have been utilized as a means to this end. First, the available scientific literature was addressed to see at what is generally known about the subject of energy transition and the mapping of actor networks. In this search for information, the potential knowledge gaps have been mapped out as well as general criticism on the used theories in the theoretical framework. The first phase of literature research allows to sharply define the research questions and get a grip on the subject of the energy transition and what this means for society. In order to set the research in a context based on theory, the literature research also required a more overarching theory which enables a perspective towards the energy transition from a theoretical point of view. This theory is the socio-technical systems approach which focuses on the relationship between people's behaviour and technological development (Roelofsen, 2016). The literature research has furthermore offered the tools to combine the different bricks of this research; *energy transition*, *good governance* and *the 'Omgevingswet'*.

The literature study has formed the foundation of the empirical part of the research. The starting point for the understanding of the bigger picture could come through theoretical insights and the knowledge left behind by those who came before. However, the literature study has another dimension.

Apart from theoretical understanding, literature also comes in the form of policy documentation. Municipal spatial visions (*Gemeentelijke omgevingsvisies*) for instance. Such visions present the societal side of the energy transition. Reading visions can help to understand how present-day policies represent the direction in which municipalities, provinces or even national governments

tend to evolve. The GEA energy transition vision document and the provincial *Omgevingsvisie* for instance show in which status the energy transition is in the Province of Gelderland and how the province is aiming to guide this. Together with a strong theoretical foundation, policy documentation forms the bridge between current knowledge and the potential for finding new knowledge.

3.2.2 Interviews

The utilization of the potential for new knowledge must be done through interviews. In paragraph 3.1, the argument why interviews are the best option for the collection of this data have been presented, both for the first and second sub questions. The third sub question is more a contraction of policy documentation on the one hand and practical information on the other hand. Since the *'Omgevingswet'* is not yet implemented the effects of it to policy development are still somewhat unsure. Thus, the conclusions from the first and second sub questions can be compared with the *'Omgevingswet'* to analyse their competence.

Conducting interviews can be done in a variety of ways. First; structured interviews. Second; semi-structured interviews and third; unstructured interviews (Hay, 2010 P.9). Structured interviews are interviews which are characterized by a fully pre-determined trajectory of questioning. Semi-structured interviews use a pre-determined set of questions while leaving room for organic twists of the conversation. Finally, unstructured interviews do not use any form of pre-determined topic list. This form of interviewing is usually conducted in spontaneous interviews or in interviews which have a very broad view and are of a more exploratory nature.

The strategy for conducting interviews in this research has been a semi-structured one. This aligns with the desk research that had been done on forehand. The network of actors to map out was the starting point of the interviews, after which the governance aspect from the actors' point of view was discussed. The semi-structured interview was founded in reading policy documents and internet sources to make a start in mapping out the actor network of energy transition initiatives. The interviews have shed light on the more detailed implications of these networks as well as discussed how the relationships between the actors have been formed. From this basis of knowledge and the pre-determined topic list, the conversations have taken some turns left and right whilst still sticking to the main topic.

The identification of people of interest to conduct interviews with will be a very selective process influenced by conversations with civil servants and the snowball method. The snowball method is described by Boeije (2009) as a method in which an interview provides information which leads to the researcher to identify new interviewees. From these interviewees, other people can be identified as well, leading to the so-called snowball effect. The snowball method here started with speaking to the overarching company concerned with a specific case and from there doing down the hierarchy to the smaller and more specialised actors.

3.2.3 Multiple case study

Case study research provides the translation of concepts into actual real-life examples. These case studies can provide information to be compared to other cases to learn for future use. A proper case is well defined in its own characteristics and needs to be typified to be compared with other sources. If not, conclusions that are drawn are too case specific and their utility to compare it to other cases are mismatched. The selection of cases is therefore of generic importance.

3.2.3.1 Selecting cases

The selection of cases has been done based on desk research and internet source consultation along with some exploratory conversations with Mark Kemperman from the province of Gelderland. The cases had to comply with a variety of predetermined characteristics to be deemed relevant for a case study and to be representative for the process of outcome generalisation. The characteristics of the cases had to:

1. Include a dominant energy (transition) element.
2. Include a spatial element in infrastructural terms.
3. Consist of a wide variate actor network.
4. Be (predominantly) situated in Gelderland.
5. Include a role of the province of Gelderland.
6. Be under development during the time of this research.

Due to time limits, the number of cases to investigate was limited to two. To ensure a high-quality case-study, quantity was not the driving force. The cases that were selected are; 1) The A1 project in Gelderland/Overijssel and; 2) Windmill park Deil in Gelderland. Both cases comply to all six characteristics I have formulated and are different in a subtle way to provide a more variate presentation of results in the conclusions.

First, the A1 broadening project. As a part of the City deal in the CityTriangle of Gelderland, a collaboration of municipalities, provinces and private parties have started a development of sustainability around the A1 highway. The broadening and redevelopment of the A1 is being utilized to make this highway an icon of the Cleantech Region (Stedendriehoek, 2014). The ambition is to develop solar panel fields, windmill clusters and other forms of green energy generation in and around the A1. On top of this, the development of nature and recreational areas combined with sustainable energy generation is in the picture. The time-frame of the project is aimed to be from 2017 until 2028, where the A1 between Apeldoorn and Azelo is being broadened with extra driving lanes in phases. This is necessary due to the proximity of Germany and the flows of international economic traffic that make use of this route. Since this project is mainly an infrastructural one, in which energy transition is tagging along makes for an interesting actor network split between the infrastructural part and the energy part. Looking at the six characteristics, this project honours them all making it a fitting case study.

Second, windmill park Deil is located south of the A15 close to node Deil at the intersection with the A2, in the western part of Gelderland. At this moment, the plan area is mostly agricultural ground along the A15 which is interrupted by the A2. The project speaks about the development of eleven wind turbines in Deil which collectively should generate about 44 megawatts of energy. Not only does this help reach the sustainability targets of the province but it also adds to the local energy targets. The interesting part of this plan compared to the A1 project is the fact that this development is purely an energy generation project incorporated in a 'finished' environment. The actor network that is concerned here is therefore solely focused on the development of the windmill park, compared to the A1 project where there are two networks working alongside each other.

Interviews are the main tool of data collection. In both cases, the interviews will start at the top of the actor network with the parties which are easily identifiable. From there the snowball method of interviewing will gradually map out the network of actors along with the discussing of government intervention in such projects. The identification of these actors was founded in policy documents which not only stands at the basis of theoretical research but also for the case study analyses.

3.2.3.2 Policy document analysis

Apart from interviews a policy document analysis has contributed to the data collection phase for the multiple case study research. The studying of municipal policy documents has formed the first basis for the empirical analysis of the selected cases. Starting points for interviews were identified using policy documentation. The preparation of topic lists for the interviews has been done according the information from the policy documents. This included technical aspects of the project as well as a pre-determined draft of the actor networks. Finally, reading these documents has helped in understanding the results of the research, specifically to interpret the data from the interviews and it has contributed to placing the results in a provincial policy context.

3.3 Data analysis

To be able to make any form of generalizable statement from the interviews, from the policy document studies and from the case studies, a proper data analysis is required. The data from the interviews has been recorded with the permission of the interviewees after which the interviews will be summarized in a transcription to be coded and analysed through the program ATLAS.ti. The transcription of these interviews provides a set of information that needs to be analysed. With the help of this coding program, a structured overview could be made to present the data concerning certain topics of interest which have been selected. This helped linking different views, opinions, topics or visions to one another to, for instance, develop a governance strategy according to the wishes, visions and requirements stated by the different actors in a network through combining them. The recordings of the interviews as well as the transcriptions and the coding scheme are in possession of the province of Gelderland, Radboud University Nijmegen and the author and can be requested through contacting the author.

Interpreting data through qualitative analysis to develop a governance policy for the province is one of the focus points of the research and the other is mapping out the energy transition actor networks of the province of Gelderland and the two cases which have been selected. A variety of tools will be used to analyse and present this data. Microsoft Powerpoint is an example of this.

The interpretation of data through Atlas.ti helps in defining the actor network and shines light on the relationships between these actors. The relationships between the actors differ in three characteristics. All actors act in a certain way, according *to what they want, what they are obliged to do and what they can do.* By defining these three characteristics it is possible to deduce the relationships between the actors. On top, defining these three characteristics helps in developing a governance policy adapted to this network.

'To want' can differ throughout the actors in the case, according their position in the network, as well as according to their vision. A private investor will want to make a profit from the project it is initiating, whilst a governmental organisation might mainly focus on making progress in reaching the targets for green energy development in the area. Not every actor has the same ambitions, which separates them and makes their relationships more complex.

'To be obliged to' also differs per actor and per case study. A province has a responsibility for a proper spatial planning in the region, whilst a private investor has an obligation towards shareholders to make a profit or an obligation to society to engage in corporate social responsibility (CSR) activities (McWilliams, 2000). Again, this differentiation between actors makes it possible to analyse how actors will act in the network and what position they will represent. Apart from obligations in terms of responsibilities, actors are also bound by formalised contracts. This is also to be considered.

'To be able to' combines the obligation and ambitions of actors. This is defined by for instance the degree to which financial possibilities are at the disposal of an actor or to what degree knowledge is available to an actor. *'Being able to'* is the leading characteristic to explain how an actor will eventually act. *'To want'* and *'to be obliged'* are explaining factors which elaborate on how *the 'to be able to'* characteristics is formed. The combination of obligations and ambitions results in what an actor can do. Therefore, all three characteristics are of interest in this analysis.

3.4 Validity, representativeness & reproducibility

This paragraph serves as a justification for the used methods, regarding their validity, representativeness and reproducibility. Validity is concerned with how this research guarantees if the information is valid and if the information is interpreted in the right way. The representativeness part of a research is concerned with how well the different sections of the target area are accordingly 'represented' in the research. The reproducibility accounts for the way in which this research can be reproduced, and to more or less guarantee the same outcomes, or better said that it results in the same insights.

3.4.1 Validity

The validity of a research encompasses the degree to which the conclusions can be trusted to represent the actual truth since they represent the interpretations of the researcher and can be used as a basis for follow up research or to develop policy. This is different than the reliability, which is about the preciseness of the methods used to collect data. Validity is about measuring that which you want to measure, and that conclusions are not drawn on the wrong observation. Validity comes in two dimensions, internal validity and external validity. This can be acquired and monitored through a variety of measures such as methodical triangulation, systematic method of working and repetitive measurements of sources.

A key element of staying neutral and preventing 'going native' is to keep distance to the research units to prevent a biased interpretation of the information. The fault which is often made is that a researcher loses neutrality because he or she becomes too much a part of the network which is being researched (Boeije, 2007. P. 276). In this case, working for the province of Gelderland to develop a governance policy for the contribution to energy transition actor networks can result in a biased opinion, steered too much by colleagues and their working preferences.

One of the strategies to prevent such biased data interpretation is to prevent an external interest such as goodwill from either the province or from actors in the network. Since this research is done from a neutral point of view, keeping distance in terms of having multiple interests is of no concern, as the only goal of the research is to get the cleanest results and consequently deliver a proper recommendation.

To help interpreting the data, the interviews will individually be transcribed and coded according to a pre-made selection of codes which represent the data which is sought. The coding tree (appendix 4) is made according to the theoretical framework along with the operationalisation of the theory. Coding helps in creating overview and increases the external validity as data is easily backtracked (Hay, 2010).

3.4.2 Representativeness

The representativeness of this research is mainly focused on selecting cases and interviewees which can represent the full scope of the research. This means that the cases which are selected are representative for other cases implying a variety of characteristics, which is also the reason to select such diverse cases. Furthermore, the interviewees need to be representative for all the interests in the actor networks that are being investigated. Finally, the interviewees need to encompass the entire network and not leave out any actors. To do this, there is a confirmation need from multiple sources, through a process of data triangulation which is also related to the validity of the research. Data triangulation is described by Boeije (2007) as a form of data confirmation which requires three or more sources of data to be compared. This can imply a triple form of data collection methods such as observations, interviews and surveys, but it can also encompass the comparison between three different interviews. To keep the findings in these interviews as representative as possible, the pre-determined topic list requires a certain order so that the central topics can be discussed in all interviews. In doing so, the interviewees can all share their thoughts on the same topics from their own perspective making the totality of results more all-encompassing. This way, no party is neglected.

3.4.3 Reproducibility

The reproducibility of qualitative research, where interviews are the central mode of data-gathering, is difficult to ensure since semi-structured interviews are constantly subjected to change. As the development of a process changes and the focus of a project shifts, actors might have new interests which changes their view on the topic. As far as the actor network of the case studies are concerned, the actor network itself can be subject to change as new companies can join or leave the project. However, the structure of the network in terms of actor layers is solid, making certain companies replaceable whilst still having the same relationships and the same interests. Reproducibility however is a complex matter of the subject, as the recommendations made in this research are influenced by the relationship between province and actor network which is case dependant. When the actors change and the playing field is different, the recommendations change as well.

3.5 Interview topic structure

In conducting the interviews and hereby answering the central research question, a clear interview topic structure is required to conduct semi-structured interviews. The leading structure has been a single interview topic structure with the exemption of the differences between the cases A1 Cleantech icon and Wind-park Deil which will have their own independent segments. For the rest, topics will cover the fields of personal interest of the interviewee; the energy transition in Gelderland and the interviewees' perspective on its progress; the actor networks in the relevant case study; the role of the province in terms of governance; to want, must and being able to; the *'Omgevingswet'* and finally the role of citizens in cooperative processes. Addressing these topics in a proper way to realise an analysable database of empirical information is done according to the operationalisation of the concepts in chapter 2.7. The complete topic list can be found in appendices 1 and 2.

3.6 Operationalisation

Operationalizing theory and research aims into comprehendible questions and concepts is what makes or breaks research results. The operationalization presented in chapter 2.6 forms the basis combined with the conceptual model from chapter 2.7. Here, these concepts are further dissected to form the framework of the topic lists for the interviews and the coding scheme to complete the empirical data.

Along with this, the central research question presents a line of concepts which require further elaboration after which the scope and method of the research is finalised and the next step can be taken.

3.6.1 Operationalising all concepts of the research question

The central research question poses several concepts in need of clarification. For the purpose of reproducibility and the strengthening of the argument, these concepts will now be demarcated.

*How **extensive are energy transition actor-networks** in the province of Gelderland and what role for the province is desirable in terms of **'good governance'** in these actor networks considering the changing development of **the legal framework of spatial planning** by the 'Omgevingswet'?*

The concepts to be clarified are: *Extensive energy transition actor networks; good governance & legal framework of spatial planning*

The extensiveness of energy transition actor networks is the identification of relevant people and companies to decide who are included in the case study which will be discussed, and how they relate. Relevant people are direct stakeholders, direct shareholders, people living in the surrounding area 'suffering' provable consequences of the project, governmental agencies concerned with the project and private investors and developers who initiate and help develop the energy transition related project.

Good Governance is the identification of the entire policy of the province of Gelderland towards the project in the case study, to identify their role in terms of what they want, what they can do and what they are obligated to do. Good governance follows the theory of good governance by living up to the core values of good governance being; Legitimacy & voice, direction, performance, accountability and fairness.

The legal framework of spatial planning encompasses all the laws to which the field of spatial planning and therefor the spatial dimension of the energy transition must adhere. What a province can, must and wants to do is all framed, protected and limited by law and regulation. The new framework from 2020 will be formed by *the 'Omgevingswet'.*

3.6.2 From fuzzy concept to comprehendible variable

Now that the central concepts presented in the research question have been framed, the next step is to link theory to practice. For this, every discussed theory in chapter two is linked to a method of data collection along with the sub-question from which its relevance is derived. Finally, the concept which will be measured in the practical side is combined with the theory to be able to answer the research question according to the empirical data findings. This operationalisation is presented in table 3.1. Finally, the concepts are translated into codes which have been used in the coding of the interview transcripts. The relevant coding segments related to the operationalised concepts are coded in the final column of table 3.1, and relates to the coding scheme in appendix 4.

Table 3.1. Theory linked to method, sub-question, operationalised concept and the coding scheme.

Theory	**Method**	**Sub-question**	**Operationalised concept**	**Coding Segments (Appendix 4)**
Socio technical systems approach	Interviews & Desk research	1	Explanatory theory for the sudden rise in energy transition awareness.	- Technology and human behaviour
Actor Network	Case studies & interviews	2	Relationship between actors and stakeholders in the actor networks of the case studies.	- Actor networks
Citizen participation	Interviews	4	Collaboration in case studies, linked to good governance and citizen participation as part of the energy transition.	- Citizen participation
Transition management	Case studies & interviews	3	Explanatory theory for the contextualisation of the policy recommendations.	- Transition management policy
Good Governance	Interviews & Desk research	3	Source of guidance for recommendations in terms of good and bad practices combined with key values of good governance.	- Governance - Transition management policy
Planning law	Desk Research	4	Role of the *'Omgevingswet'* in the formulation of relevant policy recommendations for the province of Gelderland.	- Planning law

4. Gelderland' energy transition policy

The aim of this chapter is to sketch a short framework as to what the current policy of the province of Gelderland is according to their energy transition targets. With this framework, the current status of the energy transition becomes clear, the ambitions are set out and the recommendations and conclusions drawn in the final chapters of this research become more eligible. This short analysis consists of brief notices on the general energy transition policy, the targets and projects in the province, the role of collaboration and finally the challenges in terms of dilemma's and conflicts.

4.1 Gelderland and the energy transition

"The energy transition, accelerating together!" The first eyecatcher of the Gelderland energy vision stated in the energy transition policy of Gelderland (Provincie Gelderland, 2015 P.2). The quote is a good representation of the vision presented in the energy transition policy of Gelderland being focused of accelerating exponentially towards an energy neutral climate situation. In the Gelderland Energy Agreement and the Gelderland energy policy, the aims of energy neutrality by 2050 and climate neutrality by 2030 are set out (Provincie Gelderland, 2015; Provincie Gelderland, 2016). In order to realise this, the policy aims at a mix between incrementality and master-planning resulting in a bottom-up process of collaboration with private investors and citizens, combined with the province aiming for maximum facilitation of such incentives (Ruiken et al, 2016. P. 6).

Rising awareness throughout society of the need for energy alternatives is pushing the priority of sustainability throughout the different sector of provincial policies and an integral entity (Leendertse, 2016). The resulting policy is two sided, one being the generation of energy in a clean and green way and the other being the reduction of the use of energy. What you don't use, you need not generate. The rising awareness causes more incentives in the energy transition, but the economic viability of green energy is a factor deemed equally if not more important. To realise a society wide shift in energy generation, a general realisation was born that an economically viable business case should be at the base of the energy transition. If the market senses a dimension of profit in engaging in green initiatives through improved technologies and therefore realise a future pay-off scheme, they will more likely take the initiative. Since this is the case for at least solar power and wind power, the energy transition has secured an increasing interest from private developers.

4.2 Targets and projects

The ambitions of the province for energy neutrality come with sub-targets. The intermediary sub-targets make the final ambition comprehendible and increase the urgency in-between. A share of 14% renewable energy generation in the province by 2020 marks the first sub-target, however, this target is already under pressure. Due to an attractive economy, the increase in industrial activity is accompanied by an increase in co2 pollution (Leendertse, 2016). Figure 4.1 shows the target of the energy usage reduction for private and business circles. The blue line represents the extrapolation of the current trend, and the red line represents the goal. Following the current pace, the province will shoot past the target by 20% in 2020, on the negative side of the scale. An acceleration is needed to prevent lagging behind even more. The Paris climate agreement is one of the overarching agreements needed to increase the urgency for an acceleration.

Figure 4.1, Gelderland energy usage in private and business circles. Source (Provincie Gelderland, 2015. P 7)

The province has identified the required acceleration of the current incentives to realise the set targets. The Gelderland Energy Agreement (GEA) is one of the actions aimed at accelerating the pace towards energy usage reduction. The policy of the province of helping bottom-up initiative and facilitating those initiatives moves most of the responsibility away from themselves, to the private developers. This causes discussion and conflicts about the role the province should take as the overarching decisive authority.

4.2.1 Energy generation

Sustainability comes in two ways. Increasing green generation and decreasing usage of energy. The focus of the province for the future is solar energy and wind energy, even though the largest part of green energy generation is currently realized from biomass, making up for 80% of the total generation of green energy in Gelderland. Solar power and wind energy however are free, unlimited and omni-obtainable (Provincie Gelderland, 2015. P. 13-14). Other techniques concerning hydropower and geothermal heat make up for a smaller part. Apart from these classic techniques, technological innovation is showing promise in other fields of creative energy generation as well. For instance, Hedgehog Applications owns a technique to harvest energy from braking trains (Hedgehog applications BV, 2017). Such creative techniques can enhance the main drivers of energy generation and help reach the targets.

4.2.2 Energy Usage

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For the energy usage side of the energy transition, several fields of interest are discussed which play a role in decreasing the use of energy, or change the way in which certain things are powered like the switch to electrical public transportation. The current aims point towards a variety of initiatives ranging from the preservation of energy in housing, to the switch of public transportation to electrical powered vehicles (Province of Gelderland, 2016). In between those, the province focuses on making companies switch to sustainability by providing subsidies and other fiscal advantages of going green. Mobility is a large part of energy usage, since mostly private cars cause local pollution. The mobility energy usage

in 2014 was an estimated 26.996% of the total energy consumption in the world (EIA, 2017). Switching to electric cars, banning conventional cars from city centres and improving public transport to encourage people getting out of their cars are just a handful of examples which should ultimately realise a decrease in the use of fossil fuels as well as the decrease of energy usage in total.

4.3 Collaboration and dilemma's.

Realising the ambitions for energy neutrality requires a strategy and societal wide support for the consequences. The province has formulated a clear strategy to do so. Bottom-up initiatives from the perspective of support for incentives will result in the biggest long-term changes. "*Alone faster, together further*" (Province of Gelderland, 2016 P. 2). This requires collaboration from citizens among citizens, from private investors amongst themselves but also from these two with each other and with the government. The government (Provinces included) can provide knowledge, money or support in terms of regulation and being the decisive authority for much of spatial planning.

One of the things the government is already utilizing in this respect is their role as a framework setter in terms of law and regulation. With the upcoming *'Omgevingswet',* the government aims to simplify processes and help initiatives to be realised on a shorter notice. Gelderland is known for being one of the more progressive provinces concerning progression with the development of their *Omgevingsvisie* resulting in winning the "Simply better trophy", an award for the most progressive province in the development of their *Omgevingsvisie* (Rijksoverheid, 2014). The *'Omgevingswet'* prescribes the cornerstones of integrality of policy, the facilitation of simplified law and regulation and collaboration throughout society.

Sustainability however is far from being everyone's number one priority. As a result, the dilemmas within the province and within society result in conflicts about the use of space. The construction of windmills results in a devaluation of nearby houses, have a visual impact on the environment and cause sound disturbance. Dilemma's and conflicts are inherent to spatial planning (Hatzopoulos et al, 2008). Since a space is unique and limited, a lot of different interests collide in the use of a space ranging from conflicts between different investors wanting the same project for their own profit, to conflicts about the use of space either being for wind energy or for a different purpose such as housing. These discussions also rise within the province itself, varying from public servants concerned with natural preservation to those concerned with the energy transition. This is an issue which needs to be overcomed dealt with in a proper way to realise the aforementioned cornerstone of society-wide support for the energy transition.

In conclusion, the energy transition policy in Gelderland comes down to these four main subjects:

Why: To realise a sustainable future for ourselves and future generations and preserve our welfare and nature by countering pollution and realising a clean and solid alternative.

What: To realise ***a decrease in overall energy usage*** and ***an increase in green energy generation*** in the whole of Gelderland and become energy neutral by the year 2050.

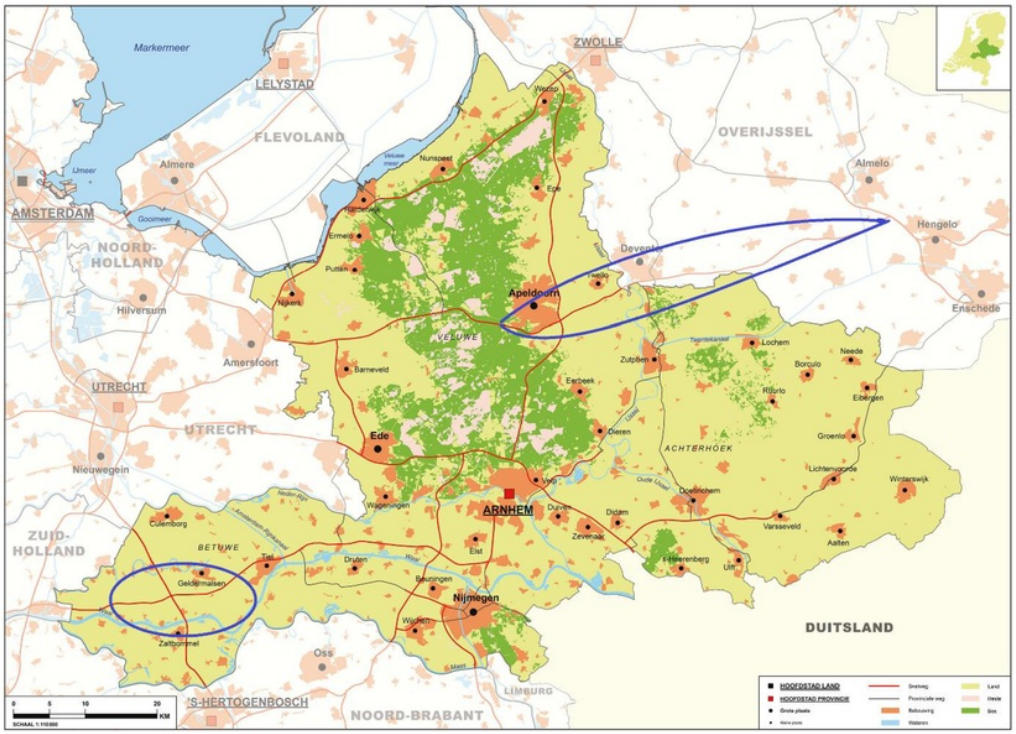
How: By ***engaging the community and private parties*** in participating in sustainability enterprises. This means engaging the entire society by increasing awareness and collaborating with them. Collaboration through an increased awareness can be fuelled by better technological developments making sustainability financially more feasible.

When: Realising a decrease in energy use by 14% by 2020, climate neutrality by 2030 and realising energy neutrality by 2050 in the whole of Gelderland.

5. Case studies

What is a policy without results? The energy transition and the implications of the vision and corresponding policy can best be analysed through a case study. Chapter 5 serves as description of the chosen case studies of which the energy transition actor networks are to be mapped. The two chosen case study areas are shown in figure 5.1 below. The top right blue circle represents the area in which the first case study is located: Cleantech Icon A1. The bottom left circle represents Wind-park Deil, case study 2. The case studies will serve as an exemplification of energy transition actor networks in the province of Gelderland.

Figure 5.1, Gelderland and the two case study areas. Source: KaartEnAtlas, 2017 & own elaboration



5.1 Case 1: A1 Cleantech Icon

The first case to be discussed is the Cleantech Icon A1. As one of four main projects of the Cleantech City deal, the A1 project is envisioned to be the icon of sustainability in the Cleantech region. In stating that the region wants to get a grip on their area and focus on exploiting the strengths of the region more and more instead of spreading the focus, the region hopes to realise a stronger and more attractive economic environment. The research in this study area will focus on mapping out the actor network of the Cleantech A1 project and to explore the most ideal form of governance as governmental contribution in the project. In order to do so, the project itself will first be elaborated after which the relevance of the project to the research is discussed.

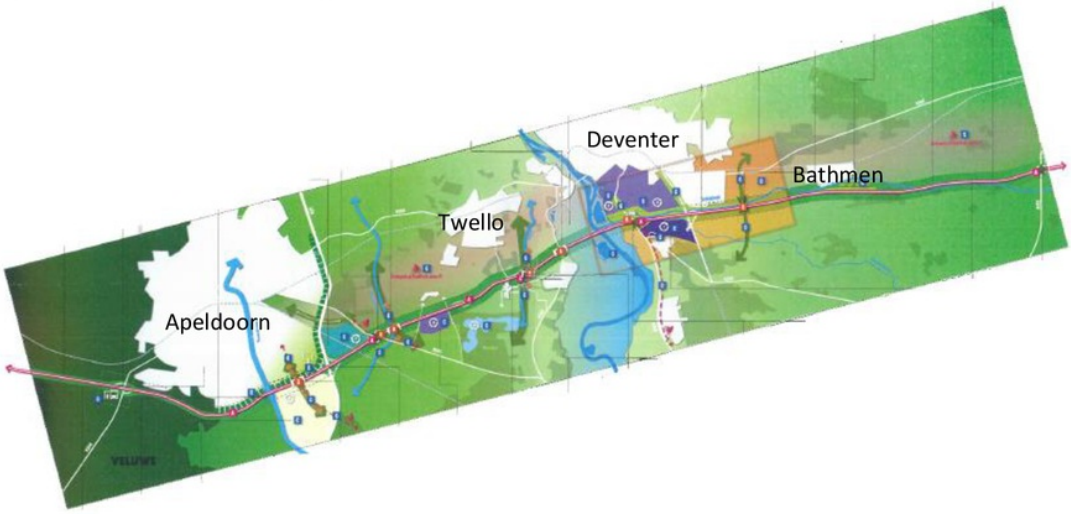
5.1.1 The project

As a part of the Cleantech region, the city deal is a formal agreement for the shared ambition of several municipalities in the region of the City Triangle, and the provinces of Gelderland and Overijssel to develop a sustainable environment for the A1 highway. The seven municipalities are: Zutphen, Deventer, Apeldoorn, Brummen, Voorst, Epe and Lochem. The broadening and redevelopment of the A1 is being utilized to make this highway an icon of the Cleantech region. To do so, ideas focus around allowing solar panel fields, clusters of windmills and other forms of energy generation are to be integrated in the strokes of land parallel to the A1. In this, the development of natural and recreational areas is given extra attention in combination with sustainable energy generation as well. It is trying to combine the best of both worlds to become a symbol for sustainability in the area. The ministry of Infrastructure and Environment has given *'Rijkswaterstaat'* (RWS) the assignment to give special attention to the sustainable incorporation of this in the infrastructure project of the A1. It must under no circumstances lead to a situation in which the initial project, the broadening of the highway, is delayed due to the energy ambition (Bakker et al, 2017).

To realise such a change, Cleantech focuses on embracing current strengths of the area and exploit them more (Stedendriehoek, 2014). This ambition is seen in 4 sub-targets.

1. Strengthening Innovation. The region sees opportunities for the development of innovation from the inside by connecting and upscaling these innovations.
2. Improving the potential of social capital. The region sees opportunities to improve social cooperation and participation in the region. The ambition is to improve the way in which knowledge and talent in the region is being utilized. Attracting and keeping talent is an important requirement for innovation.
3. Improving accessibility in the area. Mobility as a strength of the area and keeping it a strength of the area. Broadening the A1 and supporting infrastructure maintenance in budget and projects.
4. Strengthening the environment with quality. A vague target meaning the overall quality of plans, housing, working and the redevelopment of existing structures. In this, the role of local identity and cultural history is leading.

Figure 5.2, Cleantech Icon A1 project area. Source: Bolt, 2017



The project is envisioned to be from 2017 until 2028 where the A1 between Apeldoorn and Azelo is broadened in stages. This Is necessary due to its role in forming a connection for international economic streams of traffic between the Netherlands and Germany (including the further hinterland of Europe). This is where the increasing pressure of freight traffic often causes traffic jams, which explains the need for a broader highway in mobility terms. The broadening of the highway is spatially viable and because the area is going through a big infrastructural change then anyway the RWS, provinces and Cleantech want to latch onto this and make it a symbol for sustainable applications in the area. Figure (5.2) gives an indication of the area and the smaller sub-projects within the grand project.

The project contains a variety of integral projects which collectively make up the whole of the project. This varies from solar panel walls and wind parks to the development of "Ecoducts" and smart/sustainable industrial sites. Currently, although no projects have been definitively started as the entire project is still under development in the non-physical stages, several ideas for projects (ignoring several purely infrastructural plans) are to be implemented in the future Cleantech Icon A1 project (Bakker et al, 2017).

5.1.2 Relevance to research

The mapping of actor networks in the province of Gelderland concerned with the energy transition requires a spatial case study project. For the case of the A1, the relevance is obvious as it is a specific example of the interface between the energy transition and the spatial environment and it is a topical implementation of the ambition of both the government and the province to do more with sustainability. Moreover, the case is special because sustainability is not the driving force behind the initial project. Compared with a case aimed at the development of a wind-mill park or a solar panel park, this case is an infrastructural development project primarily aimed at the improvement of traffic between Germany and the Netherlands. The network of actors relevant to this can be formed without the addition of energy transition. However, the second dimension of the added energy transition project enhances the complexity of the actor network by adding and integrating a second network. The relationship between actors from the one network and the other is an interesting approach to research, by looking at how certain actors might be involved in both networks, which relationships exist between the different actors and how the networks are related to each other.

5.2 Case 2: Wind park Deil

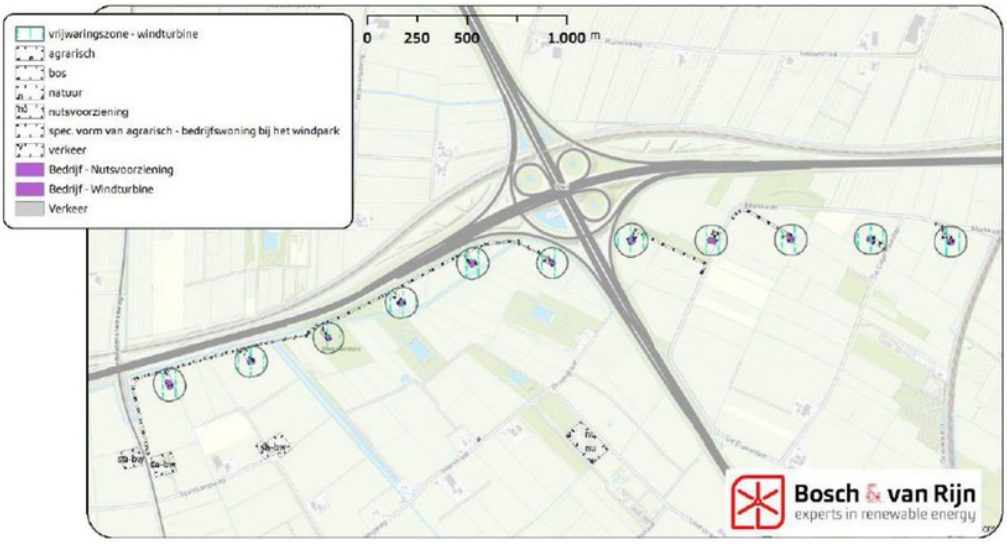
The second case to be discussed is Wind-park Deil. Wind-park Deil offers clear insight in the actor network of the operationalisation of a vision for green energy generation because all the relevant actors in the actor network are still actively engaged in the process. This simplifies the actor identification process, as well as the fact that since the project has been accepted by both municipalities, the actor network will not change anymore (Velthoven, 2017; Nieuwsblad Geldermalsen, 2017). The research in this study area will focus on mapping out the actor network of the project and to explore the most ideal form of governance as governmental contribution in the project. This will be done according to a variety of interviews with people from all segments of the network including a governmental official in the province (Province of Gelderland; Ivo van Es), a private company representative (Yardenergy; Frank Hoiting), a municipality official (Municipality of Neerijnen; Niels van de Wetering) and a citizen association representative (Burgerwindcooperatie Geldermalsen-Neerijnen; Hans Adams).

5.2.1 The project

Wind-park Deil is different than Cleantech Icon A1 due to its singularity of being an energy generation project solely. Located in the proximity of the A2-A15 intersection, situated in the municipalities of Geldermalsen and Neerijnen, the project of wind-park Deil shows the ambition of placing 11 turbines to generate an estimated amount of energy to supply 15.000 to 30.000 households. The developers Yardenergy and Raedthuys have acquired an agreement in principle to develop the land with the landowners. As an extra demand from the municipalities, a part of the project will be sold to the citizen wind-cooperation Betuwewind.

The plan area is currently mainly agricultural ground. The area itself has a lengthy character which follows the A15 and is interrupted by the A2. The plan area itself is in the municipalities of Neerijnen and Geldermalsen. Figure 5.2 shows the plan location.

Figure 5.2, Wind-park Deil



The current state of the project is in its final stages regarding the project inquiry at the national government. The parties have agreed to a certain plan and filed this inquiry after which (if accepted) the collaboration actors will contact turbine suppliers to get their hardware and start constructing the wind park. To come to this state of the plan however, a lot of bumps had to be overcome, both in the negotiations of the number of turbines, in the distribution of revenue from the turbines across the investors, but also across the citizens who are (in)directly affected by the placement of wind turbines. Another thing which is always present in negotiations between market parties, governments and ngo's/Citizen cooperation, is the fact that collaboration will always face self-interest. If two municipalities have a shared vision and as a result a company wants to settle in the area, both municipalities will want to have them settle in their area. Self-interest in this spectrum will almost always be deemed more important than the collaboration. This is also of importance to Wind-park Deil, due to the fact that there are 3 distinct investors which will all have their self-interest within the collaborative enterprise they share. A short overview of process adds up to the following.

First, the area seen in figure 5.2 has been targeted for wind energy project purposes by several parties, which have been identifying possible locations for the development of wind turbines by studying the

vision of the local municipalities and the province of Gelderland. Due to the segmented landownership state of the area these 2 companies, being Yardenergy and Raedthuys, could seal deals with the landowners about purchasing the land. The result of this was a segmented area divided between 2 parties which were in turn forced to collaborate to make the plan work (Van Es, 2017). The collaboration followed adding the newly formed citizen wind cooperation Geldermalsen-Neerijnen into the mix which was demanded by the local municipalities. These three parties in turn started to divide the gains of the projected wind turbines, before discussing where the placement would take place. The agreement for the distribution of the gains was sealed, after which the planning of the turbines and the distribution of costs followed. Now the plan resides at the decisive governmental agency to accept the plan. As soon as this is done, the attention will shift to the construction of the hardware, contacting wind turbine developers and a contractor to place it.

In short this is what the process looks like, neglecting the more complicated details concerning pushing favours, interests and deadlines to gain more, being able to influence the project more and try to increase a companies' profit margin. In chapter 6 with the analysis results, more detail will be provided on an individual level on what all the actors want, can and have to do in such a process.

5.2.2 Relevance to research

The interesting part of choosing wind-park Deil as the second case is the comparison which can be made to the A1 case. Unlike the A1, wind-park Deil is a case which is not a development parallel to another big infrastructural project but rather a stand-alone initiative, meaning that it will enhance only an area, rather than enhance another project. The expectation is therefore also that the actor network here is simpler compared to the A1 as there is just a single actor network, rather than two intertwined networks. The environment is already there, and the project is a matter of fitting in.

For the role of the province in the network, it is expected to also have a difference in developing governance strategies because the network is expected to be smaller and simpler than in the A1 case. Therefore, the need for provincial interference might be different. The case does not show its relevance only in terms of mapping out the network itself but also in terms of developing governance for either facilitating or actively engaging in the network.

6. Analysis results

Chapter 6 is the analysis of the interview results and will present the empirical data needed to answer the central and sub research question. The purpose of this chapter is to present the empirical data and combine this with the knowledge from the study of theory and policy documents. The analysis will be presented in several key aspects. First, the finalisation of the visual actor network for both the A1 Cleantech Icon case study and wind-park Deil. These actor networks will be *presented visually* after which the analysis of these networks will go into the topics of relationships and role division. Each relevant actor will be analysed based on their role concerning *what they want*, *what they can do* and *what they are obliged to do* in an energy transition network. This role division is used to formulate a policy recommendation for the province. The questions about what actors want is mainly focused on what they would like for the province to do or change in their policy. Considering the interest each actor might have in the province having a certain policy for their own benefit, the recommendations are interpreted accordingly and will result in a proper recommendation aimed at a mutually beneficial situation. First, the outline of the analysis of the actor networks will be discussed in 6.1, after which the actor networks of the Cleantech Icon A1 and Wind-park Deil are addressed. Finally, the analysis results are based on the other aspects of the central research question and sub-questions and are addressed in paragraph 6.2.

6.1 Actor networks

The energy transition actor networks in the province of Gelderland vary in their composition and in their relationships. This research distinguishes between the actor networks of the Gelderland Energy Agreement (GEA), the Cleantech Icon A1 and Wind-park Deil. For these actor networks, the level of analysis will shortly go into the context of the project, the governmental agencies connected to the project, the main financial drivers of the project, private companies associated with the project as externals and possible subprojects linked to the actor network.

6.1.1 Gelderland Energy Agreements

In their ambition of energy neutrality, the Federal Environment service Gelderland (Private environmental party), in cooperation with Alliander (Consultancy) and Klimaatverbond (Collaborative climate group), has taken the initiative to unite all municipalities, the province of Gelderland a variety of private actors, energy companies and NGO's in a single agreement called the Gelderland Energy Agreement (GEA). Over 100+ parties have signed this deal. An overview of the actors in this network can be seen in the Appendix, but the most important ones for Cleantech Icon A1 and Wind-park Deil are integrated in their respective networks.

6.1.2 Cleantech Icon A1

By analysing policy documentation, strategy reports and talking to actors from within the actor network of Cleantech Icon A1, the overview of the complete actor network has been mapped out. In this network, the three main categories of actors are typified as being part of either; Government, Private sector or External actors. Following this categorisation, the actor network of Cleantech Icon A1 of all the actors that at some point of the process either have been, still are or will be part of the project consists. On the following 2 pages, the full actor network of the Cleantech icon A1 project is presented. Figure 6.1 represents the upper layer focussing predominantly on government, figure 6.2 represents the private investors and the external actors, who can't be classified as actual developers or government but are nevertheless relevant actors in this network.

Figure 6.1. The upper layer of the Cleantech Icon A1 Actor network

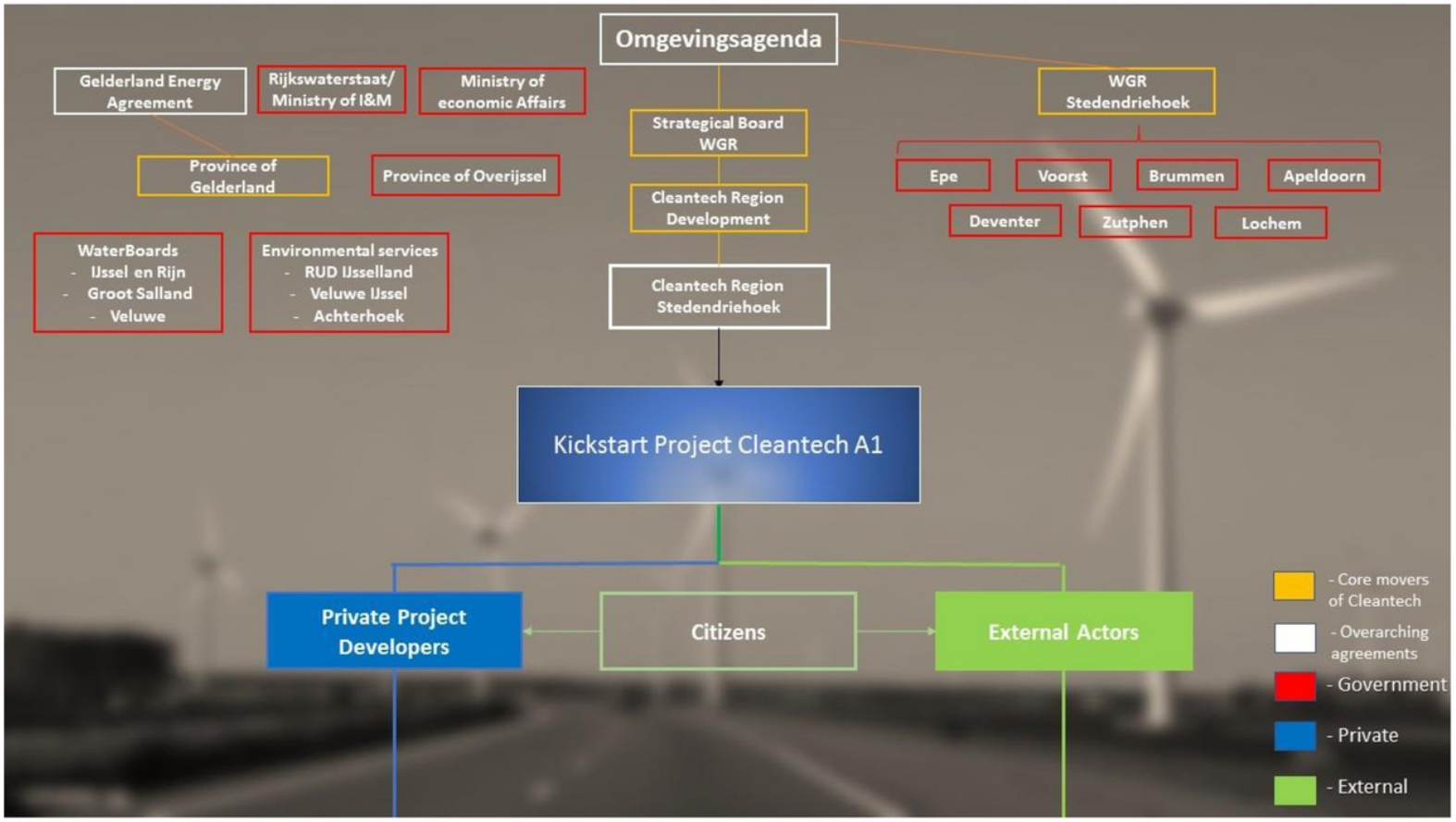
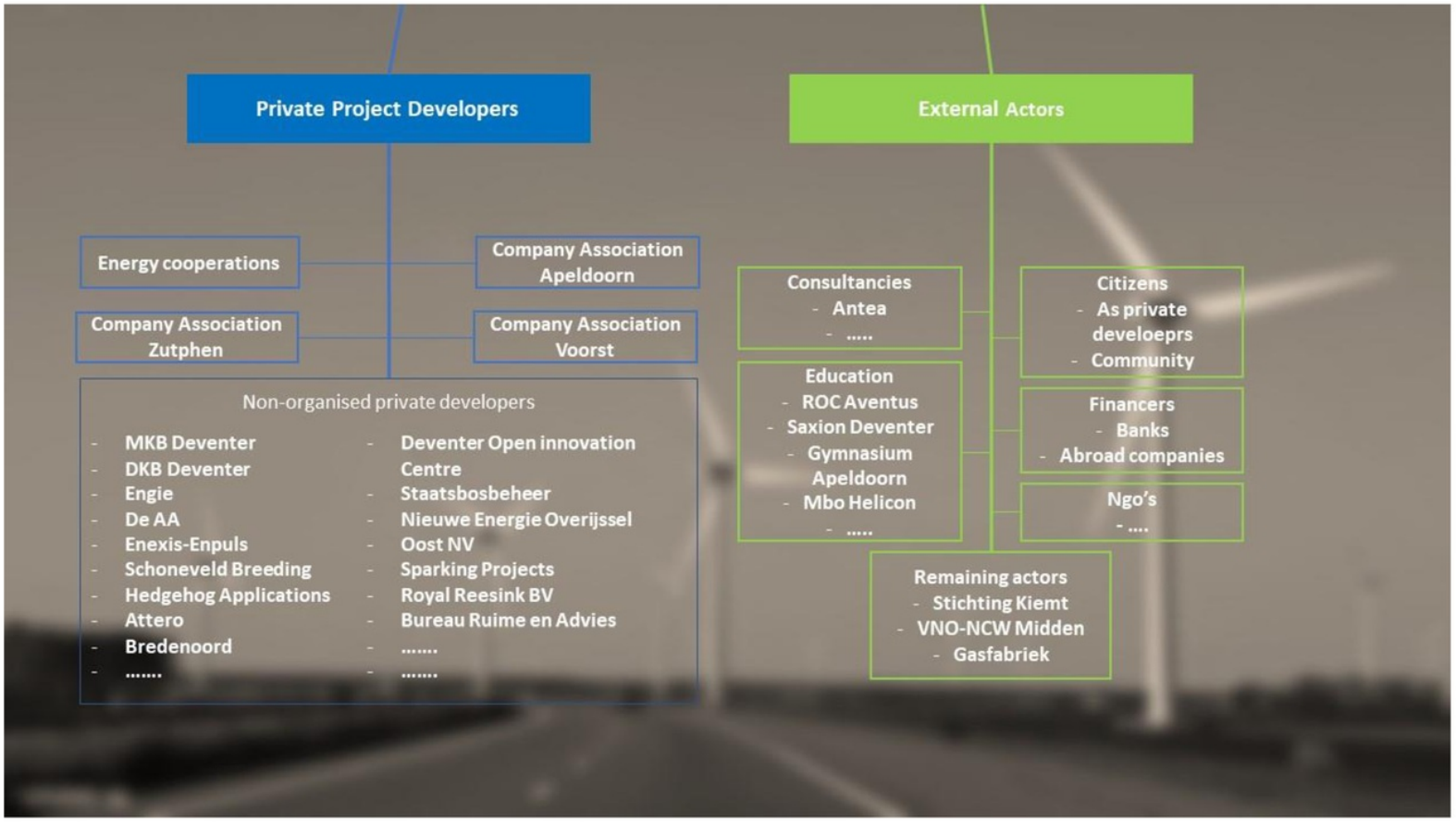


Figure 6.2 Private project developers and external actors of the Cleantech Icon A1.



The actor network of Cleantech icon A1 is split into three categories namely government, private investors and external actors. Citizens as a group can be considered a fourth category, but the choice to not define this as such is due to the idea that citizens are both represented through governments, can be part of private investors if they are organised in cooperation's. Those that remain as relevant to the project can be considered a part of external actors since they either have an interest in the project being an inhabitant of the area, or take on the role of activists. Non-participants are not defined as relevant actors.

The Cleantech Icon A1 is steered by two overarching agreements of the '*Omgevingsagenda*' and the Cleantech Region Stedendriehoek which are accompanied by the third overarching agreement, the GEA, a less relevant but equally iconic agreement. These cornerstones are developed by governments and steer these governments. They are the formal binders of governments to register commitment to the project. The actor network as presented in figures 6.1 and 6.2 now suggest that the different actors in each layer represent the same role, or degree of influence. This suggestion is the result of the aim for a clear overview. Still, it requires additional elaboration.

Governments

Figure 6.1 represents foremost the governmental agencies concerned with Cleantech icon A1. Within these governmental agencies, there are national agencies, provincial agencies, municipal agencies and regional agencies. The national agencies are the ministries of I&M, of which the executive body is Rijkswaterstaat, and Economic Affairs. The provincial agencies are the provinces of Overijssel and Gelderland. The regional agencies are the WGR Stedendriehoek, Strategical Board WGR, the water boards and the environmental agencies. In these, the WGR Stedendriehoek and the Strategical Board WGR are the driving forces behind the initial Cleantech development. Finally, The WGR Stedendriehoek is a regional collaboration between seven municipalities; Apeldoorn, Brummen, Deventer, Epe, Lochem, Voorst & Zutphen.

Private investors

Figure 6.2 represents the private developers that have shown interest in Cleantech A1 and private developers which are relevant due to their geographical site. These geographically relevant actors are summed up in the company associations of Zutphen, Voorst and Apeldoorn. The list of energy cooperation's (Approximately 40 (Pennings, 2017)) can be found in appendix 3. Furthermore, the list consists of individual companies who have shown interest in developing energy projects under the banner of, or in cooperation with, Cleantech Icon A1.

External actors / Investors / Education

Figure 6.2 also represents the external actors in Cleantech Icon A1. External actors are defined as relevant and active non-designers. These actors merely provide knowledge, advice or finances but do not act according to actual developers, who form plans and implement projects. Banks solely provide finances for interesting business cases and citizens who do not act as developers are merely stakeholder's due to their geographical site. Furthermore, consultancies help and steer developers and provide market knowledge and research. Finally, the role of educational entities is that of providing knowledge and doing research. They are therefore regarded as external actors.

Relationship between the three dimensions

The three dimensions of the energy transition actor network of the case of Cleantech Icon A1 need to work together to realise the project. This requires collaboration, communication and this forms a

complex set of relationships between each of the actors within the dimensions. Following Kemp (2007) on transition management, it is evident that each actor needs to fill in their role in such a way to optimally help the whole. Actors must take their role, their tools and their obligations and combine them in a collaborative fashion. In terms of Cleantech, according to interviews conducted with Pennings (2017), Bolt (2017), Verspui (2017), Bakker (2017), Sint Nicolaas (2017) and Heijnen (2017) the roles of these actors can be defined in terms of what they want, can and must in relationship to the Cleantech Icon A1. This is supported by the through desk research acquired data from provincial and national policy documents: Stedendriehoek (2014); Ruiken et al (2016); Rijksoverheid (2016); Rijksoverheid (2014); Provincie Gelderland (2016) and Provincie Gelderland (2017).

Figure 6.3, Cleantech Icon A1, Must want and can per actor category.

	Must	Want	Can
Government	- Facilitate private developers to realise their initiatives. - Show commitment to energy neutrality ambition. - Support and actively facilitate collaboration (Including citizens). - Support integral plan development.	- To realise the Cleantech Region ambition to help reach climate neutrality in 2030. - Realise a bottom-up support based project development - Visually show cleantech projects along the A1 to be an icon for sustainability. - Intertwine mobility and sustainability.	- Use their governmental position to adjust zoning plans. - Law based plan intervention derived from their role as a government. - Facilitate knowledge, awareness and finances to support developers and citizens. - Act as developer.
Private Developers	- Comply with zoning plans. - Show a degree of citizen participation in their plan development process. - Be the initiator of energy transition projects and submit the initiatives to the government. - Collaborate with other shareholders.	- To realise a profitable business case. - To achieve as big of a share in the development of a project as possible to maximize revenue. - Realise short terms profits via quick processes.	- Develop initiatives in the frames set by the governmental zoning plans. - Initiate collaboration between private developers and citizens. - Engage external actors such as consultancies to get advice. - Negotiate based on their stake and interest.
External Actors	- Comply with zoning plans. - Be actively engaged to claim a stake in the process. - Show their claimed interest in either geographical location, provided knowledge or economic share.	- To defend their stake or interest as an external actor. - Make a profit off of their interest. - Sustain land values and ensure a proper spatial quality in any energy project. - Prevent micro circularity by concentrating developments	- Invest in private developers' projects. - Defend their stake or interest through the use of law. - Provide support in knowledge (Education) or by engaging in citizen cooperation's to raise awareness.

There are two side notes to the actor network overview and the role division table. First, the actor network as presented here is not an exhaustive list. Since the project is still in a relative early stage, a lot of actors might still get added to the current list, and some of the actors which now play a role can withdraw their interest. This side note is mostly relevant for the private developers. The second side note is that of the role of external actors and private developers in terms of what they must. Since external actors and private developers have a free choice whether or not to initiate an interest in a project, the 'must' is only relevant when they commit themselves to Cleantech.

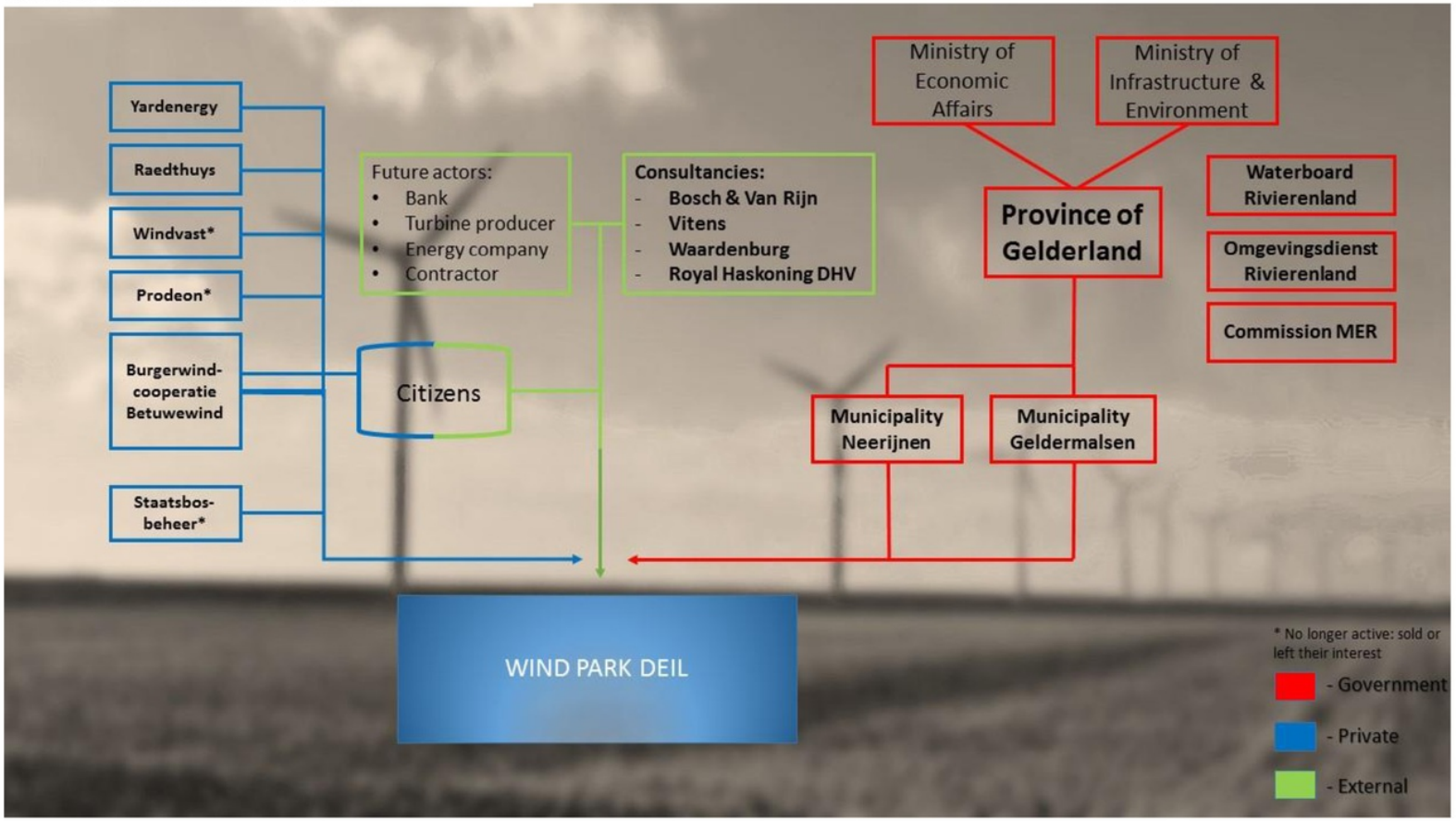
6.1.3 Wind-park Deil

By analysing policy documentation, strategy reports and talking to actors from within the actor network of Wind-park Deil, the overview of the complete actor network has been mapped out. In this network, the three main categories of actors are typified as being part of either; Government, Private sector or External actors. Following this categorisation, the actor network of Wind-park Deil of all the actors that at some point of the process either have been, still are or will be part of the project consists of: the actors which are still to be determined are parties which inevitably will take part in the

development of the project being crucial in either providing finances or providing hardware. Since the project has to be accepted still, these actors cannot be identified since there are no deals made as of yet. For the actor network as of now, including the actors which have left figure 6.1 shows how the networks is made up.

Wind-park Deil has seen a variety of actor compositions in its network throughout its development period starting in the 1990s (Van de Wetering, 2017). This ranged from the addition of the Citizen-wind-association Geldermalsen-Neerijnen to the disappearance of a number of actors in holding shares of ground. Winvast and Prodeon, as well as Staatsbosbeheer were three developers which sold their share of the project to the citizen-wind-association Geldermalsen-Neerijnen, Yardenergy and Raedthuys. The result of this trade is the future allocation of windmills being; 2 for Raedthuys, 5 for Yardenergy and 4 for Geldermalsen-Neerijnen (Hoiting, 2017). A number of phases of plan development in which the actor network composition has gone through changes have led to this. These phases are; 1) Plan phase; 2) Preparation phase; 3) Decision phase; 4) Implementation phase (Van Es, 2017; Hoiting, 2017; Adams, 2017).

Figure 6.4, the actor network of Wind park Deil



Phase 1 Plan phase

The start of Wind-park Deil was initially founded by several actors which started to identify locations for wind energy based off municipal and provincial vision documentation. In these locations, the private actors started to sign ground contracts for the right to construct and develop the pieces of land without buying them (Hoiting, 2017; De Waart, 2017). The owner stayed the same, but they sold the development rights. From this position, the private actors developed a plan and approach the municipalities of Geldermalsen and Neerijnen and the province of Gelderland to get a permit for construction. However, the shattered rights for the development of land caused a situation unwanted by the private investors since it would require complex collaborative coordination. In this phase, Winvast, Prodeon, Staatsbosbeheer, Yardenergy and Raedthuys all had some development rights, hereby constituting the actor network for phase 1 (Van de Wetering, 2017; Van Es, 2017).

Phase 2 Preparation phase

The initial plan preparation phase started with the five aforementioned developers initiating their plan and with the ground positions acquired, approached the province of Gelderland and the municipalities of Geldermalsen and Neerijnen to obtain a permit for construction. The preparation phase is aimed at realising maximum profit margins for the developers in the permit they are aiming for. This is a phase characterised by negotiations between all the developers, the phase in which external actors come into play and where the province and the municipalities of Neerijnen and Geldermalsen could state their wishes and demands. The issue concerning the ambition of maximum profit is that the other developers, which independently from one another submitted their plan, also want maximum profits. The result of this is the situation in which collaboration is both necessary to realise any form of development, but all the actors are in the same vision, stating their interest for maximum profit. The province of Gelderland along with the municipalities of Geldermalsen and Neerijnen were the main pushers of this collaboration. In this phase, Winvast, Prodeon, Staatsbosbeheer, Yardenergy and Raedthuys all still had some development rights. Combined with the new roles of the province and the municipalities they together constitute the actor network for phase 2 (Van de Wetering, 2017; Van Es, 2017).

Phase 3 Decision making phase

The decision-making phase is characterised by the plan being developed, the collaborating actors to have agreed on a division of costs and gains and where the citizen cooperation Betuwewind has been able to acquire a share of 5% of the benefits with the possibility to grow towards 35% (Adams, 2017). At this point in time, Yardenergy and Raedthuys are the only two developers that are left from the original five, along with the citizen wind cooperation. Now comes the part for the decision to be made. This is the request for a building permit which, once it is accepted, is *"Irreversible, after which the turbines can be ordered, the contractor can be contacted and the construction can start"* (Hoiting, 2017).

For the actual decision to be made, the requested permit has to be accepted by the board of mayor and deputies (B&W) of Geldermalsen and the board of Neerijnen. *"This is planned to happen on the 6th of July for Neerijnen and on the 27th of June for Geldermalsen"* (Hoiting, 2017). Afterwards, the application has to go through several layers of hierarchy. "*First the council of state, which will take up to half a year after which the plan will be initiated*" (Van Es, 2017). In between the dates of the interviews and the writing of this report, both boards have accepted the proposal, which leaves only the council of state as an uncertain passage (Nieuwsbladgeldermalsen, 2017; Velthoven, 2017).

Phase 4 Implementation phase

The implementation phase is the final phase the project development of Wind-park Deil and consists of the ordering of the turbines, the collection of finances, the growth of the citizen cooperation to support the ambitions to own up to 37,5% of the total share of revenue and the construction of the turbines in collaboration with a contractor. Since this phase will be initiated only if the council of state agrees on the permit request, this will become relevant. A number of things that are already clear about this implementation phase:

- All 11 wind turbines must be identical (De Waart, 2017; Hoiting, 2017)
- The developers will sell their energy to the net, which will then transport it to customers (Hoiting, 2017).
- Raedthuys will not be the energy company to purchase the energy from the other developers to sell to the market (De Waart, 2017), even though they have this right for their own share.
- The construction will take from one up to one and a half year (Adams, 2017).

Relationship between the actors

The three dimensions of the energy transition actor network of the case of wind-park Deil need to work together to realise the project. This requires collaboration, communication and this forms a complex set of relationships between each of the actors within the dimensions. Following Kemp (2007) on transition management, it is evident that each actor needs to fill in their role in such a way to optimally help the whole. Actors must take their role, their tools and their obligations and combine them in a collaborative fashion. In terms of wind-park Deil, according to interviews conducted with Van Es (2017), Van de Wetering (2017), Hoiting (2017), De Waart (2017) and Adams (2017) the roles of these actors can be defined in terms of what they want, can and must in relationship to Wind-park Deil.

Figure 6.5, Wind park Deil, Must want and can per actor category.

	Must	Want	Can
Government	- Facilitate in delivering relevant knowledge to the interested developers. - Make the final decision regarding the approval of wind turbine development. - Allow development when the inquiry meets all zoning plan requirements. - Facilitate collaboration (including citizens)	- Realise the largest possible energy revenue with the lowest degree of external damage done. - Realise the energy neutrality ambitions. - Integral plan realisation. - The realisation of a citizen cooperation. - Bottom-up plan development	- Delegate authority in-between municipality and province about the development of wind turbines. - Formulate demands and requirements to steer the development process and outcome. - Change zoning plans and other law based requirements to facilitate the development.
Private Developers	- Come with the first incentive for development. - Engage citizens and create awareness in the environment of the plan area. - Comply with zoning plans	- Acquire an agreement in principle with ground owners for wind turbine development rights. - To create a profitable business case - Realise maximal profit margins - Short process duration and a quick start of the construction stage.	- Invest in the development of wind turbines. - Use their development rights to bargain about the costs, gains and external demands for the area. - Engage awareness in citizens on wind energy.
External Actors	- Citizens have a participatory obligation. Pro-active participation to show interest in their own environment. - Deliver proper area research reports. - Comply with contractual agreements.	- Defend their interest. - Acquire profitable returns on investments. - Get a return on windmills either via compensation or in a direct interest.	- Use legal constructions to defend their interest. - Invest in the project by joining the citizen wind-cooperation Betuwewind. - Deliver local knowledge to governments and private developers

6.2 Analysis results

The actor networks have been mapped out, the relationships between the actor categories have been defined and the stages of development are discussed. What remains in this paragraph is to describe the results related to the three other focal points of the central research question: The *role of innovation*, the *recommendations for provincial policy* and the *role of planning law*. Transition management as an aspect of this research in terms of current provincial policies helps to understand the empirical data, which results in the raw recommendations for the province according to the interviewees, so purely their vision on how policy should be formed. The final formulation of recommendations will be presented in chapter 7.

6.2.1 Role of innovation

About the role of innovation, theory states that new technology can inspire a change in behaviour which in turn inspires a snowball effect where an innovation spreads through society. Likewise, a change in behaviour can inspire an acceleration of innovations. The results have been somewhat likewise, sometimes contradictory but also some that point to other factors.

First, Bolt (2017) points to the proposition that a technology has to be proven before it can be implemented on a larger scale. He states that "*Once the technology has been proven, the most important thing is to make a business case which presents a profitable project. For this project, technology is not the issue since we have surpassed the discussion whether solar power and wind power are energy positive projects. Even though in the future, new technologies might inspire new projects, for the scope of Cleantech considering energy and solar power, this is no issue".* Van Es (2017) likewise states that *"Technology has proven itself in the meantime, so the remaining issue is to create this awareness".* Van Kleef (2017) adds to this statement by saying *"Technology is not the issue regarding projects coming to a stop. The issue medio 2017 is that human processes are slowing progress down and that the average citizen is unaware of the opportunities of green energy generation like solar panels on houses".*

On the other side, Van de Wetering (2017) points to the fact that before the current technologies were widely accepted, a number of innovations passed which eventually led to the current situation. He states that *"looking at wind-energy, there was a point (and still is) where windmills needed to prove their usefulness, which was realised by innovation upon innovation. The same thing could apply to a technology which is at this moment not yet in the scope of our imagination."* Van de Wetering points out the fact that for the current focus on sustainability, innovation is not the issue, but I might become the issue once again if an innovation presents itself.

28 Looking at the sub-question whether innovation influences human behaviour and vice-versa in explaining the current boom of the energy transition, Van de Wetering, Bakker, Adams, Van Kleef and Bolt agree on the statement that the most important explaining factor for the energy transition boom is the rise of awareness in governments, and in agreements like the GEA and the Paris climate agreement. The rising sense of urgency throughout society for a cleaner and more sustainable source of energy gives way for more initiatives.

"Awareness increasing throughout society however is a way of encouraging innovation in terms of efficiency of technology, which in turn can cause a larger crowd to adopt an innovation due to the increased opportunities." (Van Kleef, 2017). Awareness and the sense of urgency seem to be the main

drivers, causing innovation parallel to a change in behaviour instead of the assumed cause-effect relationship between innovation and behaviour.

6.2.2 Current policy review

The current policy of the province of Gelderland concerning their role in energy transition projects has been discussed in the interviews. Related to Cleantech A1, wind-park Deil but also other comparable cases which fall under the experience of the interviewees, their view on the current policy is presented here. What is the current role of province (not what it should be, but what it actually is)? What are the positives? What are the negatives?

The role of the province in Cleantech is discussed by Bolt (2017) who states that "*the role of the province is more about organising a movement rather than being the movement itself. For myself as a process director I try to get the right people together and facilitate a shared ambition to come to life.*" The organisation of the process will be delegated further down the road to the City triangle region. Its like pulling up a glider with a car, once it is flying you keep an eye on it but your own role becomes marginal. Bolt (2017): "*From the perspective of the collaboration between province and region, the province refrains from touching the content of the project. In a later stage, the province will once again be playing a role, but then as a facilitator in terms of developing zoning plans or as a supplier of subsidies*". Van Es (2017) underlines this facilitating role by explaining the process of wind-park Deil. *"Developers look at policies of the province to identify opportunities for development. (…) Then the province facilitates the process of the development or can even delegate their authority down to the municipality*".

Sint Nicolaas (2017) points out a challenge in the facilitation of processes for the province since "*The province is always looking for meaning in between national government and municipalities*". In this search, facilitation of others is a logical result which is derived from a legal authority that provinces have (Adams, 2017). The added value of the role of the province should be sought for and found in the supporting role for others, be it in knowledge, subsidies or driving collaboration.

Positive sounds about the policy of the province come from Van Kleef (2017), who speaks about the leading role of the province in terms of processwise guidance of the energy transition. "*Numercial, Gelderland is lagging behind on others, but in terms of organising and follow-up visions others do look at Gelderland as a positive example*". Another example of the province taking on a positive role comes from Hoiting, Adams and De Waart who are positive about the addition to the process of Deil. They state that *"The project was stuck and the province saw a large opportunity in this project to add to their energy targets, so they hired a man from RHDHV (Royal Haskoning DHV) to come and unlock the negotiations." (Adams, 2017) "Furthermore, the province has proven very helpful to the municipality of Neerijnen and Geldermalsen by providing knowledge when called upon" (Van de Wetering, 2017)*

Negative sounds about the province focus mainly around the idea that the province lacks decisiveness. "*The ones that aren't moving are the provinces. The GEA is a one-way show where the province lacks a say. I think the province should be more demanding and active in showing commitment."* (Heijnen, 2017). Verspui (2017) adds to this by stating that *"The strange thing is that when building a highway, there are no complaints, or very few and the province doesn't ask anyone if they agree with a highway. Its accepted that mobility is important while at the same time when we need to develop a windmill, the province will ask everyone for their opinions, hereby lacking strength and decisiveness."*

6.2.3 The role of citizens

The role of citizens in projects is widely discussed and varies per project. The degree of participation can vary, and also the time at which citizens are incorporated into project processes can be different. The questions are always: what do we want *for* citizens and what do we want *from* citizens, and how does this reflect on how the situation in reality is?

According to the province of Gelderland and their statement on the matter of citizen participation, citizens have an obligation to actively participate in their direct environment if they want to have a say in the outcome (Provincie Gelderland, 2016). The translation of this vision into the case of Cleantech has been marginal. According to Verspui (2017) *"The role of citizens at the moment is very marginal, and that should change quickly, before Cleantech A1 becomes a government and private developer shared project. In order to get support from a bottom-up point of view, the provinces need to incorporate citizens in an organised way in an early stage."* At the same time, a role of citizens should be focused around a positive approach. *"Instead of keeping a distance, complaining and mocking a plan, citizens should actively try to work together on realising the most positive outcome possible which is shared by the largest majority possible." (Adams, 2017).*
Wind-park Deil is a unique project in terms of citizen participation (Adams, 2017) and should be considered as a mould for future development. *"Due to the collaboration between private developers, governments and the citizen cooperation Betuwewind, Wind-park Deil has managed to achieve a situation in which only 4 signed protests were filed. A historically low number for a park with eleven wind-mills. (Adams, 2017).* Frank Hoiting, from the private developer Yardenergy concerned with wind-park Deil, gives credit to Betuwewind by stating that: *"The 'not in my back yard' (nimby) effect has been drastically decreased in Deil due to the work of Betuwewind which formed the bridge between us and the local community." (Hoiting, 2017).*

For the role of citizens, provincial policy states the importance of it in a bottom-up envisioned energy transition. *"Alone you go faster, together you reach further"* (Provincie Gelderland, 2016 P. 3). At the same time, a number of good examples lead the ambition (Deil), whilst some cases are still relatively behind on it (Cleantech). *"A falling pit which should be avoided is that when a process is taking up too much time, the province can crawl back into the role of power and try to realise things in that way. That is the biggest sin in a role comparable to mine."* (Sint Nicolaas, 2017).

6.2.4 Provincial policy recommendations

In terms of the policy of the province, a number of recommendations have come from the interviewees, which will also form the basis of the discussion in chapter 7. The recommendations given here will be presented without the analysis of context and interest of the quoted interviewee. Chapter seven will discuss this, so to place the respective statements in the correct context and interpret them correctly.

Table 6.1; Interviewees recommendations for provincial policy.

Interviewee	Function	Recommendation(s) for provincial policy
Van Kleef	Province	"The province and other governmental agencies should steer developments and facilitate them, but do that in a clear and transparent way. Refrain from shooting back into the role of the decisive authority to use power to realise your vision."

Van Es	Deil (Province)	"My view on provincial policy differs from the province's' view, but I believe that the energy transition is so important, that we cannot rely on initiatives from citizens and private investors to realise the entire need for green energy. I think the province should take on a more prominent top-down focused role in some cases due to its importance. Not fully top-down, but still more vigor from the provinces is needed."
Sint Nicolaas	Cleantech (Municipality)	"Cleantech should bond with private companies and citizens more. Nothing works as good as giving companies with good ideas a podium, to lift their spirits and show the commitment we show as a cooperation."
Van de Wetering	Deil (Municipality)	"The importance of communication within the province is of great concern. We saw that at the end of the trajectory, someone from within the province formulated a new demand regarding birdcountings. Ivo van Es was also surprised by this, meaning that internal communication was lacking. There should be some form of mould for windmill development where all demands are formulated in a list."
Adams	Deil (Betuwewind)	1. "I would suggest to make energy transition the same height and prominence as mobility in policies. The importance of mobility is known and accepted, though energy is not". 2. "Incorporating a citizen cooperation and giving them the role of a private developer helps in making citizens feel heard and it supports the idea of bottom-up development. To give people a direct interest in windmills has proven to result in less resistance."
Hoiting	Deil (Yardenergy)	"A citizen cooperation like the one in Deil has proven to be successful. If a province can make a demand to incorporate such a cooperation without scaring off private developers which is the challenge, I think they should always aim to do so."
Heijnen	Cleantech (Hedgehog)	1. "Show commitment to developers. Take them seriously and maximize the degree of facilitation of them. One of the things I am missing with civil agents is the lack of commitment." 2. "The long term must not swallow the short term, in terms of losing interest from developers due to the focus on long term goals and lengthy processes." 3. "Communication from the province should be clear and open. Frustration and a decrease in trust comes with unclear motivation of statements and choices".
Bakker	Cleantech (Government)	"The translation from ambition to action should show short term wins. The long term is uninteresting for most private developers. Policy in the province should be long term, but the implementation of it should result in equally spread results, also on the short term."
Verspui	Cleantech (Government)	1. "Cleantech should incorporate citizens as soon as possible, before they get a scent of the project and feel ignored. The idea of a citizen cooperation in the style of Deil would be a good proposition.

		However, citizen participation requires a different approach and we need to make sure they feel take seriously and show for it in results". 2. "Why is mobility unquestioned with the broadening of the highway, but constructing a windmill is? I suggest a policy change and an awareness campaign to make them equal in policy and in priority. To change the discussion from 'why' to 'where'."
De Waart	Deil (Raedthuys)	"The facilitation of municipalities in their wind-vision should be a priority for the energy transition policy of the province. For this, I see a challenge in terms of improving communication by developing a blueprint list of demands that should be respected in the development of any wind-mill park to prevent last minute changes."
Pennings	Cleantech	"We need to concretise the ambition. The role for the province is to now facilitate developments in certain places under the umbrella of Cleantech to show progress and to show others the opportunities given. It is about commitment and realising your own vision. This means opening up opportunities for the long term by showing results on the short term."

6.2.5 Framework of the *'Omgevingswet'*

Planning law is the framework for all projects and ambitions for the development of our (planned) environment. The *'Omgevingswet'* is an important change in this respect, meaning that the recommendations done to the province must be in line with the framework set by the *'Omgevingswet'* in order to be relevant in the period post-2020, the implementation date. In short, the ambition for the *'Omgevingswet'* is to:

1. Improving the overview, predictability and the user friendliness of planning law.
2. Realising cohesion in approaching the physical habitat, decision making processes, policy and regulations as interrelated entities
3. Enhancing the administrative decision space by allowing an active and flexible approach for reaching goals for the physical environment.
4. Accelerating and improving decision-making in projects about the physical environment.

The conclusion that can be drawn from the interviews is that the knowledge on the implications of the *'Omgevingswet'* is not widely spread. Nevertheless, Verspui (2017) states that the implications of the *'Omgevingswet'* should be taken seriously by those that are concerned with the energy transition. *"The 'Omgevingswet' and its implications play right into the hand of the energy transition, with the focus on bottom-up initiatives and faster procedures due to simplified law, the struggles of the energy transition are being addressed."* Bakker (2017) adds to this by stating that: *"Mainly the simplification of law is a blessing for the short term versus long term aspect of spatial planning. To show actual progress on the short term will hopefully result in a long-term leap in sustainability targets."*

The *'Omgevingswet'* and its components seem to match with the energy transition very well, meaning that a policy change now, should be able to keep up with the legal changes that are part of the *'Omgevingswet'*.

7. Governance recommendations

Identifying the place to add value for the province, that is what the basis of a recommendation should be (Kemperman, 2017). This is called reporting in applied scientific research aimed at a practical utility (Boeije, 2009 P. 322). This practical utility is derived from the province of Gelderland, which is the initiator of this research. The goal of this research apart from its scientific aspect is to formulate recommendations to the province of Gelderland for their energy transition policy. The recommendations given by the interviewees in paragraph 6.2.5 are re-interpreted according to their respective roles, and are presented here as the final recommendations for the provincial energy transition policy.

Every recommendation must accede to a number of core values for provincial policy, which are also in line with the *'Omgevingswet'* implications. The core values for policy are:

1. **Integral** policy from collaboration thinking
2. Define the **added value** from collaboration
3. Prominent **citizen participation**
4. Develop from widespread **acceptation**

7.1 Recommendations

1. Improve communication in the starting phases of a project

Communication within the province needs to be addressed in order to provide a clear development framework. The issues some projects face are additional demands which are formulated in a late stage which are poorly communicated about in the province. Van Es (2017) and Hoiting (2017) reported this in their experience with Wind-park Deil. The solution for this issue could be to develop a blueprint checklist for solar panel parks, wind mill parks and other forms of energy transition related projects.

2. Include citizens at the planning phase in a cooperative manner

Citizen cooperation's have proven to result in a situation in which fewer formal objections to plan development are submitted. In wind-park Deil, only 4 objections were submitted (De Waart, 2017; Adams, 2017) which is very few compared to cases such as Zeewolde and Fryslân where respectively 54 and 543 objections where submitted (RVO, 2010; Bureau-Energieprojecten, 2017). A comparable project process was realised in Deventer with comparable results (De Waart, 2017). Citizen cooperation's are accompanied by several advantages. It can form the bridge between community on the one hand and government and private developers on the other. At the same time, the cooperation raises awareness in the environment of the actual implications of the development. Finally, the cooperation is a way for the community to be directly involved in acquiring a share of the project in being able to invest. This will prevent strong opposition. The challenge is to realise a cooperation as an obligatory element, while not scaring off private developers with this demand.

3. Raise awareness in sustainability (Get sustainability on the same height as mobility)

Equalise mobility and sustainability in policy and in awareness levels. Mobility goes without question, whilst energy transition projects can count on a lot of negative opposition. It can be argued that the supply of energy is just as important as mobility. The community accepts a highway and its external effects (noise, pollution, an infringement of the landscape) are barely heard as arguments to prevent it, while the same arguments are made for wind mills (Van Es, 2017; Van Kleef, 2017). Technological

developments are accompanied with several advantages compared to several years ago, resulting in a more attractive investing market.

4. Show commitment in policy as an integral obligation

In line with the *'Omgevingswet'* of 2020, the province should have a policy in which the commitment to sustainability is an integral obligation to all spatial developments. This means that projects ranging from the construction of a new industrial terrain to the construction of a new town hall should incorporate some degree of sustainability. Recycling, clean energy generation and/or energy usage reducing measures should be integrated everywhere. This goes hand in hand with the core value of collaboration. However, collaboration itself is a general form of advice and widely accepted. The actual point of collaboration is the search for the addition of value. The added value of the province is in showing commitment, being a lead example and facilitating development.

7.2 Points of discussion

Apart from actual recommendations, there are two points which need to be discussed since it seems they are unchallenged. These are not direct recommendations, but rather food for thought where the province might want to reconsider their policy.

1. Increase role of province in decision making

The pendulum movement of provincial policy is swinging from centralisation to decentralisation, meaning that the current movement is going towards less governmental influence. This is in line with the vision, as well as the projected necessary strategy to realise the big jump forwards, of which the province speaks (Provincie Gelderland, 2015; provincie Gelderland, 2016). The province should think about what the ideal point of balance is between these two. Facilitating private developers as a province is becoming the focal point in upcoming years, where the province will need to act as a partner rather than act as a government (Rijksoverheid, 2016). Even though this is envisioned, the provinces should not neglect their role in spatial planning as being able to do more than partner up and facilitate others. Society expects governments to do more, and some private developers feel like governments might be walking away from their obligations to society (Heijnen, 2017). A way to realise such a role is for a government to design structure, surpass private interests and weigh private and public interests against each other.

2. Invest own finances in sustainability projects

The province of Gelderland has funds in the account which are largely unmoved. Regarding the large importance of the energy transition, the argument can be made that the province takes on the role of developer with the funds they have at their disposal. Even though this is against the policy of bottom-up development and the principle of citizen participation, the case can be argued that for a number of projects the province might be better off being a sole developer. The big pros of such an example are; 1) It shows the commitment the province is willing to make to the cause of the energy transition, which sends a message to potential investors. 2) the province can add to their own energy neutrality targets and 3) the invested money is guaranteed with a yield of 6-7% per year (De Waart, 2017; Heijnen, 2017).

8. Conclusions

The context of this research was to set out how actor networks are built up within the realm of the energy transition in order to develop a fitting governance recommendation. Looking at the urgency of countering climate change and the related role of the province in setting out their own energy transition policy, the creation of understanding how this should be managed is crucial. By creating a policy which enables a set of cooperative enterprises to develop energy transition projects and effectively move towards a more sustainable region on the long term, the province can contribute to this counteract.

Even though climate change has been known for quite some time and the accompanying energy transition is on the agenda more prominently, it seems that a lot of governmental agencies are just now starting to struggle how to integrate this into their policy. The differing views from the interviewees on this topic implies that developing a fitting policy is a complex challenge due to the varying interests and perspectives in actor networks. According to a collection of interviews from interviewees with different perspectives on the same project, this research tries to conclude sharply which core values need to be respected in a provincial policy and how this policy should be carried out. The in chapter 1 presented research questions (Paragraph 8.1) are herein answered, after which a methodological reflection will take place (Paragraph 8.2) and a recommendation for further research (Paragraph 8.3) concludes this research.

8.1 Answering the research question

By answering the research question, this research also meets the requirement stated in the research aim:

To identify the networks of sustainable energy initiatives in the province of Gelderland, to address their scope, define their relations and find a fitting form of governance for possible government contribution within the projected framework of the 'Omgevingswet'.

A set of four sub-questions was formulated to help answer the central research question:

How extensive are energy transition actor-networks in the province of Gelderland and what role for the province is desirable in terms of 'good governance' in these actor networks considering the changing development of the legal framework of spatial planning by the 'Omgevingswet'?

Sub questions

1. *What is the relationship between technological innovation and human behaviour in explaining the recent energy transition boom?*
2. *How extensive are energy transition actor networks in the province of Gelderland concerning the scope of actors and the relationships between the actors?*
3. *What is the most ideal and socially desirable practice of 'good governance' for the province to implement, to support energy transition actor networks?*
4. *How does the 'Omgevingswet' change the relevant framework for the energy transition and how can it offer opportunities to enhance collaboration in these networks?*

8.1.1 Innovation and behaviour

Sub-question 1 required to look at the role of innovation as a possible cause for the current focus on the energy transition and to understand why actors move the way they do. The relationship between innovation and human behaviour within the spectrum of this research has resulted in the insights that the discussion whether technology still needs to be proven to convince policy makers to make the step has been long passed. Various interviewees have stated that feasible technology is already available, and that the current struggle to realise a change in behaviour is raising awareness of the urgency to change. In stating what the relationship is between technological development and human behaviour, the answer is that this relationship is one which is not of a technological nature but a matter of awareness. The recent energy transition boom is therefore a result of agreements such as the Paris climate agreement, as well as an urgency which is fed by reports that already show the effect of climate change.

8.1.2 Energy transition actor networks

Sub-question 2 concerned the scope of energy transition actor networks and required to map out all the actors in two case studies to gather information on what actors want, can and must. This was needed to formulate a set of provincial policy recommendations. The extensity of energy transition networks is typified in three categories, being 1) the governmental agencies with all the different roles governments have, 2) the private developers and 3) external actors which is an overarching group consisting of actors (See figures 6.1 and 6.4). These external actors are not actively engaged in shaping and developing the area from the front seat but do have an interest in terms of either living in the area, which can either support or oppose the project, or being contracted by developers for supportive activities.

The relationship between the actors is of importance to interpret the recommendations per category accordingly. In terms of the three main categories, an important conclusion to be drawn here is that the recommendations are always a trade-off between self-interest and group-interest. Whereas each actor is aware of the necessity to cooperate, each actor will choose self-interest over group-interest whenever this choice needs to be made. The difference between the actor groups Is that the governmental agencies have a slightly larger interest in adhering the group-interest whereas private developers have less incentive to serve the group and lose themselves. *"For each project, a private developer has several others meaning that a loss of self-interest will not be accepted" (De Waart, 2017).* This is an important note to explain why actors move the way they do and to support the stated provincial policy recommendations from chapter 7.

8.1.3 Good governance

Sub-question 3 was focused on the step between the actor networks and the corresponding provincial policy. What role should the province of Gelderland play in these actor networks in terms of good governance and what core values should be respected here? According to the interviews the base of each policy (and thereby each recommendation as well) should adhere to four core values:

1. **Integral** policy from collaboration thinking
2. Define the **added value** from collaboration
3. Prominent **citizen participation**
4. Develop from widespread **acceptation**

According to the theoretical research done in chapter 2, good governance is generally characterised by eight values being; participatory, consensus oriented, accountability, transparency,

responsiveness, effectiveness and efficiency, equitability and inclusiveness and follows the rule of law. Since good governance is case dependant, drawing generalisable conclusions on good governance for provincial policy for the energy transition is difficult. Based on the two case studies from this research however**, good governance must adhere to the integrality of policy from a widespread accepted degree of participation to search for added value. In this, a province must follow the rule of law, which is customary and it must be transparent**, a topic which was overseen in the interviews but deserves credit since it is inherently part of collaboration and it forces a degree of justifying choices.

8.1.4 *'Omgevingswet'* implications

Sub-question 4 asks the question how the recommendations for provincial policy concerning the energy transition should fit in the upcoming change presented in the *'Omgevingswet'*. The changes from the *'Omgevingswet'* for spatial planning are best caught in the four main goals formulated by the ministry of I&M (See Paragraph 6.2.5):

1. Improving the overview, predictability and the user friendliness of planning law.
2. Realising cohesion in approaching the physical habitat, decision making processes, policy and regulations as interrelated entities
3. Enhancing the administrative decision space by allowing an active and flexible approach for reaching goals for the physical environment.
4. Accelerating and improving decision-making in projects about the physical environment.

The implications of the *'Omgevingswet'* and the relevance it poses to the energy transition relates mainly to the integrality of policy and the improvement of the simplicity of law. The acceleration of processes and the improvement of overview of planning law at the same time tackle the most relevant issue as stated by the interviewees, which is that processes are slow and that regulations tend to be the cause of that, apart from the opposition from certain stakeholders found in every project. The argument that the acceleration of decision-making is in contest with some arguments that lengthy projects realise better results is a trade-off which is case relevant. For the energy transition, the interviewees claim that short term results are needed to realise the long-term leap. The implications of the *'Omgevingswet'* are thus very much in line with what the energy transition requires. According to the interviewees, faster processes, integral policy and a more user-friendly planning law system all work in its favour. However, the *'Omgevingswet'* is only a toolbox which states the framework. In order to exploit the opportunities properly, all the governmental agencies need to adjust accordingly. If not, the *'Omgevingswet'* will be the same wolf in a different coat.

8.1.5 Central research question

Answering the central research question, the conclusion to be drawn from the four sub questions is focused around the formulation of a good governance policy for the province of Gelderland to adequately administer the energy transition.

What can be learnt from the empirical data is that one must not forget that defining a governance policy fitting for a province is a complex challenge since it is presented with opposing interests both within the province as from external actors. However, the data has presented a number of focal points and insights that can at the very least steer a governance policy in the right direction.

Good governance policy focuses on the issues at hand, *tackling awareness problems* and *facilitating collaboration* by *developing blueprint checklists* of the demands on development and *showing commitment* to these causes. Furthermore, good governance *respects the 'Omgevingswet'* and its implications and makes *full use of its potential*. The governance policy to be developed must

motivate innovation, but not as a means to change behaviour. Rather to create *new opportunities*. The behavioural change must be sought in *awareness campaigns*. Finally, actor networks are complex and ever-changing networks which only stop changing as soon as the project is finished. Mapping out the extensity of it therefore is a difficult task but should generally be done according to a three or four-way dissection of the network into government, private developers and external actors. A possible fourth should be citizens. In this way, the overview of a recommended course of actions can be tracked back. Concluding, the role of the province in the energy transition considering the factors of planning law and the complexity of actor networks should be one in which:

The province of Gelderland must critically define its role ranging from a facilitating partner which shows commitment to a decision-making authority when needed. The policy must respect integrality, seeking for added value from an accepted citizen participatory trajectory which is transparent. Apart from this, the province should set an example to their own ambition by incidentally acting as a developer.

8.2 Reflection

By doing this research, the aim was to deliver an addition to scientific knowledge by looking into what the role of innovation is on human behaviour, how this helps to explain the energy transition and how provinces should adjust their policy to help the actor networks which exist within the energy transition. This chapter provides a critical reflection, because even though this research adds to knowledge about the complexity of actor networks and the role of the energy transition in relation to spaces, the research has some restrictions.

First, this research and the recommendations for provincial policy are based on a set of two case studies. The downside of this is that the energy transition and the actor networks in this are case dependant. Any form of generalisability from these case studies to other case studies would be difficult. However, the policy recommendations can be considered general statements, which leave room for interpretation throughout different cases.

Second, the research has tried to focus on the role of each actor group per case study. However, since the case study of Cleantech is still in its early stages, the actor group of the private developers is one which leaves room for questions. The problem is that identifying actors which still need to come into play is an issue. The best option to tackle this issue is to generalise the role of private developers in such a way that whichever actor eventually fills in the gap, the conclusions and the recommendations will stay the same.

8.3 Further research

This research is just a small addition to the knowledge about the energy transition and its implications to policy, its relation to spatial planning and the extensity of its actor networks. Several conclusions have been drawn but still, a few research topics and further concretisations of knowledge remain.

For further research, it is interesting to look at how the *'Omgevingswet'* has affected spatial planning and the way in which provinces implement their policy. This should be done post-implementation of the *'Omgevingswet'*, so at the very earliest in 2020. The interesting part is to see how the *'Omgevingswet'* has changed the roles of citizens, governmental agencies and how planning processes both in length and in complexity have changed.

Second, further research should look into more detail on how the awareness aspect of the energy transition is integrated in our society. By looking at what is causing the current energy transition focus, one can identify what is needed to be done to enhance this. Whether this would focus on the role of increasing awareness, starting a campaign for green energy or by developing more technologies. The nature of such a research would be partly a social research and partly a planning research. One could argue if it fits well within the boundaries of social geography. By doing a research on this, recommendations as how to enhance the energy transition from the perspective of getting the community more engaged can be more sharply defined.

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Interviewees	**From**
Adams, Hans (2017)	Betuwewind
Bakker, Petra (2017)	Rijkswaterstaat
Bolt, Carel (2017)	Provincie Gelderland
De Waart, Jelle (2017)	Raedthuys
Heijnen, Arjan (2017)	Hedgehog Applications BV
Hoiting, Frank (2017)	Yardenergy
Pennings, Luc (2017)	Cleantech Regio Board
Sint Nicolaas, Ron (2017)	Gemeente Deventer
Van Es, Ivo (2017)	Province Gelderland
Van de Wetering, Niels (2017)	Gemeente Neerijnen
Van Kleef, Mijnke (2017)	Provincie Gelderland
Verspui, Kees (2017)	Cleantech Regio Board

Appendix 1: Topiclist Interviews Cleantech

(Translated from Dutch to English)

Personal questions

1. What is your job function?
    a. Relationship to Cleantech Icon A1?
    b. Relationship to the energy transition?
2. Experience with comparable cases?
3. What is your view on the potential of the project?

The energy transition in General

1. What is, according to you, the most important cause of the lagging position of the Netherlands compared to other countries in Europe? Looking at the general sustainability targets that have been defined in the Paris climate agreement.
2. What differentiates Gelderland from other provinces in their energy transition efforts?
3. What is the role of technological development in the implementation of a project? Has the lack of efficient technology ever been a cause of not implementing a project or is this mainly caused by bureaucracy and resistance from the public?
4. What is the most important reason of the increasing focus on sustainability throughout society at this moment?

Actor network in the case study of Cleantech Icon A1

1. How are you connected to the project of Cleantech Icon A1?
2. I Need a complete overview of all actors related to the project. What can you tell me about the actors related to this, private, public or civil associations?
3. Can you draw out the network as far as you know it?
    a. Not just actors who cooperate to realise a goal but also actors that make a process encounter resistance. State forest management, Greenpeace, citizen cooperation's or any party.
4. Can you name some people I should take to?
5. What is the role division of the actors in the network?
    a. Want
    b. Can
    c. Must
6. How does the initial network of actors working on the broadening of the A1 solely, relate to the network of actors wanting to make the area an icon for sustainability?
    a. Are there actors opposing the plan of the Cleantech Icon due to wanting to focus on the infrastructure first?

Role of the province in the network

1. What is the primary role of the province in this network?
    a. What must they do?
    b. What can they do?
    c. What do they want to do?

2. What does the province refuse to do?
3. Dilemma's and conflicts?
4. Place of Cleantech Icon A1 in the GEA?
5. How does the province relate to your work specifically?
6. What should a province do according to you?
    a. Division of tasks between province, national government and municipality

Policy development

1. Rhyming policy with the environment act. What role does the environmental act play in the energy transition?
2. How is intergrality part of your work in the realisation of the Cleantech Icon A1 projects?
    a. Does this create conflicts?
3. What is the role of the national government in this network?

Role of citizen participation

1. How is the citizen incorporated in the development of the Cleantech Icon A1?
    a. Is this ideal?
    b. What would you change?
2. What do citizens add to the project?

Closing statement.

Appendix 2: Topiclist Interviews Wind-park Deil

(Translated from Dutch to English)

Personal questions

1. What is your job function?
    a. Relationship to Wind-park Deil?
    b. Relationship to the energy transition?
2. Experience with comparable cases?
3. What is your view on windenergie?

The energy transition in General

1. What is, according to you, the most prominent cause of the lagging position of the Netherlands compared to other countries in Europe? Looking at the general sustainability targets that have been defined in the Paris climate agreement.
2. What differentiates Gelderland from other provinces in their energy transition efforts?
3. How big is the role of wind energy in realising the ambitions for energy neutrality on the long run?
4. What is the role of technological development in the implementation of a project? Has the lack of efficient technology ever been a cause of not implementing a project or is this mainly caused by bureaucracy and resistance from the public?
5. What is the most important reason of the increasing focus on sustainability throughout society at this moment?

Actor network in the case study of Wind-park Deil

1. How are you connected to the project of Wind-park Deil
2. I Need a complete overview of all actors related to the project. What can you tell me about the actors related to this, private, public or civil associations?
3. Can you draw out the network as far as you know it?
    a. Not just actors who cooperate to realise a goal but also actors that make a process encounter resistance. State forest management, Greenpeace, citizen cooperation's or any party.
4. Can you name some people I should take to?
5. What is the role division of the actors in the network?
    a. Want
    b. Can
    c. Must

Role of the province in the network

1. What is the primary role of the province in this network?
    a. What must they do?
    b. What can they do?
    c. What do they want to do?
2. What does the province refuse to do?
3. Dilemma's and conflicts?
4. Place of Wind-park deil in the GEA?

Policy development

1. Rhyming policy with the environment act. What role does the environmental act play in the energy transition?
2. How is integrality part of your work in the realisation of Wind energy projects?
    a. Does this create conflicts?
3. What is the role of the national government in this network?

Role of citizen participation

1. How is the citizen incorporated in the development of Wind-park Deil?
    a. Is this ideal?
    b. What would you change?
2. What do citizens add to the project?

Closing statement.

Appendix 3. Gelderland Energy Agreement.

Government

Province of Gelderland

Waterboard Rijn & Ijssel

Waterboard Rivierenland

Waterboard Vallei & Veluwe

Municipalities

- Aalten
- Apeldoorn
- Arnhem
- Barneveld
- Berg en Dal
- Berkelland
- Beuningen
- Bronckhorst
- Brummen
- Buren
- Culemborg
- Doesburg
- Doetinchem

- Druten
- Duiven
- Ede
- Elburg
- Epe
- Ermelo
- Geldermalsen
- Harderwijk
- Hattem
- Heerde
- Heumen
- Lingewaal
- Lingewaard

- Montferland
- Neder Betuwe
- Neerijnen
- Nijmegen
- Nunspeet
- Oldebroek
- Oost-Gelre
- Oude IJsselstreek
- Overbetuwe
- Putten
- Renkum
- Rheden

- Rijnwaarden
- Scherpenzeel
- Tiel
- Voorst
- Wageningen
- West Maas & Waal
- Westervoort
- Wijchem
- Winterswijk
- Zaltbommel
- Zevenaar
- Zutphen

Private actors

- ADV
- AGEM
- Allego
- Alliander
- ARN B.v
- Atelier Arnhem West
- AVR- Afvalverwerking
- Balance & Result
- BAM Woningbouw
- BDH Strategie Energie
- BK Energy efficiency
- Bouwend Nederland
- Bureau Albatros
- Buro Bron
- Circulus-Berkel
- Cleantech Regio
- CNCPTMKR.nl

- De Campagnefabriek
- De Gasfabriek
- Groene stroomfabriek
- De Hoop Mill
- Delta Werkt
- Diep
- Direction Adviseurs
- DNA in de bouw
- DNV- GL
- Duurzaam in bedrijf
- Elaad NL
- ENCON
- ENGIE
- Europe's energy point
- Giesbers Groep
- Greenspread
- Greenvis

- IF Technology
- IGEV
- Industrial Energy Expert
- Industrie Kleefse Waard
- Industrieel Berkelland
- Innovatiepartners
- Intentief
- Itho Daalderop
- Kennisceuntrum VGO
- Koninklijke metaalunie
- Konlijklijke VNP
- Lagerwey Wind
- LTO Noord
- Miscancell B.V.
- NUON
- Orion Duurzaam Leven
- Parenco

- Project HTB
- SIKA
- SmartWheels BV
- STENVI Advies
- Stichting KiEMT
- Time Shift Energy Store
- TPN West
- TransitieReizen
- TWL
- Uneto-VNI
- Van Beek
- Van Gelder Infra
- VNO-NCW Midden
- Woningbouwstichting de Gemeenschap
- Zilverberg Advies
- Zoncorp

Energy Companies

- Berkelland Energie
- BoeN
- BoerzoektBuur
- BrummenEnergie
- Betuwewind
- Co-Lingewaard Energie
- Co-Tijd voor groen
- Co- Vallei Energie
- Co Wageningen Zon
- Co Wind Nijmegen
- Co Zonning Zieuwent
- DEC Liemers
- Duurzaam Energie Apeldoorn
- Duurzame Energie Bommelerwaard

- Energie 11Duurzaam
- Energiek Leur
- Energie Haarloseveld
- EnergierijkVoorst
- Rivierenland
- Geesteren Duurzaam
- Kerschoten Energie
- LochemEnergie
- Lochem Neutraal
- NI SOlarpark Kwekerij
- Novio VOlta
- Opgewekt Culemborg
- Opgewkt Maas & Waal
- Schep je Leven
- Spijkerenergie
- ZutphenEnergie

NGO's

- Bewoners Belangenverenging Bastion 95
- Bewonersraad Dinxpelo
- Bewoners Siverder
- GNMF
- Hogeschool Arnhem Nijmegen
- Huurdersvereningen:
  - Walfort
  - Burculo
  - De Klink
  - De NOabers
  - HeVO
  - Lichtenvoorde
  - WijWonen
  - Winterswijk
  - Zelhem
- IVN Gelderland
- Klimaatverbond Nederland
- Natuurcentrum Nijmegen
- Stichting Waal-Maas Symbiose
- Woonstichting Bergh

Appendix 4 Coding scheme

Part A: Structured Codes

Actor Networks

- Cleantech (37)
  - Identification of an actor (23)
    - Can (6)
    - Must (15)
    - Want (11)
  - Procedural development (14)
  - Relationships between actors (24)
  - Role of the province (15)
- Wind park Deil (29)
  - Identification of an actor (23)
    - Can (11)
    - Must (8)
    - Want (15)
  - Procedural development (10)
  - Relationships between actors (11)
  - Role of the province (11)

Governance

- Reviewing the province (16)
  - Negative review (7)
  - Positive review (9)
- Provincial policy recommendation (28)
  - Communication (17)
  - Core values (11)
  - Less influence (2)
  - More influence (6)
  - Process improvement (13)
  - Show commitment (9)
  - Sustainability as a business case (6)
- Omgevingswet implications
  - Acceleration of processes (10)
  - Administrative decision space (4)
  - Digitalisation (4)
  - Initiative to citizens and initiative takers (11)
  - Integrality (17)
  - Simplification of law (2)
- Self-interest vs Collaboration (8)
- Short term versus long term (10)

Citizen participation

- Ambition for more participation (5)
- Awareness (20)
- Citizen cooperation's (11)
  - Business Case (15)
- Co-creation (8)
  - Bottom up (13)
  - Top-down (5)

- Forms of participation (26)
    - Citizens as external non-participants (6)
    - Citizens as Private developers (13)
    - Citizens represented through Government (7)
- Role government vs Role citizen (5)

Technology and human behaviour

- Actor tactics according to technology (8)
- Behaviour change causing innovation (6)
- Generation gap (5)
- Technological development influencing behaviour (8)

Transition management policy

- Active management (5)
- Ambitions (12)
- Collaboration (14)
- Role of the province (17)
    - Contract (5)
    - Knowledge (13)
    - Money (13)
    - Support (4)

Planning Law

- Limiting factor (8)
- *'Omgevingswet'* implications (9)
- Protection (2)

Part B: Remaining codes

- Cause of the Energy transition (7)
- Double role of province (8)
- Dilemma's (10)
- Experience of the interviewee (12)
- Flexibility of plans (7)
- Independency (3)
- Learning from doing (9)
- Netherlands overall sustainability progress (11)
- Policy comparison (10)
- Process evaluation (13)
- Provincial internal dilemma's (12)
- Questions for the future (12)
- Role of Pilot projects (3)

Master's Thesis Bas Kramer S4345126 on the spatial policy implications of the energy transition.

ORIGINALITY REPORT

%7	%6	%3	%4
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1	edepot.wur.nl Internet Source	<%1
2	www.score-network.org Internet Source	<%1
3	www.researchgate.net Internet Source	<%1
4	Rene Kemp. "Transition management as a model for managing processes of co-evolution towards sustainable development", The International Journal of Sustainable Development and World Ecology, 02/01/2007 Publication	<%1
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6	Submitted to University of Newcastle upon Tyne Student Paper	<%1
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16	Submitted to Wageningen University Student Paper	<%1
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18	digitalarchive.maastrichtuniversity.nl Internet Source	<%1
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