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Master-thesis

Energy collectives in the Netherlands:

background players in a fossil fuel based system?

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"*Our energy woes are in many ways the result of classic market failures that can only be addressed through collective action, and government is the vehicle for collective action in a democracy.*"

Sherwood Boehlert (2015)

Acknowledgements

After two years of attending a full time academic study while working part-time as a social worker at irregular times, I am proud to present this master-thesis. The quality of my work was largely improved by the efforts of Ludwien Meeuwesen who, as my supervisor, challenged me to explain why I chose the strategies that I used to write this master thesis. In the several group- and individual meetings and e-mail contacts, she proved to be able to find the right balance between complementing on the progress I made and criticising the writings that could be improved. I appreciate the energy and patience she showed in her efforts to keep me on the right track. Trudy Knijn who is the second reader of this master thesis, helped me a great deal by giving me suggestions for improvement. Leonie van Grootel advised me on statistical matters and helped me to gain more confidence in my approach. I would like to thank my peers, Jessica Zhou, Ytsje Weerman and Lisette Hiddink for their suggestions, proof-readings and emotional support.

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Thomas Roos
August, 2015.

Executive summary

Renewable energy initiatives from cooperating civilians (energy collectives, ECs) are active in the production of wind- and solar energy, advocacy, consultancy and the improvement of energy efficiency / reducing the use of energy. But they play a marginal role as producers of renewable energy (RE) in the Dutch fossil fuel based energy system. Studying individual and contextual factors that influence the RE-production by ECs helps to develop ideas about how to facilitate them and improve their contribution.

The 76 respondents of this study can be described as predominantly employed or self-employed middle aged men with a high education level. They are actively involved as a board member, volunteer or campaigner/promoter, invest time, money and other means in ECs and contribute knowledge and skills. The first 24% of the ECs that were studied were established between 1986 and 2011 and from 2012 there was a sudden increase of establishments. Most of the ECs (75%) have 100 members or less.

By answering the research question: to what extent do individual factors (caring for the environment, awareness of consequences of human activity and a sense of responsibility) and contextual factors (economical factors, policy factors, etc.) contribute to the production of RE by ECs? This study extends the primarily qualitative knowledge of the social context in which ECs in the Netherlands operate with quantitative data. The study tests the following three hypotheses:

1. Individual- and contextual factors are significantly correlated.
2. A high score on individual factors has a significant positive effect on collective energy production.
3. Contextual factors have a significant effect on collective electricity production.

The results of this study show that individual and contextual factors correlate and that contextual factors do have an effect on RE-production by energy collectives. Contrary to hypothesis 2, this study found a *negative* effect of a high score on individual factors on the production of energy by energy collectives. This negative effect might be caused by the possibility that respondents with a higher score on individual factors consider the reduction of energy use as more important.

Participants of ECs and experts in the field of collective electricity production can be regarded as agents who develop pathways to pursue sustainability through advocacy and consultancy and have an understanding of the consequences of human activity on the environment which is based on the information they have and their interpretation of this information. To provide information about the impact of their actions, energy production data should be made accessible for participants of energy collectives and for researchers in a customised and anonymised form.

Infrastructure is regarded as an important factor that influences RE-production by ECs and is, according to (experiential) experts insufficient for RE-producers who aim to serve several dozens or hundreds of households.

Because the definition of what an energy collective actually is becomes wider as the number of collectives increase, for future research I propose a categorisation of energy collectives based on their activities such as production or energy, improving energy efficiency, trade, advocacy and consultancy. This could make it easier to investigate the direct and indirect effects of ECs on RE-production. To subdivide energy producing collectives based on their source of energy is useful because energy producers face different challenges based on their source of energy.

1 Introduction

Behavioural studies concerned with sustainability agree that context has a determinant effect on how people behave. Many qualitative studies in the Netherlands try to draw a picture of the social context in which energy collectives (ECs) operate and how this determines their effectiveness. This study aims to supplement the theoretical knowledge built on qualitative studies with quantitative data by performing and analysing a survey among participants of ECs.

The Netherlands has committed itself to achieve a 14% share of renewable energy (RE) in 2020. Both in 2012 and 2013 the share of RE in the Netherlands was 4.5% (Ministerie van Economische Zaken, 2014; CBS, 2014). The Netherlands belongs to 4 of the 27 countries with the lowest score in the share of RE (European Commission, 2013).

In the Netherlands there is a growing number (currently about 500 according to hieropgewekt.nl, 2015) of ECs. Annemarie Schwencke (2012:11) defines these groups as *civilians who participate collectively in sustainable energy and organise themselves spontaneously as a cooperation, association or some less official form of partnership*. ECs are concerned with facilitation, promotion, use and / or production of renewable energy (Schwencke, 2012).

ECs are part of a process which involves many different *stakeholders*[1] such as vested energy companies, municipalities, the local community, local businesses, etc (Attema-van Waas, 2013). Examining how this multi-stakeholder process works is helpful for the development of interventions that are acceptable for all stakeholders and supports scientific theory with empirical data. This study covers economical issues such as the contribution of ECs to the national electricity production and the barriers to increase this production as well as behavioural and contextual issues (such as policy- and economical factors). Therefore this study requires a multi disciplinary social sciences approach.

Although ECs are vastly increasing in numbers, they have no significant effect on the energy system in the Netherlands (Netbeheer, 2013). This might be due to a lack of a convincing course of action and a lack of top down support as leading followers of the 'energy transition' in the Netherlands (Jan Rotmans, Jan Jonker, Maarten Hajer and Jan Paul van Soest) observe (Schwencke, 2012: 5-9).

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[1]Stakeholders can be defined as "Those who have an interest in a particular decision, either as individuals or representatives of a group. This includes people who influence a decision, or can influence it, as well as those affected by it" (Hemmati, 2002:2).

The fact that citizens involved in ECs develop ideas and invest money, time and effort to increase RE-production and reduce the use of fossil fuels, while their overall contribution to the increase of the share of RE within the Dutch energy system is close to zero (Netbeheer, 2013) can be regarded as a missed opportunity for all stakeholders concerned with the increase of the share of RE in the Netherlands.

The purpose of this study, therefore, is to develop ideas about how to facilitate ECs and improve their contribution to the share of RE within the Dutch energy system. Therefore this study tries to answer the following research question:

To what extent do individual and contextual factors

contribute to the production of energy by energy collectives?

The study starts with a review of literature in chapter 2 where I describe how sustainability can be defined (2.1) and what theories can be applied to develop a model that can help to visualise how different factors affect the production of (renewable) energy (2.2). Chapter 2 ends with describing the Dutch situation in section 2.3.

In chapter 3 is described how the research question is approached and which population is investigated (3.1). In section 3.2 I describe the dependent and independent variables and how they are measured. The model that was developed in section 2.2 will be used in section 3.3 to describe which questions can be asked about the relationships visualised in the model and what hypotheses could be derived from them. Chapter 3 ends with a description of how the response of the survey was gathered (3.4) and why I think that the small sample size could still yield scientifically significant results (3.4.1). The results of the analysis as proposed in section 3.3 are presented in chapter 4.

Chapter 5 describes the limitations of this study (5.1) and the conclusions that could be derived from the results (5.2). In the last two sections of chapter 5 I discuss the implications of my findings (5.3) and make recommendations for policy, practice and future research (5.4).

2 Literature review

Within the Netherlands there is a growing number of individuals who invest money, time and effort to establish energy collectives, but somehow their contribution to an increase of RE in the Netherlands is close to zero (Netbeheer Nederland, 2013). This study tries to find out to what extent individual and contextual factors of stakeholders contribute to the production of energy by energy collectives. In order to build on existing theory on sustainability, in this chapter I will answer the questions: how can sustainability be defined (2.1), what determines sustainable behaviour (2.2) and what is already known about energy collectives in the Netherlands?

2.1 Defining sustainability

Currently there is no fully accepted research framework for trans-disciplinary research on sustainability (Brandt et al., 2013). Theoretical articles "suffer from a rigorous conceptual framework deficiency", while case studies suffer from "limited added value to theory development" (Karatzoglou, 2013: 44). Two conceptual approaches to sustainability developed by Thaddeus R. Miller (2012), however, can be very useful for this study:

> *Thin sustainability* can be described as a concept that encourages widespread agreement but does not "translate substantively to the level of individual behaviour changes nor conflict with more contextual notions of what is moral or desirable" (Miller, 2012: 283 § 3)

> *Procedural sustainability* is concerned with "how sustainability comes to be defined and how pathways are developed to pursue it" (Miller, 2012: 284 § 5) and can be defined as "the emergent property of a discussion about desired futures that's informed by some understanding of the ecological, social and economic consequences of different courses of action" (Miller, 2012: 285)[2]. It differs from thin sustainability by emphasising difference and context (Miller, 2012: 285).

While a *thin sustainability* definition would increase legitimacy among different stakeholders as it encourages widespread agreement, it does not take notion of specific contextual conditions in which stakeholders operate. A p*rocedural sustainability* approach, however, could be very useful when personal and contextual factors are being investigated. The procedural sustainability approach could help answering questions as: how do context and personal factors influence behaviour? Because

[2] Interview of R.T. Miller (2012) with John Robinson, October 5th, 2009)

this study focusses on differences in individual and contextual factors, a *thin sustainability* definition wouldn't be of much use. Furthermore, this study is about individuals who collectively produce energy within a context where involvement of different stakeholders and the local situation is very important. Therefore *procedural sustainability* is the approach chosen for this study.

2.2 Stern's theory of environmentally significant behaviour

In the previous paragraph I described that personal factors and context are important aspects of the procedural sustainability approach. Stern (2000) also emphasises the importance of these aspects from a behavioural point of view as ecological, social and economic values, beliefs and norms directly or indirectly influence behaviour that might be of environmental significance.

Environmentally significant behaviour (ESB) can be approached as an *intent* driven type of behaviour in which an actor behaves with the intent to change the environment, while it does not necessary have the intended impact on the environment. ESB can also be approached in a way that describes the *impact* that behaviour has on the environment. Both approaches are important: the intent driven approach of ESB helps to investigate people's beliefs and motives, understanding these beliefs and motives can help to change the target behaviours; the impact approach of ESB helps to "identify and target behaviours that can make a large difference to the environment" (Stern, 2000: 408 § 3). In this study the *intent* driven type of behaviour can be described as the intent to produce RE, while the *impact* driven type of behaviour can be described behaviour that directly or indirectly increases the production of RE.

Stern (2000) distinguishes 4 types of ESB: (1) environmental activism, which involves active involvement in environmental organisations and demonstrations; (2) non-activist behaviours in the public sphere, which involves support for and acceptance of public policies; (3) private sphere environmentalism, which involves the purchase, use and disposal of personal and household products that have environmental impact; and (4) other environmentally significant behaviour such as professionals in organisations who apply environmental criteria for their business and manufacturers who innovate (Stern, 2000: 410-11).

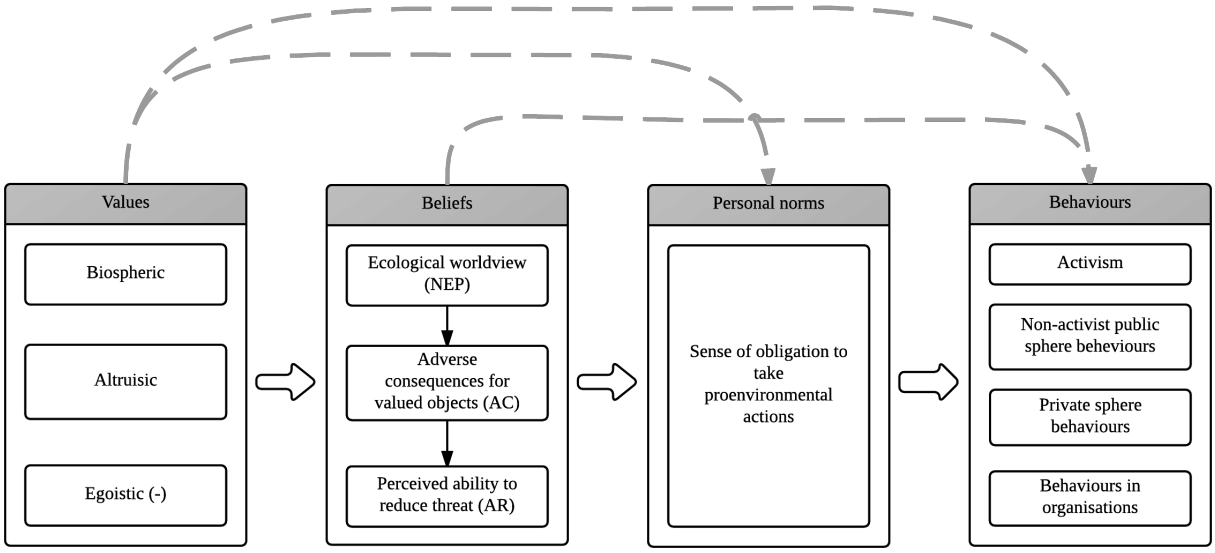

Figure 1: Visual representation of the VBN theory of environmentalism (Stern, 2000: 412).

The dashed arrows represent possible direct effects of one group of variables to a group of variables further down the chain.

2.2.1 Values, beliefs and norms

Stern and colleagues (Stern et al. 1999) developed the idea of a causal chain of values, beliefs and norms (VBN) that lead to behaviour (visually represented in figure 1). According to the VBN theory values have a direct effect on beliefs, and may have a direct effect on personal norms and / or behaviour. Egoistic values are empirically negatively associated with indicators for environmentalism. Beliefs have a direct effect on personal norms and may have a direct effect on behaviour and personal norms have a direct effect on behaviour (Stern, 2000: 413).

ESB "is mediated by particular beliefs, such as beliefs about which kinds of people or things are affected by environmental conditions (AC) and about whether there are individual actions that could alleviate threats to valued persons or things (AR)" (Stern, 2000: 414 § 2) personal norms and the behaviour that is affected by these norms "can be influenced by information that shapes these beliefs" (Stern, 2000: 414 § 2). The VBN theory, therefore, is a useful theory to apply in a situation where different stakeholders concerned with energy collectives inform each other and cooperate to improve the share of RE in the Netherlands. In this study the VBN-theory is used to derive individual factors that influence behaviour.

2.2.2 Attitude, behaviour and context

ESB can be highly influenced by contextual forces in the sense that favourable contextual conditions promote ESB, while unfavourable contextual conditions limit ESB. Simultaneously ESB shapes the context in which choices are made that directly cause environmental change. Contextual forces include rules and regulations, finances, technological capabilities and constrains and the broad social, economical and political context. It is important to realise that contextual factors can have a different meaning for different people: an expensive product might be regarded as an economic barrier by one, while the other regards a highly priced product as a prestigious object. Stern (2000) describes behaviour (B) as "an interactive product of personal-sphere attitudinal variables (A) and contextual factors (C)" (Stern, 2000: 415 § 3). He suggests that when contextual factors become more neutral, attitudinal variables become more important, while if there is a strong contextual effect, behaviour is less affected by attitudinal variables. This implies that when the context is less in favour of a certain behaviour of an individual and makes it more difficult, time consuming or expensive, the less the behaviour depends on attitudinal variables (Stern, 2000: 416).

2.2.3 Determinants of behavioural change

Multiple variables have a determinant effect on behaviour, and sometimes these variables interact. There is, for example, strong evidence that a combination of information and incentives interact and together sometimes have more effect than the sum of both (Stern, 2000). "The nature of these interactions can be well described in terms of barriers, or limiting conditions to behavioural change"(Stern, 2000: 419 § 4)[3]. To identify these barriers, it is helpful to use a framework developed by J.P. Painuly (2000). Painuly's model (Figure, 2) demonstrates how barriers can be identified and categorised and defines four different levels of barriers as is demonstrated in the example. Barrier categories (the first level) can be described as a broad category such as policy, economy and culture. Every level down becomes more specific. The existence of one or more barriers of the 2nd and the 3rd level could indicate that these barriers are relevant for RE technologies (RETs). Advantages of this approach are that circumstances that have limiting effects can be broken down into barrier categories, barriers, barrier elements and the dimensions of these elements. This makes it easier to identify root causes and possible solutions for the presence of limiting circumstances for the development of ECs. Once an identification of barrier elements and their dimensions is made, it is possible to approach the root causes of barriers to RE-penetration from a behavioural perspective.

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[3] I would like to add that, once strategies are developed to overcome these "barriers" these strategies should be regarded as enabling and stimulating conditions for RET penetration.

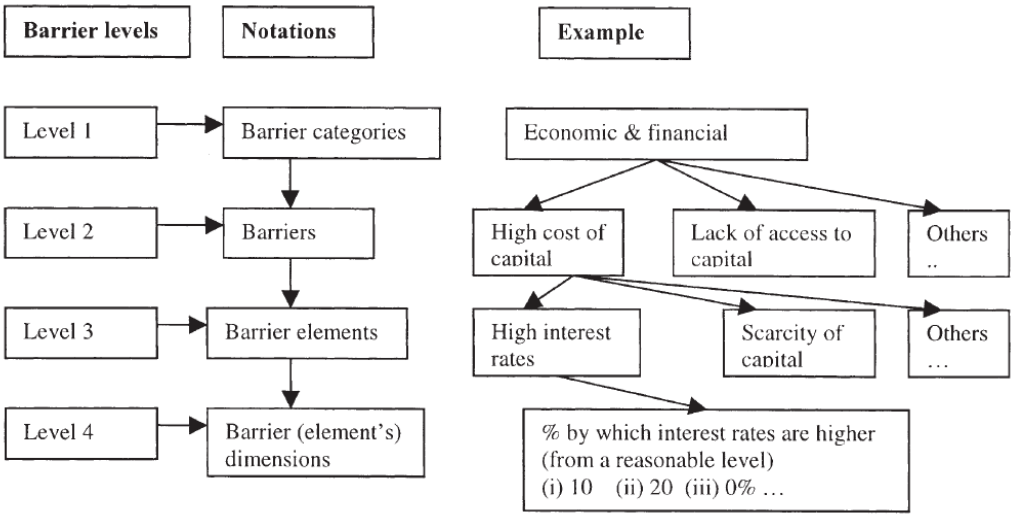

Figure 2: Barriers to renewable energy penetration (Painuly, 2000: 78).

The construct *Institutional barriers* can be used to describe the institutional context in which ECs operate. Institutional barriers are barriers that are caused by institutional problems and shortcomings such as the distribution of information, rules and regulations and an unstable macroeconomic environment, a lack of involvement of stakeholders in decision-making, a lack of professional institutions etc (Painuly, 2001).

2.2.4 Strategy to behavioural change

Stern (2000) developed a related set of principles for researchers "to make behavioural approaches to environmental protection more successful" (Stern, 2000: 420 § 3). This involves (1) an identification of behaviours that have a significant impact on the environment, (2) an analysis of the behaviours to identify the responsible actors and actions, (3) a consideration of the full range of causal variables and how these variables are relevant from the actor's perspective. Stern suggests that "by exploring the possibilities directly with representatives of the population whose behaviour is to be changed, it is possible to find promising strategies for intervention without trying them all out experimentally (Stern, 2000: 420 § 3)".

2.2.5 The theoretical foundation of this study

Within the Netherlands multiple stakeholders are concerned with ECs. A procedural approach to sustainability is important for this study because it takes personal factors and the context in which stakeholders operate into account. Stern's theory of environmentally significant behaviour can be used as a framework to study the effect of context and individual factors on the production of energy collectives. For a deeper understanding of barriers that ECs might experience Painuly's

barriers to renewable energy penetration can be used to describe the context in which ECs operate. With Stern's and Painuly's theories, it is possible to create a model where individual factors are derived from Sterns theory of environmentally significant behaviour and the contextual factors from Painuly's barriers to renewable energy penetration.

Figure 3 is a visual representation of the model that is under investigation in this master-thesis. Individual factors are derived from the VBN theory (Stern, 2000) representing the New Ecological Paradigm or *ecological concern, awareness of consequences*, and *personal normative beliefs*. These factors have an empirically tested correlation (Stern, 2000). Contextual factors are derived from Painuly's barriers to renewable energy penetration (Painuly, 2000) representing economic barriers (*economic viability), decision-making process* and other barriers or *other contextual factors*.

Individual factors and contextual factors of energy collectives could affect the energy production directly or indirectly. A direct influence on energy production would mean that individual factors and contextual factors have an effect on how much energy (or gas) an EC produces. An indirect effect would mean that individual- and contextual factors within energy collectives have a determinant effect on the (local or national) community in which ECs operate. This effect can be caused by raising awareness (through campaigning and promoting renewable energy or saving energy) which changes how people think about renewable energy, which in turn might affect the market and policies regarding renewable energy.

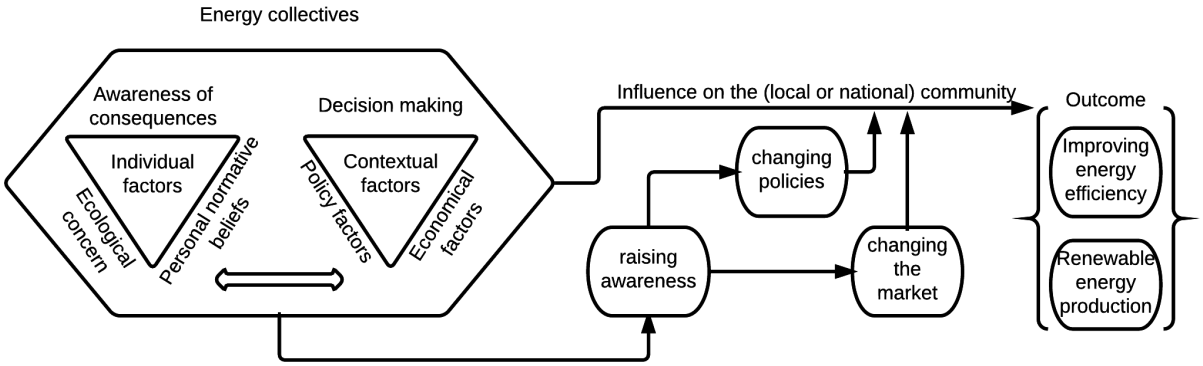

Figure 3: the effect of individual- and contextual factors on the energy production.

2.3 Research on energy collectives in the Netherlands

As the development of ECs is a recent phenomenon, studies on this subject are recent as well. Among several studies on ECs a qualitative case study compared four energy collectives in the Netherlands (Attema-van Waas & Rijken, 2013) and describes 30 factors of success of energy collectives, another compared one EC in the Netherlands with one in Germany (Lepping, 2014) and describes the processes and conditions for increasing the effect of ECs on the energy system. Another study compared policy arrangements and their effects on the available space for community initiative development in Germany, Denmark and the Netherlands (Oteman et al. 2014). The ministry of infrastructure and environment (Agentschap NL, 2012) published a report with 9 lessons from experiences of ECs. The Dutch institute for applied sciences (TNO) reports on their website about the importance of civic participation in the Dutch energy transition (TNO, 2014-I & 2015) and the lack of consistency and coherency of governmental policies. And a local newspaper reports that plans of ECs rarely succeed as a result of strict regulations and unsuccessful communication with stakeholders (Eindhovens Dagblad, 2015).

Although attention for ECs is increasing and public statements about (the lack of) success and barriers for the development of ECs in the Netherlands were relatively easy to find, I found no quantitative information about energy collectives in the Netherlands. It seems that the website hieropgewekt.nl (2015) is the only reliable source that has information on the year of establishment of ECs, the number of members and customers, the source of their energy, the stakeholders and initiators and the organisational form. This study contributes to the quantitative knowledge of ECs in the Netherlands by providing information about individual- and contextual factors and their effect on the energy production of ECs.

2.3.1 The emergence of energy collectives in the Netherlands

The Dutch energy sector heavily relies on energy sources as oil, gas and coal. This causes pollution and carbon dioxide emission (Geels, 2011; Loorbach & Rotmans, 2006) which is the root cause of global warming. Global warming in turn causes glaciers to melt and sea levels to rise which increases the risk of flooding and extreme weather. If we wish future generations not to suffer from the consequences of human activity, we need to put a halt to global warming by curbing carbon-dioxide emission. A transition towards a sustainable energy production is one way to do that and reducing the amount of energy we use another.

The number of cooperations or foundations that are concerned with sustainable energy is increasing in the Netherlands and the national government and municipalities formally agree on the necessity and latent power of civil participation (PBL, 2014). But the current fossil-fuel based energy regime is a very dominant entity with a huge effect on market structures and user practices (Kern & Smith, 2008: 3).

Scholars recently pay more attention to the power of civilian led initiatives in the Netherlands that are concerned about globalisation and the effects on the environment. They describe a process of gradual changes within the current energy regime in the Netherlands where a growing network of dedicated technicians, researchers and products who's individual motivation lead them to become specialised and skilled with new technology in the niche-market of renewable energy (Rotmans et al. 2000; Mourik & Burger, 2013). Civilian led initiatives orient themselves to increase regional autonomy and self sufficiency and emphasise cooperative approaches. They are vastly increasing in numbers, but they currently have no significant effect on the energy system in the Netherlands (Netbeheer, 2013). And leading followers of the 'energy transition' in the Netherlands (Jan Rotmans, Jan Jonkers, Maarten Hajer and Jan Paul van Soest) observe that there is a lack of a convincing course of action and a lack of top down support (Schwencke, 2012: 5-9).

2.3.2 The Dutch context

Although the Netherlands is a small country, it is rich in variety of landscape: the Netherlands has a long shoreline providing possibilities for wind energy and tidal energy, it has rural areas with many possibilities for different sources of RE and populated areas where one has to deal with interests of many different parties. The Netherlands shares a border with Germany and Belgium. The Netherlands has islands in a large area of *tidal flats*[4] which is enlisted in the world heritage list of UNESCO (UNESCO, 2015). This big difference in contexts within one small and populated country requires different strategies to implement sustainable technologies.

The government in the Netherlands has different levels: the centralised national government and decentralised governmental organisations such as the counties and municipalities (Ministerie van BZK, 2013) and the water boards (waterschappen.nl, 2015). These are important stakeholders in the transition towards a more sustainable energy supply in the Netherlands.

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[4] Tidal flats, sometimes called mud flats or sand flats, are areas that flooded at high tide and exposed at low tides and sediments from river runoff or inflow from tides deposit mud or sand. Tidal flats are considered as important for ecosystems as they are an important source of food for birds, fish and many other organisms and they support coastal biodiversity (Miththapala, 2013).

Regional and national energy network operators (ENOs) too are important stakeholders in the Dutch energy transition process because they provide essential infrastructure to bring gas and electricity from the producer to the consumer. They are organised in the branch organisation Netbeheer Nederland who is involved in discussions with market parties and governmental organisations and is concerned with the socially accepted and efficient delivery of electricity and gas in the transition process towards a bigger share of RE in the Netherlands (Netbeheer Nederland, 2015). Currently there are 11 ENOs of which four operate locally and 7 regionally (energieleveranciers.nl, 2015).

A question that comes to mind is whether the different stakeholders involved with RE have different definitions of, or attitudes towards sustainability. It is important to define sustainability in such a way that it can be accepted by all stakeholders involved.

3 Research strategy

In this master-thesis the effects of individual factors of EC-participants and contextual factors on renewable energy production are examined by performing and analysing an online survey. In this chapter the population of the survey is described in paragraph 3.1 and the variables that were tested for validity and reliability in paragraph 3.2. To answer the research question:

To what extent do individual and contextual factors contribute
to the production of energy by energy collectives?

A model (section 2.2.5) was developed as a synthesis of two theories: the VBN-theory (Stern, 1999, 2000) and Painuly's Barriers to Renewable Energy Penetration (Painuly, 2000).

For an online survey a questionnaire (Appendix H) was developed to answer the research question. An e-mail was sent to publicly available e-mail addresses of self-registered energy collectives and followed by two reminders. The e-mail informed about the research and its cause and requested the receiver to participate. In the e-mail a link to the questionnaire was included. During the second annual energy ambassadors meeting on the 13th of June 2015 in Apeldoorn, notes were made of speeches, workshops and remarks from visitors who were all members of or associated with energy collectives (Appendix K). During this meeting several potential respondents were personally approached. They received a flyer with a link to the online survey. To expect a high response rate was thought to be realistic as the respondents are mostly active volunteers who proved to be willing to share relevant information on a publicly accessible website.

Based on the results of the survey, a second questionnaire (Appendix J) was developed to retrieve qualitative data from a small number of (experiential) experts. They were contacted by phone and asked whether they were willing to share their ideas and experience. They could choose whether they wanted to be referred to by name or anonymously by their function and type of organisation they were active for.

3.1 Population

The population of this study can be described as civilians who are involved with ECs. ECs are mostly spontaneously organised by people who are concerned about sustainability. Anne Marieke Schwencke (2012) categorises these energy collectives as *wind-cooperations* who emerged in the 1980's and early 1990's, *solar-collectives* who emerged as prices of solar panels decreased due to

market developments (Sark, et al., 2014) and collective purchasing, and *new-utility services*. New Utility Services are a new branch of utility services that operate locally as officially registered sustainable energy companies with a focus on: collective purchasing of 'green' energy; local production of green energy or gas; delivery to the local community; financing of and / or participating in sustainable energy projects; and or improving energy saving in the community. The main difference between the new utility services with solar collectives and wind cooperations is that their objective is wider than just the delivery of solar or wind energy and often trade in energy as well (Schwencke, 2012: 11-23).

ECs are part of a process which involves many different stakeholders such as vested energy companies, municipalities, the local community, local businesses etc. (Attema-van Waas, 2013). The contribution of ECs to the overall national energy production is rather small, but the speedy increase of the number of energy collectives shows that civilians are prepared to put time, means and effort into the transition towards a sustainable energy system (Netbeheer, 2013: 24-25).

3.2 Variables

In this section the dependent variable and independent variables will be described. In the description of the variable is referred to the number of the question in the questionnaire. The questionnaire and the coding of the questions are presented in Appendix H.

3.2.1 Dependent variables

In this study two dependent variables were used to investigate the effect of individual- and contextual factors on energy production and / or energy efficiency. One measures the actual production of energy, while the other can be regarded as an indicator of potential future energy production and efficiency.

Collective electricity production

According to the model as described in chapter 2 contextual and individual factors affect RE-production and energy efficiency. RE-production by ECs can only be measured by asking respondents directly if they know how much energy is produced by the EC and if yes, how much. In the Netherlands, there are three main sources of energy that are used in households: electricity, heat that was produced elsewhere and is transported to the household, and (the burning of) gas. The measurement of the amount of electricity is the most reliable, because the amount of electricity that is produced can be measured directly from the device (a photo voltaic cell, or a windmill for example) that produces it. Collective electricity production will therefore be used as a measurement

for actual production of energy. In the survey respondents are asked whether they know how much electricity their collective produced (question 23) and if yes, how much in KWH (question 24).

Payback period

The payback period (PBP, question 10) is a measurement of the expected time (in years) to earn back the money invested in RETs. It is used in studies concerned with supporting measures for renewable energy (Campoccia et al, 2007; Black, 2003). PBP is described as one of the barriers of RET penetration (Painuly, 2000; Reddy & Painuly, 2004). Reddy and Painuly state that "if the government can remove barriers and create a restructured and competitive energy industry based on market efficiency, it will spark immense benefits for both the economy and the environment." (Reddy & Painuly, 2004: 1447). In mainstream economic theory the production is seen as a function of labour and capital in which both labour and capital have a positive effect on production. The PBP can therefore be a good indicator of potential future renewable energy production as a shorter PBP allows collectives to re-invest their initial capital faster and therefore produce more renewable energy. The PBP can also be used as a measurement for improving energy efficiency as it describes in how much time the money invested in, for example building isolation, balances out with the extra money that would have been spent when the investment had not been made. PBP is measured by question 10 where the respondent can choose whether he or she thinks the PBP is 5 years or shorter, 5 to 10 years, 10 to 15 years, 15 to 20 or 20 years or longer. The choice options are coded from 1 (5 years or shorter) to 5 (20 years or longer).

3.2.2 Independent variables

Measurement validity can be described as "the extent to which a measure reflects the concept it is intended to measure" (Rossi et al., 1999: 234). To acquire valid measurements of individual factors, the variables ecological concern, norms and values, and awareness of consequences are measured by items that were derived from a questionnaire that was developed and tested by Stern and colleagues (Stern et al, 1999, 2000; Appendix E) and translated into Dutch.

To acquire valid measurements for contextual factors, the variables decision making and other contextual factors, items were developed using Painuly's barriers of renewable energy penetration (2000, Appendix F).

To determine wether items that form one construct, such as the items that measure ecological concern, can be grouped together as one reliable variable, a reliability test was performed. The reliability can be described as "the extent to which scores obtained in a measure are reproducible in

repeated administrations" in similar conditions (Rossi et al., 1999: 234). Reliability is expressed in Cronbach's Alpha and for this study a Cronbach's Alpha of more than .600 is considered to be reliable.

Variable 1: ecological concern (question 1)

The New Ecological Paradigm scale (NEP) "measures broad beliefs about the biosphere and the effects of human interaction on it (…) from which beliefs about adverse consequences (AC) of ecological change can easily be deduced" (Stern et al., 1999). This variable will be referred to as "ecological concern". The scale consists of 5 items, which are measured with a 5 point Likert scale, coded from 1 to 5. Respondents are asked to indicate whether they totally disagree, disagree, disagree nor agree, agree or totally agree. The possible answers are coded in such a way that a high score on this scale indicates that the respondent is highly concerned about the impact of human activity on ecology. The 5 items ask to what degree respondents agree wether there is currently an ecological crisis, wether there are limits to space and supply, wether one could speak of an imminent ecological disaster, wether one could speak of a strong natural balance and wether people abuse nature. The variable ecological concern is built up as the sum of the scores on the 5 items divided by 5.

Cronbach's Alpha for the 5-item ecological concern scale was .625 which can be considered adequate for research purposes. The Cronbach's Alpha would increase to .639 if the item eco-crisis was removed. This item asked to what degree respondents agree with the idea that there is a so called ecological crisis. Because ecological concern is based on Stern's new ecological paradigm scale (Stern et al., 1999: 87 §6) which has a Cronbach's Alpha of .73, I decided not to drop the item.

Variable 2: Awareness of consequences (question 2, 3 & 4)

The Awareness of Adverse Consequences (AC) scale measures the degree to which someone is concerned of consequences of ecological change. The scale consists of 9 items which are measured by a 3 point Likert scale. Items are coded 1, 3 or 5 to simplify comparisons with other variables. The respondent is asked to answer whether they think that climate change, the loss of rainforest and the accumulation of toxic chemicals in air, water or soil is a highly problematic, problematic or not really problematic for their family, for the Netherlands or for the nature. The possible answers are coded in such a way that a high score on this scale indicates that the respondent is highly concerned about the effects of environmental change on others. The variable awareness of consequences is built up as the sum of the scores on the 9 items divided by 9.

Cronbach's Alpha for the 9-item awareness of consequences was .751 and could be increased to .870 if the item toxics affect family was removed. This item asked to what degree respondents thought that toxics would affect their family. Because awareness of consequences is based on Stern's "awareness of consequences" with a Cronbach's Alpha of .88 (Stern et al., 1999: 87 §3) and because it would be inconsistent to remove just one out of three questions concerned with effects on family, I decided not to drop the item.

Variable 3: Personal normative beliefs (question 5)

The personal normative beliefs scale measures the belief of respondents considering to what degree different agents are responsible for the prevention and mitigation of pollution and deforestation caused by human activity. The scale consists of 9 items measured by a 5 point Likert scale coded from 1 to 5. Respondents are asked to indicate whether they totally disagree, disagree, disagree nor agree, agree or totally agree. The possible answers are coded in such a way that a high score on this scale indicates that the respondent finds that individuals, government and companies have a responsibility to prevent and mitigate pollution and deforestation. The variable norms and values is built up as the sum of the scores on the 9 items divided by 9.

Cronbach's Alpha for the 9-item norms & values scale was .877, and could not be increased by removing items. The original scale (Stern et al., 1999: 87 §3) had a Cronbach's Alpha of .88.

Variable 4: Decision making (question 6,7 & 8)

(derived from Painuly's institutional barriers, Painuly, 2000)

The variable decision making consists of three items:

Agreement with the decision making process measures the degree to which respondents agree with how decisions are made that (might) affect the EC in which they participate. This item is measured with a 5 point Likert scale coded from 1 to 5.

Representation in decision making measures wether respondents feel not, insufficiently, or sufficiently represented in decision making that (might) affect the EC in which they participate. This item is measured with a 3 point Likert scale coded 1, 3 and 5 to remain consistent with the other items.

Involvement in decision making measures the degree to which participants feel that they are involved in decision making processes that (might) affect the EC in which they participate. This item is measured with a 5 point Likert scale coded from 1 to 5.

Decision making is coded in such a way that a higher score represents more involvement, representation and / or agreement. The variable decision making is built up as the sum of the scores on the 3 items divided by 3.
Cronbach's Alpha of the 3-item decision making scale was .897

Variable 5: policy factors (question 11)
(based on Painuly's other barriers, Painuly, 2000)
The variable policy factors consists of 3 items which are measured with a 5 point Likert scale, coded from 1 to 5.
Policy climate, measures the respondents perception of the stability of rules and regulations that (might) affect the EC in which he or she participates. A high score indicates a favourable policy climate for the EC.
Municipality support measures to what extend the respondent experiences that the municipality facilitates the development of the EC. A high score indicates a positive experience of support from the municipality.
Governmental support, measures to what extent the respondent experienced help from governmental organisations for the start and development of the EC. A high score indicates a positive experience of support from the governmental organisations. The variable policy factors is built up as the sum of scores on the 3 items divided by 3.
Cronbach's Alpha of the 3-item policy factors was .640.

Variable 6, infrastructure, measures the degree of difficulty respondents experience in distributing the energy or gas they produce to the end user. A high score indicates a favourable infrastructure.

The variables 7 to 12, economic viability (question 9 & 11, based on Painuly's economic and financial barriers, Painuly, 2000) are all one-item variables measured with a 5 point Likert scale, coded from 1 to 5.

Variable 7, economical vs social measures wether the respondents see their EC more as an economic enterprise or as a social project. A high score indicates that the respondent regards the EC more as an economic enterprise.
Variable 8, financial challenge, measures the degree to which the respondent regards it as a financial challenge for the EC to become or remain a financially healthy organisation. A higher score on this variable indicates more financial challenge.

Variable 9, economical impulse, measures whether respondents think that the EC in which they participate has a positive economical impact on the environment in which it operates. A higher score indicates more positive economical impact.
Variable 10 Access to capital measures whether the respondent experiences difficulties in getting access to capital for investments in favour of the EC. A high score indicates that it is easy to gain access to capital.
Variable 11 Financial incentive measures to what degree the financial compensation for electricity production (saldering) is regarded as an incentive for the growth of the EC in which the correspondent participates. A high score indicates that there is a financial incentive for the growth of the EC.
Variable 12, risk perception (question 11c), measures to what extent the respondent perceives investments in RE as a financial risk. A high score indicates a high risk.

Variable 13, involvement (question 16) describes how respondents are involved in the EC. Respondents can mark wether they are involved in campaigning & promotion activities, volunteering, board-membership, and / or contributing special skills.
Variable 14, investment, describes whether respondents invest time, money, means and / or knowledge and skills in the EC and how much. Respondents can select the amount of time they invest from a predefined scale: 2 hours or less, 2 to 5 hours, 5 to 10 hours, 10 to 20 hours, and more than 20 hours. The coding of these choice options is based on the average of the lowest and highest possible score of each option to improve the linearity of the variable. To the questions whether respondents invest money, means and /or knowledge and skills they can select yes or no.

Variable 15 to 18 (questions 19 to 22), year of establishment, members, active members and activity, asks the respondents to enter in what year the EC was established, how many members it has, how many active members and how much time the active members weekly spend (on average) for the EC.

Variables 19 to 22 measure gender, age, education level and occupation. Respondents can choose which category (man or woman, retired, employed or self employed, etc.) of each variable is most relevant for them.

3.2.4 Final comments

At the end of the questionnaire, respondents are asked to leave comments and / or suggestions that could help to improve the questionnaire.

3.3 Analysis

In section 2.2.5, a model was developed to visualise the relationships between individual factors and contextual factors and how these affect the production of renewable energy. The purpose of the analysis is to test this model and the hypotheses derived from it. How the hypotheses are derived from the model will be described in section 3.3.1.

The relationships between all independent variables were examined with a correlation analysis. The aim of this analysis is threefold:

1. To describe whether the relationship between two variables is positive (one variable increases when the other variable does) or negative (while one variable increases, the other decreases).
2. To describe the form of the relationship between two variables (whether there is a linear, exponential or other kind of relationship).
3. To measure to what degree the value of one variable predicts the value of the other within a given set of data (Gravetter & Wallnau, 2013).

To understand and compare the effect of different categories of variables on collective electricity production two regression analyses were performed. A regression analysis determines the best fitting straight line within a set of data (Gravetter & Wallnau, 2013). The purpose of the regression analyses was to find which variables have the most effect on collective electricity production and payback period.

Both regression analyses were performed using backward entry: all individual variables of the model (see section 3.2.2) ecological concern, awareness of consequences and norms and values were entered into the regression model together with the economical variables economical vs social, financial challenge, economic impulse, access to capital, financial incentive and risk perception, and the other contextual variables decision making, policy factors, infrastructure, municipality support and governmental support. The least significant variables was removed from the regression model, then the regression analysis was performed again until the model was significant and the model could not be improved any longer by removing insignificant variables.

The quantitative data was gathered through the web-service SurveyMonkey (2015) and analysed in the statistical IBM SPSS software (2015). Qualitative data was gathered at the second annual meeting of energy ambassadors (EnergieAmbassadeursTOP.nl, 2015) at the town-hall of Apeldoorn at the 23rd of June 2015 for a better understanding of the results from the quantitative study. This qualitative data comprises notes from conversations (Appendix K) that resulted directly and

indirectly from this meeting, and response (Appendix I) to a questionnaire (Appendix J) that was send to (experiential) experts on energy collectives and/or renewable energy.

3.3.1 Model and hypotheses

The model (figure 4) as described in section 2.2.5 visualises the possible relationships between individual- and contextual factors and how they might affect RE-production in the form of bio-gas or electricity. Based on this model six hypotheses are formulated. Because of the limitations of this study, such as the availability of e-mail addresses of participants of ECs and limitations in time to supplement the quantitative data analysis with a market and policy analysis, only the first three hypotheses will be tested. The last three hypotheses will be mentioned as it helps to provide a better understanding of the model.

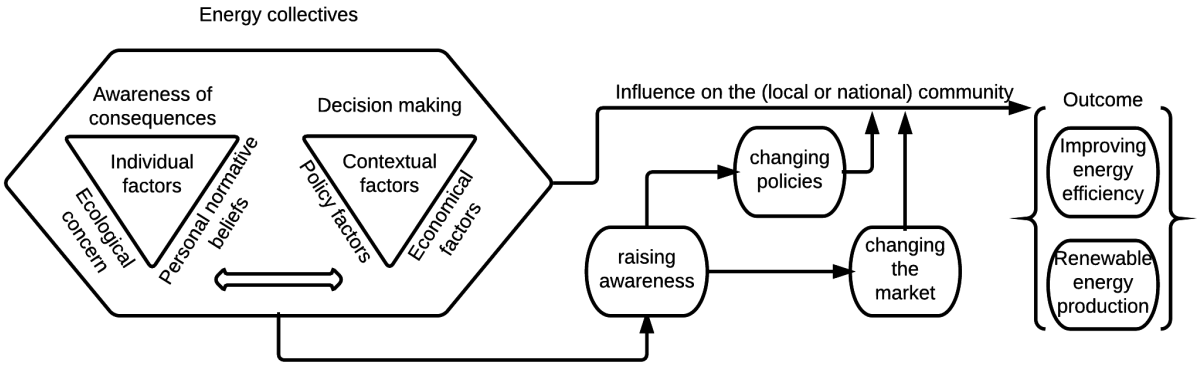

Figure 4: the effect of individual- and contextual factors on the energy production.

Examining this model by using empirical data can help answering the following questions:
How do individual- and contextual factors relate to each other?
How do individual factors affect renewable energy production?
How do contextual factors affect renewable energy production?
How do energy collectives affect energy efficiency?
How do energy collectives affect the market of renewable energy?
How do energy collectives affect policy?

Based on these questions six expectations are formulated as hypotheses:

H1: Individual- and contextual factors are significantly correlated.

The expectation of hypothesis 1 is that individual factors as ecological attitude, awareness of consequences and norms and values and contextual factors all have a determinant effect on behaviour. Therefore it is logical to expect to find significant correlations between these factors.

H2: A high score on individual factors has a significant positive effect on collective electricity production.

The expectation of hypothesis 2 is that, when respondents have a high score on individual factors such as awareness of consequences, ecological attitude and norms and values, they have more motivation to produce renewable energy which might influence the collective electricity production. This hypothesis can be tested with a regression analysis with collective electricity production as the dependent variable and the individual factors ecological attitude, awareness of consequences and norms and values as the independent variables.

H3: Contextual factors have a significant effect on collective electricity production.

Hypothesis 3 expresses the expectation that contextual factors such as decision making, economic viability and other contextual factors affect collective electricity production. Because ECs are vastly increasing in numbers but have no significant effect on the energy system in the Netherlands (Netbeheer, 2013), they might face economic challenges to grow and produce more energy. Hypothesis 3 can be tested by performing a multiple linear regression analysis with collective electricity production as the dependent variable and the contextual factors as independent variables.

H4: Energy collectives have a positive effect on energy efficiency.

Hypothesis 4 is based on the fact that some activities of energy collectives are focussed on energy efficiency (such as isolation of houses). To measure if these activities are successful, it is possible to compare the average use of energy and gas of the respondents with the average use of gas and energy of Dutch residents. For a population of approximately 500 energy collectives, this would require a sample size of 340 (Neuman, 2014: 114). As the publicly available e-mail addresses of ECs are less than 300, this hypothesis cannot be tested in this study.

Hypotheses 5 and 6 will not be tested in this master-thesis since this requires an analysis of market- and policy effects which, in combination with a quantitative study, would consume more time than available for writing a master-thesis. Nevertheless, both hypotheses will be mentioned below as they are important for a complete understanding of the model:

H5: Energy collectives have an effect on the market in favour of renewable energy.
H6: Energy collectives have a positive effect on policies in favour of renewable energy.

Over the years prices of renewable energy technologies (RETs) dropped (Sark et al., 2014), and collective purchasing became more common (Schwencke, 2012). Hypothesis 5 is based on the activities of ECs such as promotion and campaigning in favour of RE and energy efficiency which might affect awareness among Dutch residents, which in turn might result in a larger customer base for RETs. The same effect on awareness might also affect policies in favour of renewable energy (hypothesis 8). ECs can influence policy directly through lobbying activities or indirectly by influencing the opinion of the electorate.

3.4 Response and representativity

According to hieropgewekt.nl, an online platform concerned with ECs, there are currently about 500 energy collectives in the Netherlands (hieropgewekt.nl, 2015) of which 279 e-mail addresses were publicly available. All 279 e-mails were contacted on the 18th of May 2015. 15 e-mail addresses could not be delivered and 2 addressees replied that they did not consider themselves as belonging to the target group. This lead to 54 responses. On the 28th a second e-mail was sent and 5 additional publicly available contacts from the website duurzameenergie.org (Ode, 2015) were added to the mailing list leading to 32 additional responses on the 9th of June 2015. On the 12th of June a third e-mail was sent mentioning the closing date of the survey at the 23rd of June 2015 leading to a total response of 115. After randomly removing responses from participants of the same energy collective and largely incomplete observations, 76 observations remained.

The respondents were asked to fill out a questionnaire of 40 questions and subquestions. To allow identification, questions concerning the name of the EC, municipality and county, were marked as compulsory. All other questions were not compulsory. The questionnaire (in Dutch) is included as Appendix H.

To get a better understanding of the population, questions were asked to gather demographic information and to learn how respondents are involved in and contribute to the EC.

3.4.1 Sample size

With a small sample size, the possibility of type I and type II errors increases. "A type I error occurs when we believe that there is a genuine effect in our population, while in fact there isn't" and a type II error "occurs when we believe that there is no effect in the population when, in reality there is" (Field, 2005: 31). The value of type I errors is known as the α-level) and the value of type II errors is known as the β-level. An acceptable level for α is .05 and an acceptable level for β is .2 (Field, 2005).

The effect size measures the magnitude of an effect. In this study the Pearson correlations coefficient (r) is used to express the magnitude of the effect and the direction of the effect (+, positive or - negative). Because of the small sample size in this study the focus is on medium (r > . 3) and large (r >.5) effects (Field, 2005).

I used the program G*Power which is suggested by Andy Field (2005) and Faul et al (2009) to calculate which effect size I could measure with an α-level of .05, a β-level of .2 and a sample size of 32 for the dependent variable collective electricity production and a sample size of 75 for the dependent variable payback period (figure 7). Based on this calculation for a correlation analysis an absolute effect size of r > .3493 is required for the dependent variable *collective electricity production*, and for the dependent variable *payback period* an absolute effect size of *r* > .2271. To evaluate the regression analysis, I used G*Power to calculate the power of the best fitting regression model.

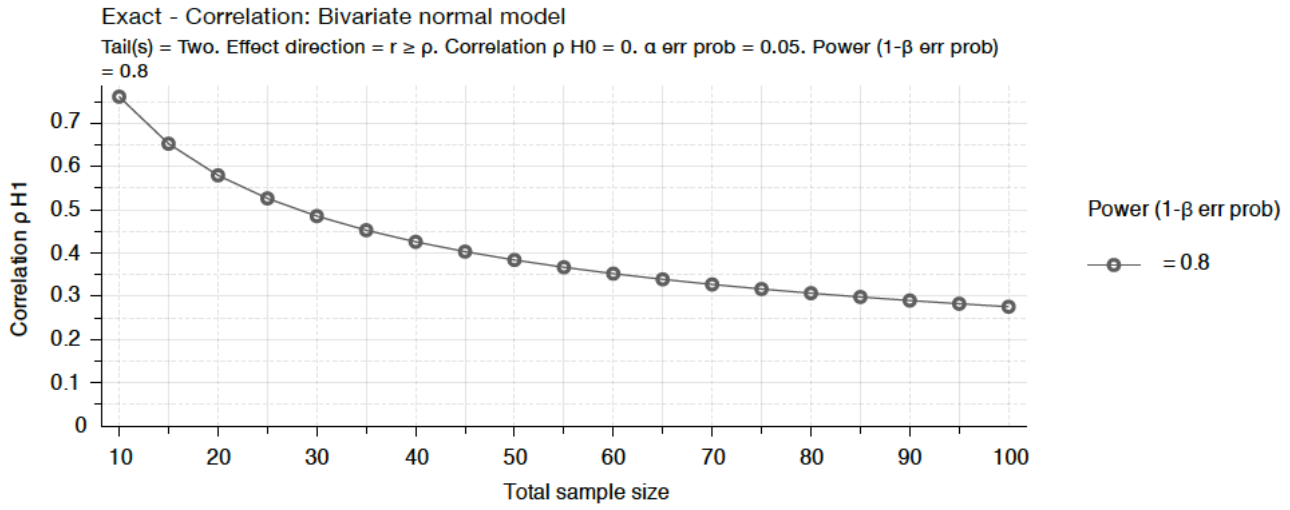

Figure 7: Required effect size (output from G*Power)

4 Results

The establishment of EC's started in 1986 with a few establishments every couple of years and a sudden increase in 2012 and 2013 (Table 1). In every county there are at least a few established ECs, but the response was not evenly distributed. The three categories of collectives are well represented in the response, but a large proportion (38%) of the respondents reported that their collective should be considered as another category such as collectives with a focus on energy efficiency and RE production, consultation, raising awareness, water power production, reselling of RE, bio-mass and combinations of different focusses.

Energy collectives		N	percent			N	percent
year of establishment (N = 74)	1986 - 2011	18	24%	members (N = 72)	0 - 10	18	25%
	2012	17	23%		11 - 50	18	25%
	2013	18	24%		51 - 100	18	25%
	2014	15	20%		101 - 450	18	25%
	first 6 months of 2015	6	8%	active members (N = 74)	0 - 4	23	31%
categories (N = 76)	new utility services	16	21%		5	11	15%
	other categories	29	38%		6 - 8	15	20%
	solar collective	18	24%		10	14	19%
	wind collective	12	16%		12 - 25	12	16%
counties (N = 76)	Drenthe	7	9%		26 - 100	5	7%
	Flevoland	4	5%	hours per week (N = 72)	0 -2	26	36%
	Friesland	10	13%		3 - 5	23	32%
	Gelderland	10	13%		6 - 10	8	11%
	Groningen	3	4%		11 -30	5	7%
	Limburg	6	8%				
	Noord-Brabant	14	18%				
	Noord-Holland	6	8%				
	Overijssel	3	4%				
	Utrecht	4	5%				
	Zeeland	2	3%				
	Zuid-Holland	7	9%				

Table 1: Energy collectives in the Netherlands, their members and how much time active members invest in the collective.

The number of members of ECs varies between 0 and 450 while 25% of the collectives comprise 10 members or less and 75% of the ECs have 100 members or less (Table 1).

The respondents can be described as predominantly employed or self-employed middle aged men with a high education level (Table 2). They are actively involved as a board member, volunteer and campaigner/promoter and invest time, money and other means in the EC and contribute knowledge and skills (Table 3). According to the scores on individual factors (Table 4) they are people who believe that the biosphere is affected by human activity and acknowledge the existence of an ecological crisis. They agree that something needs to be done to prevent an imminent ecological disaster and find that the natural balance is not strong enough to cope with the impact of modern industrial nations.

Respondents (N = 76)		N	Percent			N	Percent
Gender	male	57	75.0%	Education	high school	1	1.3%
	female	6	7.9%		vocational education	4	5.3%
	not reported	13	17.1%		applied sciences	30	39.5%
Age	younger than 25	1	1.3%		university	36	47.4%
	25 to 35	4	5.3%		not reported	5	6.6%
	35 to 50	15	19.7%	Occupation	searching for job	4	5.3%
	50 to 65	44	57.9%		employed	21	27.6%
	older than 65	6	7.9%		self employed	32	42.1%
	not reported	6	7.9%		retired	11	14.5%
					other	1	1.3%
					Not reported	7	9.2%

Table 2: Demographics of respondents.

Respondents activities (N = 73)					
involvement	N	Percent			
campaigning & promoting	27	37%			
volunteering	31	42%			
board membership	55	75%			
contributing special skills	32	44%			
other involvement	8	11%			
time investment					
less than 2 hours	10	14%			
2 to 5 hours	21	29%	**other investment**	N	Percent
5 to 10 hours	27	37%	money	42	58%
10 to 20 hours	6	8%	other means	39	53%
more than 20 hours	9	12%	knowledge & skills	62	85%

Table 3: Respondents activities.

Ecological concern						**Awareness of consequences**					
scale	N	Min	Max	Mean	Std. Deviation	**scale**	N	Min	Max	Mean	Std. Deviation
ecological concern	75	1.80	5.00	3.9227	0.61062	awareness of consequences	75	1.44	4.56	3.4326	0.76186
items						**items**					
eco-crisis	75	1.00	5.00	3.9867	0.92259	climate change affects family	76	1.00	5.00	2.9211	1.47660
limits to space and supply	76	1.00	5.00	4.0921	0.94060	climate change affects the Netherlands	76	1.00	5.00	3.6053	1.26574
imminent eco-disaster	76	1.00	5.00	3.8421	0.92452	climate change affects nature	76	1.00	5.00	3.6579	1.43808
natural balance	75	1.00	5.00	3.7600	1.01129	deforestation affects family	75	1.00	5.00	2.8400	1.49811
abuse of natural environment	76	1.00	5.00	3.9605	1.01247	deforestation affects the Netherlands	76	1.00	5.00	3.2632	1.32029
						deforestation affects nature	76	1.00	5.00	4.2895	1.06853
						toxics affect family	76	1.00	5.00	2.3421	1.32215
						toxics affect the Netherlands	76	1.00	5.00	3.8684	1.23658
						toxics affect nature	76	1.00	5.00	4.1316	1.14708

Personal normative beliefs					
scale	N	Min	Max	Mean	Std. Deviation
personal normative beliefs	75	3.33	5.00	4.3956	0.45821
items					
resp. gov. toxics removal	76	2.00	5.00	4.2763	0.68505
personal resp. to curb climate change	76	2.00	5.00	4.3289	0.68094
personal resp. to prevent pollution	76	1.00	5.00	4.2500	0.75056
resp. business and industry to limit emissions	76	3.00	5.00	4.5526	0.52649
resp. gov. to protect rainforest by international pressure	76	2.00	5.00	4.4737	0.62126
resp. gov. to reduce emissions and prevent global climate change	76	3.00	5.00	4.4605	0.64168
resp. importers to prevent deforestation in supplying countries	75	2.00	5.00	4.5467	0.57641
pers. resp. to prevent deforestation	76	2.00	5.00	4.1184	0.71119
resp. chem. indust. to clean up their own pollution	76	2.00	5.00	4.5526	0.59766

Table 4: Scores on individual factors.

(Experiential) experts write that understanding the consequences of human activity is important to get a sense of responsibility and to act upon it. They agree that people might have different motivations for participating in an EC. Anne Marieke Schwencke[5] mentions that, next to ecological concern, a concern for the community is also an important individual factor and that the importance of diversification, decentralisation and democratisation of the energy market should not be ignored. During a group session at a meeting of "energy ambassadors"[6] awareness was seen as a first step to behavioural change.

The respondents find that humans abuse the environment severely and acknowledge the notion of the earth as a spaceship with limited room and resources. They are concerned about the effects of climate change, deforestation and toxics on the nature and on the Netherlands and they have strong personal normative beliefs when it comes to the responsibilities of governments business and industry and individuals to mitigate and prevent pollution and deforestation. They are less concerned about the effects of climate change, pollution and toxics on their own families.

[5] Written response from an online survey among (experiential) experts (Appendix I)

[6] 2nd annual meeting of energy ambassadors, Apeldoorn, 13th of June 2015.

When it comes to contextual factors (Table 5), the (in)stability of regulations and policies and infrastructure are regarded as limiting factors for the production of RE, while respondents indicated that they were satisfied with how decisions are made, how they are represented and how they are involved in decision making processes that affect the context in which their EC operates.

Energy collectives were described as social projects, rather than economical enterprises and they face financial challenges to survive financially. They sometimes experience difficulties to gain access to capital while respondents believe that their EC gives an economic impulse to the local community. The current netting regulations function as a financial incentive to produce energy according to the respondents. Karin Keizer[7] acknowledges the often social character of cooperations, she mentions that wind-cooperations are often formed to establish social support as ideas to place windmills often find opposition from people who regard windmills as a source of "horizonvervuiling" (destroying the visual beauty of the landscape) while solar collectives are often formed to establish financial support (crowdfunding / access to capital).

Decision making						**Policy factors**					
scale	N	Min	Max	Mean	Std. Deviation	**scale**	N	Min	Max	Mean	Std. Deviation
Decision making	50	2.33	5.00	3.9067	1.02804	Policy factors	76	1.00	5.00	2.8026	0.83298
items						**items**					
process	66	2.00	5.00	3.5606	1.05435	policy climate	76	1.00	5.00	1.8026	1.11976
representation	66	3.00	5.00	4.1818	0.99087	municipality support	76	1.00	5.00	3.5263	1.14861
involvement	61	2.00	5.00	3.5738	1.37185	governmental support	76	1.00	5.00	3.0789	1.00350
Economical factors						**Infrastructure**					
items	N	Min	Max	Mean	Std. Deviation	**item**	N	Min	Max	Mean	Std. Deviation
economical vs social	69	1.00	4.00	2.6957	0.92838	infrastructure	76	1.00	5.00	2.6579	1.13787
financial challenge	69	2.00	5.00	3.7681	1.03106						
economic impulse	71	2.00	5.00	3.9718	0.82759						
access to capital	68	1.00	4.00	2.7353	0.98674						
financial incentive	68	2.00	5.00	3.3676	1.13169						
risk perception	76	1.00	5.00	3.1184	1.18847						

Table 5: Scores on contextual factors.

[7] Phone conversation with Karin Keizer, coordinator of the team "lokale initiatieven" (local initiatives) of the Rijksdienst voor Ondernemend Nederland (RVO) 23rd of June, 2015 (Appendix K).

As hypothesis 1 predicted, significant correlations were found between individual factors and contextual factors: a significant positive correlation was found between ecological concern and policy factors ($r(73) = .236$, $p < .05$) and awareness of consequences and financial incentive ($r(65) = .274$, $p < .05$). According to (experiential) experts it is important to include economical, political, and legal factors if one wants to change behaviour:

> One cannot expect of individuals to behave in a sustainable way if pollution is not included in prices. Our (political) institutions are the agents who can take these structural measures.[8]
>
> There is no level playing field for local energy. Current economical processes are complicated. Energy cooperations loose when they enter a commercial environment because of this.[9]
>
> Economical factors are the most important, especially in production of energy where large sums of money are involved. It has to be financially profitable for motivated citizens, it is not a charity, but they are willing to invest a large proportion of their free time. The economical conditions are manipulated by the state through fiscal regulations and subsidies. For the near future renewable energy is not profitable without these regulations and subsidies. As long as external environmental costs are not included, the price of energy remains low and the costs of RE production high, this situation will continue. As RE production is a field for pioneers, highly motivated people are necessary.[10]

Hypothesis 2 predicted that a high score on individual factors would have a significant positive effect on collective electricity production. But the regression analysis showed a negative effect of awareness of consequences on collective electricity production ($\beta = -.666$; $p = .004$).

The only significant contextual factor in the regression model is infrastructure ($p = .041$), but collectively the 7 contextual factors combined with 2 individual factors accounted for a statistically significant proportion of the variance in coherence. Therefore hypothesis 3, contextual factors have a significant effect on the collective electricity production, can be accepted.

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[8] Anonymous (experiential) expert 1 (Appendix I: 72)

[9] Anonymous (experiential) expert 2 (Appendix I: 72)

[10] Anne Marieke Schwencke (Appendix I: 72)

5 Conclusion and discussion

This final chapter starts with a description of the limitations of this study. (5.1) and the conclusions that could be derived from the results (5.2). In the last two sections I discuss the implications of my findings (5.3) and make recommendations for policy, practice and future research (5.4).

5.1 Limitations

This study investigated a model with an outcome of two variables: energy production and energy efficiency. A larger sample size than the number of publicly available e-mail addresses was necessary to investigate energy efficiency as a dependent variable. Therefore it was only possible to investigate energy production as a dependent variable. In the approach of respondents I had to rely on the only publicly accessible database available with a number of ECs that was big enough for a good sample. The database made no clear distinction between ECs who produce energy and those who don't. This makes an estimation of the number of ECs who actively produce energy less precise.

The time available for writing a master-theses did not allow me to investigate the indirect effects of ECs on RE-production or energy efficiency next to my primarily quantitative approach. Problems with measuring other forms of energy than electricity made me decide to report only on electricity production as one of the various forms of energy.

The findings of this study are based on a relatively small sample size and some survey questions were not answered by many respondents. Not all the collectives represented by respondents produced energy and there was limited knowledge among the respondents about the amount of electricity that was produced by the collective they represented. This had a negative effect on the statistical power of the results. To overcome this limited knowledge of collective electricity production and to improve the robustness of the analysis, an alternative dependent variable, payback period, was used as a measurement for potential future energy production. The regression analysis for both dependent variables was significant, had a medium effect size and sufficient statistical power.

During this study, I found estimates of the size of the population of ECs from different sources from several hundreds in 2013 (Netbeheer Nederland, 2013), more than 300 in 2012 (Schwencke, 2012) or about 300 (TNO, 2014 I) and about 500 self-registered ECs in 2015 (hieropgewekt.nl, 2015). This is an increase of 40% in two years! Although a sudden increase of ECs is in line with the

results of this study (a sudden increase in 2012 and 2013) and can be expected as a result of market developments (Sark, 2014) and collective purchasing (Schwencke, 2012), an increase of 40% in two years seems unlikely. The 40% increase of ECs can be caused by the possibility that, while more people became involved with renewable energy and collectives, the commonly accepted definition of what an energy collective actually is became wider: 38% of the respondents said their EC was active with improving energy efficiency, trade, advocacy or consultancy. Secondly, an increased publicity for the website hieropgewekt.nl could have caused an improvement of registration. Finally, the fact that the representatives of ECs are self registered can cause over-registration: different members of the same collective might accidentally register while using a different name for the same collective, a different spelling or made a typo while registering the name. And in the database registrations might be present of collectives who ceased to exist, merged with another collective or changed their name. Because of these reasons it is only possible to give the rough estimation that the number of energy collectives who actively produce RE in the Netherlands is probably bigger than 300 but smaller than 500.

5.2 Conclusions

The purpose of this study was to find an answer to the question: to what extent do individual factors contribute to the production en energy by energy collectives? To answer this question the following three hypotheses were tested:

1. Individual- and contextual factors are significantly correlated.
2. A high score on individual factors has a significant positive effect on collective energy production.
3. Contextual factors have a significant effect on collective electricity production.

The results of a quantitative data analysis, a meeting of energy ambassadors, conversations with and written input from (experiential) experts led to the following conclusions:

Individual and contextual factors relate in such a way that, when participants of energy collectives are more concerned with ecological issues, they express that they are being more supported by the municipality, the government and experience stability in regulations and policies. And when they are concerned for their families, their country and the nature, they perceive the current netting regulations as a stimulating measure for the growth of energy collectives.

Although individual motivation might lead to more policy support, it does not necessarily lead to more electricity production. The results, in fact, show the opposite: more awareness of the consequences of climate change, deforestation and pollution results in a lower rate of electricity production by collectives. This might be caused by the possibility that people who are more aware of these consequences consider limiting the use of energy / improving energy efficiency as more effective and would therefore contribute less to electricity production.

Economical, legal and political factors are found to be important factors to change behaviour and the cost-ratio of fossil fuels vs RE has a big effect: "There is no level playing field for local energy"[11], "the external costs of fossil fuels are not included in the price"[12]. Jan Rotmans (2011) writes that, since the appearance of the fourth National environmental policy plan in 2001, the energy transition project was step by step encapsulated by the existing gas- and oil regime and the process, which was more technologically oriented instead of process oriented. It also became more hierarchical even though it was intended to have a more horizontal structure. He proposes a strategy of facilitating the social dynamics on local and regional level, stimulate front runners and up-scaling successful experiments (Rotmans, 2011).

A combination of individual and contextual factors affect collective electricity production. Infrastructure appears to be the most important contextual factor. This result was found in the quantitative data analysis as well as in the responses of (experiential) experts. Infrastructure appears to be good for consumer / producers and for big producers, while insufficient for producers who (want to) supply some dozens or hundreds of households with electricity. Next to infrastructure, policy factors, financial challenge, access to capital, financial incentives, risk perception and decision making are an important combination of factors that affect electricity production by collectives.

When looking at payback period as a measurement of potential future energy production, next to infrastructure, financial challenge becomes an important factor too: when respondents indicated that they experience it as a financial challenge to survive financially, they estimate the payback period to be longer. The majority of qualitative responses confirmed that payback period is (certainly) a good or even crucial measurement for potential future RE production. "The payback period is crucial as a measurement for potential future RE production. Especially for risk calculation and to prevent

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[11] Anonymous (experiential) expert 2 (Appendix I: 72)

[12] Anonymous (experiential) expert 1 (Appendix I: 73)

capital to be frozen (otherwise you mostly just pay interest). For a small organisation with little money / cashflow, frozen capital is a nuisance because it limits flexibility. For larger organisations this is often less of a problem"[13]. This is also acknowledged by Andrew J. Black (2003) : "Solar electricity can generate rates of return of 11% to 21%[14] exceeding most other common investments, can increase property value by more than the cost to install the system, and generate a positive cash flow if financed".

5.3 Discussion

As expected, individual and contextual factors do correlate significantly in this study and contextual factors do have an effect on collective electricity production. (Experiential) experts mention that financial and economical factors are the most important ("the $ rules"[15]), although "as RE production is a field for pioneers, highly motivated people are necessary."[16] From a procedural sustainability approach (Miller, 2012: 285), participants of ECs and experts can be regarded as agents who develop pathways to pursue sustainability through advocacy and consultancy. And (experiential) experts demonstrated ideas about ecological, social and economical consequences of different courses of action.

Contrary to my expectations I found that respondents who were concerned about ecology and the effects of human behaviour (demonstrated with high scores on ecological concern and awareness of consequences) and had strong personal normative beliefs were connected to ECs who produce less energy than others. A reasonable explanation for this might be that they are less active in the production of energy (which can be seen as an intent driven type of ESB) and more active in other activities such as improving energy efficiency and advocacy (which can be seen as an impact driven type of ESB). Maybe they consider these activities more effective for achieving sustainability than the production of RE. One visitor of a meeting of energy ambassadors[17] pointed out that there is too much emphasis on the production of electricity by solar cells while a more sustainable consumers behaviour could have a large positive impact on the environment as well as the wallet (Appendix K: 80). Connecting this to the VBN theory (Stern, 2000) one could say that respondents consider

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[13] Anonymous (experiential) expert 2 (Appendix I: 74)

[14] These rates of return are based on a mostly sunny California with relatively stable weather and can therefore not be applied to the Dutch situation with short days in winter, long days in summer and a relatively unstable climate.

[15] Anonymous (experiential) expert 4 (Appendix I: 72)

[16] Anne Marieke Schwencke (Appendix I: 72)

[17] 2nd annual meeting of Energy Ambassadors, 13th of June, 2015, Apeldoorn (Appendix K).

different individual actions to alleviate threat to people and/or nature because the information they have, is different from others or they perceive the same information differently. Their perception of information shapes their beliefs about the impact of their own and others behaviour and determines their individual actions. This is also acknowledged by (experiential) experts who find that understanding the consequences of human activity is important to get a sense of responsibility and to act upon it. Participants of energy collectives can play an important role to provide information to, for example, the municipality in which they operate[18].

During this study, I found signs of non-activist behaviours in the public sphere in the form of support for and acceptance of public policies (Stern, 2000: 410-11). I also found signs of gradual changes within the current energy regime in the Netherlands (Rotmans, 2011) where a growing network of dedicated technicians, researchers and products whose individual motivation lead them to become specialised and skilled with new technology in the niche-market of renewable energy: the respondents of the survey are highly educated, employed or self-employed persons who contribute knowledge and skills to the collectives.

In a process of gradual changes within the energy system, the new technology becomes more recognisable and new rules and regulations appear in support of this new technology. Karin Keizer[19] supports this by mentioning that within policy there has been a change from financing big projects to "take all chances" which means that after recognition of big projects as meaningful, smaller projects become recognised too. These rules and regulations are created and distributed with different forms of communications such as magazines, conferences and cooperative programs (Rotmans et al, 2000; Mourik & Burger, 2013) such as the online platforms hieropgewekt.nl and duurzameenergie.org, the conference of energy ambassadors (energieambassadeurstop.nl, 2015) and cooperative programs such as the storage of heat (WKO werkgroep, 2009) and the development of smart grids (TKI S2SGs, 2015).

[18] Introductory speech at the 2nd annual meeting of Energy Ambassadors by Detlev Cziesso, alderman of the municipality of Apeldoorn.

[19] Phone conversation with Karin Keizer, coordinator of the team "lokale initiatieven" (local initiatives) of the Rijksdienst voor Ondernemend Nederland (RVO) 23rd of June, 2015.

5.4 Recommendations

Although it seems quite a task for the Netherlands to achieve a 20% share of renewable energy in 2020, a focus not only on the production of renewable energy, but also an improvement of energy efficiency / reduction of energy use would be a good strategy. Reducing the amount of the use of energy from fossil fuels alone will already improve the share of renewable energy, even if the amount of RE production remains the same. Increasing the awareness of the Dutch population about the consequences of human activity can improve the reduction of the use of energy from fossil fuels as a result of energy efficient behaviour of individuals who are more aware of the consequences of their consumer behaviour.

One way to increase the choice of consumers for RE is to include the external costs of fossil fuels for cleaning up pollution, environmental damage and public health costs caused by the fossil fuel industry and the use of fossil fuels by industry and individuals. This might result in a more competitive price difference between RE and fossil fuel based energy.

To improve RE-production by collectives, there is a need to improve infrastructure for small producers serving several dozens or hundreds of households. To increase the number and amounts of investments in RETs one might think of reducing the payback period of RETs with tax reductions on RET investments, subsidies and low interest loans.

For research purposes it seems that the categorisation of energy collectives by Anne Marieke Schwencke (2012) is still valid for the majority of ECs, but faces limitations as the number of ECs is rapidly increasing: 38% of the respondents mentioned a focus on trade, energy efficiency / reducing the use of energy, advocacy and consultancy. Because the number of ECs is increasing and the definition of what an EC actually is became wider, the categorisation of ECs needs to be improved. Especially for quantitative research purposes. For an improved categorisation of ECs, a reasonable approach would be to focus on the primary type of activity (energy production, improving energy efficiency, trade, advocacy and consultancy). Collective energy producers can be categorised by their main source of energy. This is sensible because collective energy producers face different challenges depending on the source of energy: for the placement of windmills social support is required, while support for the placement of solar cells has a more financial character. A database that uses this categorisation would be very helpful. The most likely exploiter of this database would be hieropgewekt.nl as this is already a well known platform among participants of ECs, policy makers and researchers.

Although the direct effect of ECs on RE production is marginal, scientists in sustainability (Geels, 2011; Rotmans et al, 2000; Rotmans, 2011) acknowledge that indirect effects of ECs on RE production through their activities (such as advocacy and consultancy) to influence the market and policy should not be ignored. Here lies a task for future researchers to investigate these indirect effects.

To improve the knowledge of participants of ECs on the production of other forms of energy than electricity, participants should be provided with information about the energy that is produced by the collective. Preferably in such a way that the different forms of energy can be compared. To improve the reliability of measurements by future researchers, measurements that are used to bill clients of energy companies can be customised and anonymised for research purposes.

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Appendix

Appendix A: Correlations table

Correlations		CEP	PBC	EC	AC	PNB	DM	POL	INF	SOC	FIN	IMP	CAP	INC	RISK
CEP	ρ	1	-0.217	-0.305	-.358*	0.020	-0.161	-0.149	-0.161	0.035	-0.162	0.054	0.182	0.296	0.202
	Sig.		0.217	0.079	0.041	0.912	0.474	0.400	0.364	0.858	0.411	0.773	0.345	0.100	0.251
	N	34	34	34	33	34	22	34	34	29	28	31	29	32	34
PBC	ρ	-0.217	1	-.308**	-.329**	-0.141	-0.138	-0.018	0.032	0.134	.276*	0.022	-0.073	-0.148	-.267*
	Sig.	0.217		0.008	0.004	0.230	0.344	0.880	0.786	0.275	0.023	0.857	0.558	0.231	0.021
	N	34	75	74	74	74	49	75	75	68	68	70	67	67	75
EC	ρ	-0.305	-.308**	1	.402**	.287*	0.208	.258*	0.006	-0.097	-0.036	0.001	-0.058	0.188	0.067
	Sig.	0.079	0.008		0.000	0.013	0.147	0.025	0.959	0.430	0.768	0.996	0.638	0.128	0.570
	N	34	74	75	74	74	50	75	75	68	68	70	68	67	75
AC	ρ	-.358*	-.329**	.402**	1	.265*	0.201	.236*	0.121	-0.189	0.122	0.080	-0.059	.274*	0.035
	Sig.	0.041	0.004	0.000		0.022	0.162	0.041	0.300	0.123	0.321	0.509	0.637	0.025	0.766
	N	33	74	74	75	74	50	75	75	68	68	70	67	67	75
PNB	ρ	0.020	-0.141	.287*	.265*	1	0.175	-0.024	0.006	0.122	0.085	0.231	0.005	-0.013	0.120
	Sig.	0.912	0.230	0.013	0.022		0.230	0.837	0.961	0.322	0.493	0.055	0.966	0.917	0.307
	N	34	74	74	74	75	49	75	75	68	68	70	67	67	75
DM	ρ	-0.161	-0.138	0.208	0.201	0.175	1	0.139	0.071	-0.048	-0.199	0.172	0.013	0.127	0.099
	Sig.	0.474	0.344	0.147	0.162	0.230		0.336	0.623	0.751	0.190	0.242	0.935	0.399	0.495
	N	22	49	50	50	49	50	50	50	46	45	48	45	46	50
POL	ρ	-0.149	-0.018	.258*	.236*	-0.024	0.139	1	0.125	0.070	-0.093	-0.089	0.097	0.031	0.051
	Sig.	0.400	0.880	0.025	0.041	0.837	0.336		0.283	0.566	0.446	0.461	0.431	0.802	0.663
	N	34	75	75	75	75	50	76	76	69	69	71	68	68	76
INF	ρ	-0.161	0.032	0.006	0.121	0.006	0.071	0.125	1	-0.047	-0.154	-0.139	0.069	0.039	-0.058
	Sig.	0.364	0.786	0.959	0.300	0.961	0.623	0.283		0.704	0.206	0.246	0.578	0.755	0.616
	N	34	75	75	75	75	50	76	76	69	69	71	68	68	76

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

SOC	ρ	0.035	0.134	-0.097	-0.189	0.122	-0.048	0.070	-0.047	1	-.326**	-0.133	.394**	-.425**	-0.109
	Sig.	0.858	0.275	0.430	0.123	0.322	0.751	0.566	0.704		0.008	0.295	0.001	0.001	0.372
	N	29	68	68	68	68	46	69	69	69	65	64	66	62	69
FIN	ρ	-0.162	.276*	-0.036	0.122	0.085	-0.199	-0.093	-0.154	-.326**	1	0.157	-.257*	0.166	-0.021
	Sig.	0.411	0.023	0.768	0.321	0.493	0.190	0.446	0.206	0.008		0.211	0.040	0.201	0.862
	N	28	68	68	68	68	45	69	69	65	69	65	64	61	69
IMP	ρ	0.054	0.022	0.001	0.080	0.231	0.172	-0.089	-0.139	-0.133	0.157	1	-0.153	0.030	-0.112
	Sig.	0.773	0.857	0.996	0.509	0.055	0.242	0.461	0.246	0.295	0.211		0.232	0.818	0.352
	N	31	70	70	70	70	48	71	71	64	65	71	63	63	71
CAP	ρ	0.182	-0.073	-0.058	-0.059	0.005	0.013	0.097	0.069	.394**	-.257*	-0.153	1	-0.154	-0.018
	Sig.	0.345	0.558	0.638	0.637	0.966	0.935	0.431	0.578	0.001	0.040	0.232		0.237	0.884
	N	29	67	68	67	67	45	68	68	66	64	63	68	61	68
INC	ρ	0.296	-0.148	0.188	.274*	-0.013	0.127	0.031	0.039	-.425**	0.166	0.030	-0.154	1	0.020
	Sig.	0.100	0.231	0.128	0.025	0.917	0.399	0.802	0.755	0.001	0.201	0.818	0.237		0.871
	N	32	67	67	67	67	46	68	68	62	61	63	61	68	68
RISK	ρ	0.202	-.267*	0.067	0.035	0.120	0.099	0.051	-0.058	-0.109	-0.021	-0.112	-0.018	0.020	1
	Sig.	0.251	0.021	0.570	0.766	0.307	0.495	0.663	0.616	0.372	0.862	0.352	0.884	0.871	
	N	34	75	75	75	75	50	76	76	69	69	71	68	68	76

Dependent- with independent variables	CEP	Collective Electricity production	POL	policy factors	IMP	economical impulse
Individual factors with individual factors	PBC	Payback period	DM	decision making	CAP	access to capital
Contextual factors with contextual factors	EC	Ecological concern	INF	infrastructure	INC	financial incentive
Contextual factors with individual factors	AC	Awareness of consequences	SOC	economical vs social	RISK	risk perception
	PNB	personal normative beliefs	FIN	financial challenge		

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Appendix B: Regression analysis Collective Electricity Production

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.854[a]	0.730	0.542	15498674.33		

a. Predictors: (Constant), decision making, infrastructure, awareness of consequences, financial incentive, personal normative beliefs, financial challenge, risk perception, access to capital, policy factors

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.42712E+15	9	9.36347E+14	3.898	.013[b]
	Residual	3.12272E+15	13	2.40209E+14		
	Total	1.15498E+16	22			

a. Dependent Variable: collective electricity production

b. Predictors: (Constant), decision making, infrastructure, awareness of consequences, financial incentive, personal normative beliefs, financial challenge, risk perception, access to capital, policy factors

Coefficients						
Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	14591648.953	46453399.347		0.314	0.758
	awareness of consequences	-22916621.097	6656646.405	-0.666	-3.443	0.004
	personal normative beliefs	13461413.162	8062873.413	0.274	1.670	0.119
	policy factors	6032171.070	4240708.164	0.268	1.422	0.178
	infra-structure	-7150312.505	3158015.470	-0.357	-2.264	0.041
	financial challenge	-3142108.929	3835553.517	-0.143	-0.819	0.427
	access to capital	-1152246.790	3700106.281	-0.057	-0.311	0.760
	financial incentive	6131714.826	3534124.978	0.317	1.735	0.106
	risk perception	6605204.612	3253048.825	0.357	2.030	0.063
	decision making	-4830404.579	3575792.333	-0.236	-1.351	0.200

a. Dependent Variable: collective electricity production

Appendix C: Regression analysis Payback Period

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.605[a]	0.366	0.219	0.71442		
a. Predictors: (Constant), decision making, infrastructure, awareness of consequences, financial incentive, personal normative beliefs, financial challenge, risk perception, access to capital, policy factors						

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.482	9	1.276	2.500	.023[b]
	Residual	19.905	39	0.510		
	Total	31.388	48			
a. Dependent Variable: payback period						
b. Predictors: (Constant), decision making, infrastructure, awareness of consequences, financial incentive, personal normative beliefs, financial challenge, risk perception, access to capital, policy factors						

Coefficients						
Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.061	1.193		3.404	0.002
	awareness of consequences	-0.323	0.155	-0.295	-2.082	0.044
	personal normative beliefs	-0.238	0.223	-0.142	-1.064	0.294
	policy factors	0.007	0.127	0.007	0.052	0.959
	infra-structure	0.177	0.098	0.238	1.802	0.079
	financial challenge	0.290	0.105	0.370	2.766	0.009
	access to capital	-0.052	0.111	-0.062	-0.465	0.644
	financial incentive	-0.042	0.104	-0.057	-0.407	0.686
	risk perception	-0.126	0.098	-0.179	-1.293	0.203
	decision making	-0.051	0.103	-0.070	-0.491	0.626
a. Dependent Variable: payback period						

Appendix D: Abbreviations and definitions

AC	**Awareness of adverse consequences**	Altruistic behaviour (including environmentalism) as a function of "personal norms that are activated in individuals who believe that particular conditions pose threats to others" (Stern, 2000: 412 § 2).
AR	**Ascription to responsibility to self**	Actions that one could initiate can avert the consequences of conditions that pose threats to others (Stern, 2000: 412 § 2).
ECs	**Civilian led renewable energy collectives**	Civilians who participate collectively in sustainable energy and organise themselves spontaneously as a cooperation, association or some less official form of partnership (Schwencke, 2012:11). In this master-thesis design I refer to them as "energy collectives" or ECs.
ESB	**Environmentally significant behaviour**	Behaviour that has an impact on "the extend to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself (Stern, 2000: 408).
IB	**Institutional barriers**	Barriers that are caused by institutional problems and short-comings such as the distribution of information, rules and regulations and an unstable macro-economic environment, a lack of involvement of stakeholders in decision-making, a lack of professional institutions etc (Painuly, 2001).
NEP	**New ecological paradigm**	The emerging worldview in which ecological values become more important. In 1978 the NEP-scale was developed by Riley E. Dunlap and is now widely used in numerous studies (Dunlap, 2007).
RE	**Renewable energy**	Energy obtained from natural sources such as wind power, solar power, water power, bio fuels etc.
RETs	**Renewable energy technologies**	Technologies for the production or distribution of renewable energy.
	Stakleholders	Those who have an interest in a particular decision, either as individuals or representatives of a group. This includes people who influence a decision, or can influence it, as well as those affected by it (Hemmati, 2002:2).
	Thin sustainability	A concept that encourages widespread agreement but does not "translate substantively to the level of individual behaviour changes nor conflict with more contextual notions of what is moral or desirable" (Miller, 2012: 283 § 3).
	Procedural sustainability	"the emergent property of a discussion about desired futures that's informed by some understanding of the ecological, social and economic consequences of different courses of action" (Miller, 2012: 285).

Appendix E: Original items Stern et al (1999)

New Ecological Paradigm (NEP)

The so-called "ecological crisis" facing humankind has been greatly exaggerated. (R)
The earth is like a spaceship with limited room and resources.
If things continue on their present course, we will soon experience a major ecological catastrophe.
The balance of nature is strong enough to cope with the impacts of modern industrial nations. (R)
Humans are severely abusing the environment.

Personal Normative Beliefs

The government should take stronger action to clean up toxic substances in the environment.

I feel a personal obligation to do whatever I can to prevent climate change.

I feel a sense of personal obligation to take action to stop the disposal of toxic substances in the air, water, and soil.

Business and industry should reduce their emissions to help prevent climate change.

The government should exert pressure internationally to preserve the tropical forests.

The government should take strong action to reduce emissions and prevent global climate change.

Companies that import products from the tropics have a responsibility to prevent destruction of the forests in those countries.

People like me should do whatever we can to prevent the loss of tropical forests.

The chemical industry should clean up the toxic waste products it has emitted into the environment.

Awareness of Consequences (AC)

In general, do you think that climate change, which is sometimes called the greenhouse effect, will be a very serious problem for you and your family, somewhat of a problem for you and your family or won't really be a problem for you and your family?

Do you think that climate change will be a very serious problem for the country as a whole, somewhat of a problem or won't really be a problem for the country as a whole?

Do you think that climate change will be a very serious problem for other species of plants and animals, somewhat of a problem or won't really be a problem for other species of plants and animals?

Next, I'd like you to consider the problem of loss of tropical forests. Do you think this will be a very serious problem for you and your family, somewhat of a problem or won't really be a problem for you and your family?

Do you think that loss of tropical forests will be a very serious problem for the country as a whole, somewhat of a problem or won't really be a problem for the country as a whole?

Do you think that loss of tropical forests will be a very serious problem for other species of plants and animals, somewhat of a problem or won't really be a problem for other species of plants and animals?

Next, I'd like you to consider the problem of toxic substances in air, water and the soil. Do you think this will be a very serious problem for you and your family, somewhat of a problem or won't really be a problem for you and your family?

Do you think that toxic substances in air, water and the soil will be a very serious problem for the country as a whole, somewhat of a problem or won't really be a problem for the country as a whole?

Do you think that toxic substances in air, water and the soil will be a very serious problem for other species of plants and animals, somewhat of a problem or won't really be a problem for other species of plants and animals?

Appendix F: Barriers to RETs penetration

(Painuly, 2000: 79-81)

Numbers in right margin refer to the questions in the questionnaire (Appendix H).

Barrier category	Barriers	Remarks	
1. *Market Failure/imperfection*	Highly controlled energy sector	This may lead to lack of investments in RETs.	
	Lack of information and awareness	It increases uncertainty, and hence costs.	
	Restricted access to technology	Technology not available or available at high cost.	
	Lack of competition	Product cost increases.	
	High transaction costs	Economic viability of the project may be affected.	
	Missing market infrastructure	It may increase cost of product to the consumer.	
	High investment requirements	This acts as an entry barrier for entrepreneurs.	
2. *Market Distortions*	Favour (such as subsidies) to conventional energy	This affects competitiveness of renewable energy adversely.	
	Taxes on RETs	Cost of energy from RETs increases.	
	Non-consideration of externalities	Cost of conventional energy is less than what it should be.	
	Trade barriers	Cost of RETs may go up, for example due to high taxes on RET imports.	
3. *Economic and Financial*	Economically not viable	Cost reduction in RETs needed.	Q 9
	High discount rates	Incentives may be needed in the initial stages.	
	High payback period	Project becomes un-viable.	Q 10
	Market size small	Economy of scale cannot be achieved.	
	High cost of capital	It may affect economic viability.	
	Lack of access to capital	No. of producers less, and hence competition and market efficiency may suffer.	Q 9
	Lack of access to credit to consumers	It may reduce market size.	
	High up-front capital costs for investors	Capital costs may also go up due to increased risk perception. Adverse effect on competition and efficiency.	
	Lack of financial institutions to support RETs, lack of instruments	Supply of RET products may suffer. Adverse effect on competition and efficiency.	

(continued on next page)

(Continued)

Barrier category	Barriers	Remarks
4. *Institutional*[c]	Lack of institutions/mechanisms to disseminate information	It leads to non-availability of information with producers as well as consumers.
	Lack of a legal/regulatory framework	Renewable energy producers may face market/economic/financial barriers without this.5y Q 11
	Problems in realising financial incentives	This may be due to red tape, leading to economic/financial barriers.
	Unstable macro-economic environment	This may increase risk and uncertainty for new investments. Only products with low payback period may be acceptable.
	Lack of involvement of stakeholders in decision making	This can result in mis-placed priorities. Q 6,7,8
	Clash of interests	This may lead to powerful lobbies against RETs.
	Lack of R&D culture	This may make adaptation of technology difficult.
	Lack of private sector participation	Lack of competition and inefficiency is possibly due to this.
	Lack of professional institutions	Producers' problems and views on barriers cannot reach the policy makers effectively.
5. *Technical*	Lack of standard and codes and certification	Product quality and product acceptability is affected. Purchase and commercial risk increases, as also negative perception about technology.
	Lack of skilled personnel/training facilities	This can be a constraint for producers.
	Lack of O&M facilities	This can affect product acceptance.
	Lack of entrepreneurs	It may lead to lack of competition and supply constraints.
	System constraints	Market can not be realised by producers.
	Product not reliable.	Market size may get affected.
6. *Social, Cultural and Behavioural*	Lack of consumer acceptance of the product	Market size becomes small.
	Lack of social acceptance for some RETs	Affects market size. For example, gas from urban waste for cooking may not be acceptable to a sizeable segment.

(continued on next page)

(Continued)

Barrier category	Barriers	Remarks	
7. *Other Barriers*	Uncertain governmental policies	It creates uncertainty and results in lack of confidence. May also increase cost of project.	Q 11
	Environmental	Environmental damages/pollution may be unacceptable.	
	High risk perception for RETs	It increases cost of capital (high financial risk) as well as discount rate of producer.	Q 11
	Lack of infrastructure	RETs such as wind may need strong infrastructure development such as roads, grid connectivity.	

Appendix G: Survey questions

	Ecological attitude (new ecological paradigm Stern et al, 1999).	
Question	**English**	**Dutch**
1a	The so- called “ecological crisis” facing humankind has been greatly exaggerated.	De zogenaamde “ecologische crisis” die de mens te wachten staat wordt zwaar overdreven.
1b	The earth is like a spaceship with limited room and resources.	De aarde is als een ruimteschip met beperkte ruimte en voorraden.
1c	If things continue on their present course, we will soon experience a major ecological catastrophe.	Als er niks verandert staat voltrekt zich straks een grote ecologische ramp.
1d	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	Het natuurlijk evenwicht is stark genoeg om de invloed van moderne industriën het hoofd te bieden.
1e	Humans are severely abusing the environment.	Mensen misbruiken de natuurlijke omgeving in hoge mate.

	Awareness of consequences (AC) (Stern et al, 1999)	
Question	**English (adapted from the use for telephone interviews to the use in an online survey)**	**Dutch (adapted to the Dutch situation)**
2a	In general, do you think that climate change, which is sometimes called the greenhouse effect, will be a very serious problem for you and your family or won’t really be a problem for your family?	Denkt u in het algemeen dat klimaatverandering, soms ook wel het broeikas effect genoemd, een behoorlijk serieus probleem voor u en uw familie zal zijn of niet echt een probleem zal zijn voor u en uw familie?
2b	Do you think that climate change will be a very serious problem for the country as a whole, somewhat of a problem or won’t really be a problem for the country as a whole?	Denkt u dat klimaatverandering een behoorlijk serieus probleem zal zijn voor Nederland, enigszins problematisch zal zijn of niet echt problematisch zal zijn voor Nederland?
2c	Do you think that climate change will be a very serious problem for other species of plants and animals, somewhat of a problem or won’t really be a problem for other species of plants and animals?	Denkt u dat klimaatverandering een groot probleem vormt voor andere organismen zoals planten en dieren, enigszins een probleem of niet echt een probleem zal zijn voor andere organismen als planten en dieren?

Question	Awareness of consequences (AC) (Stern et al, 1999) English (adapted from the use for telephone interviews to the use in an online survey)	Dutch (adapted to the Dutch situation)
3a	Do you think that the loss of tropical forests will be a very serious problem for you and your family, somewhat of a problem or won't be a problem for you and your family?	Denkt u dat het verlies van tropisch regenwoud een behoorlijk serieus probleem zal zijn voor u en uw familie, enigszins een probleem of niet echt een probleem voor u en uw familie?
3b	Do you think that the loss of tropical forests will be a very serious problem for the country as a whole, somewhat of a problem or won't be a problem for the country as a whole?	Denkt u dat het verlies van tropisch regenwoud een behoorlijk serieus probleem zal zijn voor Nederland, enigszins een probleem of niet echt een probleem voor Nederland?
3c	Do you think that the loss of tropical forests will be a very serious problem for other species of plants and animals, somewhat of a problem or won't be a problem for the country as a whole?	Denkt u dat het verlies van tropisch regenwoud een behoorlijk serieus probleem zal zijn voor andere organismen als planten en dieren, enigszins een probleem of niet echt een probleem voor andere organismen als planten en dieren?
4a	Do you think that toxic substances in air, water and the soil will be a very serious problem for you and your family, somewhat of a problem or won't be a problem for you and your family?	Denkt u dat giftige stoffen in de lucht, het water of de grond een behoorlijk serieus probleem vormt voor u en uw familie, enigszins een probleem vormt of niet echt een probleem vormt voor u en uw familie?
4b	Do you think that toxic substances in air, water and the soil will be a very serious problem for the country as a whole, somewhat of a problem or won't be a problem for the country as a whole?	Denkt u dat giftige stoffen in de lucht, het water of de grond een behoorlijk serieus probleem vormt voor Nederland, enigszins een probleem vormt of niet echt een probleem vormt voor Nederland?
4c	Do you think that toxic substances in air, water and the soil will be a very serious problem for other species of plants and animals, somewhat of a problem or won't be a problem for other species of plants and animals?	Denkt u dat giftige stoffen in de lucht, het water of de grond een behoorlijk serieus probleem vormt voor organismen als planten en dieren, enigszins een probleem vormt of niet echt een probleem vormt voor organismen als planten en dieren?

	Personal normative beliefs (Stern et al, 1999)	
Question	**English**	**Dutch**
5a	The government should take stronger action to clean up toxic substances in the environment.	De overheid moet sterker zich meer inzetten om giftige substanties uit het milieu te verwijderen.
5b	I feel a personal obligation to do whatever I can to prevent climate change.	Ik voel mij persoonlijk verantwoordelijk om mij in te zetten tegen klimaatverandering.
5c	I feel a sense of personal obligation to take action to stop the disposal of toxic substances in the air, water and soil.	Ik heb een gevoel van persoonlijke verantwoordelijkheid actie te ondernemen om te voorkomen dat schadelijke stoffen in de atmosfeer, het water of in de grond belanden.
5d	Business and industry should reduce their emissions to help prevent climate change.	Bedrijven en industrie moeten hun uitstoot beperken om bij te dragen aan het voorkomen van climaatverandering.
5e	The government should exert pressure internationally to preserve the tropical forests.	De regering moet internationale druk uitoefenen om het regenwoud te beschermen.
5f	The government should take strong action to reduce emissions and prevent global climate change.	De overheid moet krachtig optreden om uitstoot te verminderen en de wereldwijde climaatverandering tegen te gaan.
5g	Companies that import products from the tropics have a responsibility prevent destruction of the forests in those countries.	Bedrijven die producten importeren uit hebben een verantwoordelijk om de vernietiging van de regenwouden in die landen tegen te gaan.
5h	People like me should do whatever they can to prevent the loss of tropical forests.	Mensen als ik moeten doen wat ze kunnen om het verlies van tropiesch regenwoud tegen te gaan.
5i	The chemical industry should clean up the toxic waste products it has emitted into the environment.	De chemische industrie zou de giftige stoffen die door haar toedoen in het milieu terecht zijn gekomen moeten opruimen.

	Decision making process	
Question	**English**	**Dutch**
6	To what extend do you agree with how decisions are made that (might) affect the energy collective in which you participate?	In hoeverre bent u het eens met de wijze waarop beslissingen worden genoemen die (mogelijk) effect hebben op het energiecollectief waarin u deelneemt?
7	To what extend do you feel represented in the decision-making process that (might) affect the energy collective in which you participate?	In hoeverre vindt u dat u vertegenwoordigd wordt in besluitvormingsprocessen die het energiecollectief waarin u deelneemt aangaan?
8	To what extend are you involved in the decision-making process that (might) affect the energy collective in which you participate?	In hoeverre bent u betrokken bij besluitvormingsprocessen die het energiecollectief waarin u deelneemt aangaan?

	Policy factors	
Question	**English**	**Dutch**
11a	The Dutch government takes care of a stable regulation- and policy environment. Therefore we know where we stand as an energy collective.	De Nederlandse overheid zorgt voor een stabiele regelgeving en beleidsvoering waardoor wij als energiecollectief weten waar we aan toe zijn.
11d	The municipality supports our energy collective in its development.	De gemeente ondersteunt ons energiecollectief in zijn ontwikkeling.
11e	Governmental institutions support our energy collective in its development.	Overheidsinstanties ondersteunen ons energiecollectief in zijn ontwikkeling.

	Infrastructure	
Question	**English**	**Dutch**
11b	As energy collective we experience no problems to (have) deliver(ed) the gas or energy we produce to the end user.	Als energiecollectief ervaren wij geen enkel probleem om het gas of de energie die we produceren aan de eindgebruiker te (laten) leveren.

	Economic factors	
Question	**English**	**Dutch**
9a	My energy collective is rather a social project than an economically healthy enterprise.	Mijn energiecollectief is eerder een sociaal project dan een economisch gezond bedrijf.
9b	It remains a challenge for my energy collective to survive financially.	Het blijft een uitdaging voor mijn energiecollectief om financieel rond te komen.
9c	My energy collective gives an economic impulse to the community.	Mijn energiecollectief geeft een economische impuls aan de omgeving.
9d	It is hard for my energy collective to gain access to capital for investments.	Het is moeilijk voor mijn energiecollectief om aan kapitaal te komen voor investeringen.
9e	The current netting regulations stimulate the growth of energy collectives.	De huidige salderingsregeling stimuleert de groei van energiecollectieven.
10	How long does it take before investments in your energy collective become profitable?	Hoe lang duurt het volgens u voordat investeringen binnen uw energiecollectief worden terugverdiend?
11c	Investments in renewable energy technology are a financial risk.	Beleggingen in groene technologie zijn een financieel risico.

Appendix H: Questionnaire (in Dutch)

Deelnemers van energiecollectieven

1. Welkom bij deze enquete!

Beste respondent,

Als masterstudent sociaal beleid en interventies aan de Universiteit van Utrecht studeer ik af met een onderzoek naar individuele- en omgevings factoren en de invloed daarvan op de energieproductie van collectieven.

De collectieven die ik onderzoek zijn groepen mensen die zich gezamenlijk bezig houden met duurzame energie. Bijvoorbeeld door het opwekken van zonne-energie, wind energie en het produceren van biogas. Met het invullen van deze enquete helpt u de wetenschap en de maatschappij met kennis over energiecollectieven en mij met afstuderen. Hartelijk dank daarvoor!

Met vriendelijke groeten,

Thomas Roos

PS het invullen van deze enquête duurt ongeveer 15 tot 20 minuten.

2.

Numbers in selection possibilities refer to how questions are coded.

1. In hoeverre bent u het eens met de volgende 5 stellingen?

	Helemaal mee oneens	oneens	neutraal	eens	Helemaal mee eens
De zogenaamde "ecologische crisis" die de mensheid te wachten staat wordt zwaar overdreven.	5	4	3	2	1
De aarde is als een ruimteschip met beperkte ruimte en voorraden.	1	2	3	4	5
Als er niks verandert voltrekt zich straks een grote ecologische ramp.	1	2	3	4	5
Het natuurlijk evenwicht is sterk genoeg om de invloed van moderne industriën het hoofd te bieden.	5	4	3	2	1
Mensen misbruiken de natuurlijke omgeving in hoge mate.	1	2	3	4	5

3.

all items of question 2,3 & 4 are coded similarly

2. In hoeverre denkt u dat klimaatverandering, soms ook wel het broeikaseffect genoemd, een probleem zal zijn voor ... 5 3 1

	een groot probleem	een probleem	niet echt een probleem
uw familie?	○	○	○
voor Nederland?	○	○	○
voor planten en dieren?	○	○	○

3. In hoeverre denkt u dat het verlies van tropisch regenwoud, een probleem zal zijn voor ....

	een groot probleem	een probleem	niet echt een probleem
uw familie?	○	○	○
Nederland?	○	○	○
planten en dieren?	○	○	○

4. In hoeverre denkt u dat giftige stoffen in de lucht, het water of de grond, een probleem vormt voor ...

	een groot probleem	een probleem	niet echt een probleem
uw familie?	○	○	○
Nederland?	○	○	○
planten en dieren?	○	○	○

4.

All questions of this item are coded similarly.

5. In hoeverre bent u het eens met de volgende 9 stellingen?

	Helemaal mee oneens	oneens	neutraal	eens	Helemaal mee eens
De overheid moet zich meer inzetten om giftige substanties uit het milieu te verwijderen.	1	2	3	4	5
Ik voel mij persoonlijk verantwoordelijk om mij in te zetten tegen klimaatverandering.					
Ik voel mij persoonlijk verantwoordelijk om te voorkomen dat schadelijke stoffen in de atmosfeer, het water of in de grond belanden.					
Bedrijven en industrie moeten hun uitstoot beperken om bij te dragen aan het voorkomen van klimaatverandering.					
De regering moet internationale druk uitoefenen om het regenwoud te beschermen.					
De overheid moet krachtig optreden om uitstoot te verminderen en de wereldwijde klimaatverandering tegen te gaan.					
Bedrijven die producten importeren uit tropische landen hebben een verantwoordelijkheid om de vernietiging van de regenwouden in die landen tegen te gaan.					
Mensen als ik moeten doen wat ze kunnen om het verlies van tropiesch regenwoud tegen te gaan.					
De chemische industrie zou de giftige stoffen die door haar toedoen in het milieu terecht zijn gekomen moeten opruimen.					

5.

In onderstaande vragen wordt met "collectief" de energie producerende organisatie (vereniging, stichting, bedrijf etc.) waar u als deelnemer of lid bij betrokken bent.

6. In hoeverre bent u het eens met **de wijze waarop** beslissingen worden genomen die van invloed (kunnen) zijn op het energiecollectief?

In het geheel niet	niet	neutraal	eens	volledig mee eens
○ 1	○ 2	○ 3	○ 4	○ 5

7. In hoeverre vindt u dat u vertegenwoordigd wordt in besluitvormingsprocessen die van invloed (kunnen) zijn op het energiecollectief?

In het geheel niet vertegenwoordigd	onvoldoende vertegenwoordigd	voldoende vertegenwoordigd
○ 1	○ 3	○ 5

8. In hoeverre bent u betrokken bij besluitvormingsprocessen die van invloed (kunnen) zijn op het energiecollectief?

In het geheel niet betrokken	onvoldoende betrokken	voldoende betrokken	ruim betrokken	volledig betrokken
○ 1	○ 2	○ 3	○ 4	○ 5

6.

9. In hoeverre bent u het eens met de volgende stellingen?

	In het geheel niet	niet helemaal	neutraal	gedeeltelijk	absoluut wel
Mijn energiecollectief is eerder een sociaal project dan een economisch gezond bedrijf.	○ 5	○ 4	○ 3	○ 2	○ 1
Het blijft een uitdaging voor mijn energiecollectief om financieel rond te komen.	○ 1	○ 2	○ 3	○ 4	○ 5
Mijn energiecollectief geeft een economische impuls aan de omgeving.	○ 1	○ 2	○ 3	○ 4	○ 5
Het is moeilijk voor mijn energiecollectief om aan kapitaal te komen voor investeringen.	○ 5	○ 4	○ 3	○ 2	○ 1
De huidige salderingsregeling stimuleert de groei van energiecollectieven.	○ 1	○ 2	○ 3	○ 4	○ 5

10. Hoe lang duurt het volgens u voordat investeringen binnen uw energiecollectief worden terugverdiend?

5 jaar of korter	5 tot 10 jaar	10 tot 15 jaar	15 tot 20 jaar	20 jaar of langer
○	○	○	○	○
1	2	3	4	5

11. In hoeverre bent u het eens met de volgende 5 stellingen?

	volledig oneens	gedeeltelijk oneens	neutraal	gedeeltelijk mee eens	absoluut mee eens
De Nederlandse overheid zorgt voor een stabiele regelgeving en beleidsvoering waardoor wij als energiecollectief weten waar we aan toe zijn.	1 ○	2 ○	3 ○	4 ○	5 ○
Als energiecollectief ervaren wij geen enkel probleem om het gas of de energie die we produceren aan de eindgebruiker te (laten) leveren.	○	○	○	○	○
Beleggingen in groene energie technologie zijn een financieel risico.	○	○	○	○	○
De gemeente ondersteunt ons energiecollectief in zijn ontwikkeling.	○	○	○	○	○
Overheidsinstanties ondersteunen ons energiecollectief in zijn ontwikkeling.	○	○	○	○	○

7. Uw energiecollectief en uw deelname

* 12. Wat is de naam van het energie collectief waar u deelnemer van bent?

* 13. In welke gemeente(s) is het energiecollectief waar u deelnemer van bent actief?

* 14. In welke provincie is het energiecollectief waar u deelnemer van bent actief?

Energiecollectieven kunnen worden ingedeeld in drie typen:
Windcollectieven die zich bezig houden met het realiseren van de bouw en exploitatie van windmolens.
Zonnecollectieven die zich voornamelijk bezig houden met zonne-energie door bijvoorbeeld collectieve inkoopacties en initiatieven in de wijk.
Nieuwe nuts, organisaties die bestaan uit burgers die gezamenlijk groene energie inkopen, leveren en/of zelfstandig opwekken in en voor de regio.

15. Hoe is uw energie collectief het best typeren?

- ○ Wind collectief
- ○ Zonne collectief
- ○ Nieuwe nuts
- ○ Overige (geef nadere toelichting)

16. Waaruit bestaat uw deelname aan het energiecollectief voornamelijk?

- ☐ Deelname aan campagnes en promotie activiteiten
- ☐ Vrijwilligerswerk
- ☐ Bestuurswerk
- ☐ Inzet van specialistische vaardigheden
- ☐ Overige (geef nadere toelichting)

17. Hoeveel tijd heeft u gemiddeld per week beschikbaar voor uw energiecollectief?

2 uur of minder	2 tot 5 uur	5 tot 10 uur	10 tot 20 uur	meer dan 20 uur
○ 1	○ 3,5	○ 7,5	○ 15	○ 20

18. geld, middelen en kennis

	nee	ja
Investeert u geld ten behoeve van uw energiecollectief?	○ 0	○ 1
Stelt u andere middelen ter beschikking aan uw energiecollectief zoals uw dak voor zonnecellen, gereedschap of een ruimte voor vergaderingen?	○ 0	○ 1
Beschikt u over specialistische kennis en / of vaardigheden die u beschikbaar stelt voor uw energiecollectief?	○ 0	○ 1

19. In welk jaar is uw energiecollectief opgericht?

20. Uit hoeveel leden bestaat uw collectief?

21. Hoeveel van de leden zetten zich actief in voor het collectief?

22. Hoeveel uren per week zetten uw actieve leden zich gemiddeld per persoon in voor uw collectief?

8. Energieproductie collectief

23. Heeft u zicht op de totale electriciteitsproductie van het energiecollectief in 2014?

nee	ja
0	1

24. Zo ja, hoeveel was dit in KWH?

25. Heeft u zicht op de totale warmteproductie van het energiecollectief in 2014?

nee	ja
0	1

26. Zo ja, hoeveel was dit in GJ?

27. Heeft u zicht op de totale gasproductie van het energiecollectief in 2014?

nee	ja
0	1

28. Zo ja, hoeveel was dit in m3?

9. Persoonlijk energiegebruik

29. Produceerde u in 2014 electriciteit voor eigen gebruik?

nee	ja
○	○
0	1

30. Hoeveel electriciteit heeft uw energiebedrijf u in 2014 in rekening gebracht (in KWH)?

31. Produceerde u in 2014 gas voor eigen gebruik?

nee	ja
○	○
0	1

32. Hoeveel gas heeft uw energiebedrijf u in 2014 in rekening gebracht (in m3)?

33. Produceerde u in 2014 warmte voor eigen gebruik?

nee	ja
○	○
0	1

* 34. Stookt u op gas, electriciteit, stadswarmte of anders?

gas	electriciteit	stadswarmte	anders
○	○	○	○

Anders (geef nadere toelichting)

35. Voor hoeveel GJ heeft uw energiebedrijf u in 2014 in rekening gebracht voor stadsverwarming?

10. Persoonlijke gegevens

36. Geslacht

	man	vrouw
...	○	○
	1	2

37. Leeftijd

- ○ jonger dan 25 1
- ○ tussen 25 en 35 jaar oud 2
- ○ tussen 35 en 50 jaar oud 3
- ○ tussen 50 en 65 jaar oud 4
- ○ ouder dan 65 5

38. Mijn hoogst genoten opleiding is:

	lagere school	middelbare school	MBO	HBO	Universiteit
Hoogst genoten opleiding:	○	○	○	○	○

Overige (geef nadere toelichting)

39. mijn huidige werksituatie is te omschrijven als:

arbeidsongeschikt	langdurig werkloos	werkzoekend	in loondienst	zelfstandig	gepensioneerd	Anders, namelijk:
○	○	○	○	○	○	○

Overige (geef nadere toelichting)

11. Hartelijk dank!

40. Heeft u commentaar en / of suggesties die mij kunnen helpen met het verbeteren van deze vragenlijst?

Appendix I: Qualitative responses from (experiential) experts

res	position	organisation	activities
1	associate *Ir. (anonymous)*	coöperative research, consultancy and business development sustainability	initiating and developing new activities, lobbying
2	1 policy officer, 2 secretary, 3 board-member, 4 chairperson. Previous: former alderman of a rural, medium sized municipality. *(anonymous)*	1 union of over 150 municipalities, counties and water boards cooperating to work towards an energy transition from fossil fuels to 100% RE. 2 regional energy agreement, 3 advocacy organisation for civilians and cooperatives who produce RE, 4 knowledge platform for local RE initiatives.	guiding cooperative processes between governments, civil society and business towards energy transition
3	Sander Willemsen, director Energie-U	energy cooperation	initiating organising and managing projects, maintaining and developing a network, further development of the cooperation
4	Promotor information sharing website *(anonymous)*	distributor of good independent information about RE	writing articles and promoting the website
5	Director of energy cooperation *(anonymous)*		Operational processes, project management
6	Anne Marieke Schwencke Researcher	self employed	Research on energy cooperatives, local and decentralised energy. Assignments for renown public sector agents

res	importance of factors	Individual factors
1	One cannot expect of individuals to behave in a sustainable way if pollution is not included in prices. Our (political) institutions are the agents who can take these structural measures.	It starts with taking responsibility based on an understanding of the consequences of our (collective) acts in other places and in the future.
2	There is no level playing field for local energy. Energy cooperations loose when they enter a commercial environment because of this. Social and political choices are necessary to break through this problem such as a preferred position for cooperations for wind, large scale solar and involvement in energy-efficiency / sustainable renovation (that is where money is earned). A second factor is that current economical processes are complicated (such as the relation between energy taxation and "postcode roos" debate etc). Individual factors are least important because within municipalities one can always find pioneers, experts and socially involved people.	Personally I am oriented at responsibility, but this is a personal choice and is dependent on my citizenship style. I don't believe that one individual factor is more important than the other. I am an advocate for differentiating to different groups.
3	Economical factors are the most important: pioneering initiatives often failed because of a business case that did not work out, a retreat of politics. Individual responsibility and initiative are not enough in these cases. When a strong business case is possible you often see support by subsidies. Just a favourable policy climate or infrastructure is not enough.	The relationship between humankind and his environment is a vague concept. Consequences for others is certainly a motivation , but preventing climate change (which is of course related to the previous) is felt stronger.
4	"The $ rules" For most people money is the most important reason to choose for sustainability, unfortunately.	
5	I believe strongly in 'eigen kracht' (self empowerment), but it must be financially possible.	There is a need to do something against climate change, but it is all about starting to act upon it and take responsibility.
6	Economical factors are the most important in the energy. Especially in production of energy where large sums of money are involved. It has to be financially profitable for motivated citizens, it is not a charity, but they are willing to invest a large proportion of their free time. The economical conditions are manipulated by the state through fiscal regulations and subsidies. For the near future renewable energy is not profitable without these regulations and subsidies. As long as external environmental costs are not included, the price of energy remains low and the costs of RE production high, this situation will continue. As RE production is a field for pioneers, highly motivated people are necessary	Environmental concern is part of the motivation (see remark) For many people in energy cooperations concern for the community is more important, they search for ways to decrease the costs of energy (to decrease poverty) extra means of income and economical activities that benefit the community. Energy expenses currently move away from the region into the hands of large energy companies.

res	economical factors	policy factors
1	The external costs of fossil fuels are not included in the price. Subsidies are second best relative to internalisation of costs.	The production of green energy is mostly influenced by the cost-ratio of fossil fuels vs RE.
2	It is a fact that the risks for an organisation with a limited cash flow are considerable. This also limits the access to (low interest) capital and this determines the financial challenge you face. For example: the effect of a high interest rate for a large demand for investment is that your small organisation is mostly occupied with paying interest instead of economical entrepreneurship. I am not so much an advocate for subsidies, although I think that governments should support the pioneers phase, but it is not a breaking point.	In my experience (as an alderman of a medium sized municipality) you can do a lot in a conservative environment when you alter the climate within the politics (which is something else than the policy climate). You need to share the responsibility with the council and guide them along in the development. This is a requirement for acting power and risks. Then you need to have the freedom to provide support. For this you need to have political back-up. From this backup you build the infrastructure. In this order, not any other.
3	Many funds are available, that is not the problem. A business case that (a) doesn't reach above zero and (b) is risky will never fly, no one puts money on that. Mostly it is a combination of a meagre business case with risks that cannot be controlled by the initiator or financier (such as policies and regulations, the price of energy and taxing regulations). The financial status of a collective can also be a (negative) factor if the club is primarily self absorbed. But when the case looks healthy and some people are involved who notice, the form can be adapted to the situation.	Infrastructure has the most influence on RE production. A subdivision of infrastructure is the financial infrastructure and relationships with parties such as network operators. The political climate dictates wether or not governments support RE.
4	When there is a safe investment, banks and others are certainly willing to participate.	When there is a good and secure financial support from the government it will be alright, a sustainable project should of course be connected to the infrastructure (grid)
5	Without subsidies it is not possible to produce renewable energy. Access to capital can be organised through society.	Respondent indicates that support from governmental organisations is the most important of contextual factors.
6	Subsidies form highly determinant conditions for energy production. The access to capital is partly overcome by collective financing, which is in fact the added value of energy cooperations. One of the biggest problems is financing the costs of preparation: it takes a lot of time to organise a project (finding a suitable location, searching for partners, involving stakeholders, getting permissions). This initial phase is often done one a voluntary base, which can not continue in the long run. Energy efficiency projects need less capital, but require a lot of time and attention, this also can not continue in the long run. In my opinion municipalities and other parties make use of the voluntary involvement of cooperations with little consideration.	Subsidies and fiscal arrangements are most important for RE production. For wind and solar projects policies concerned with the use of (public or private) space are very important. The political climate determines regulations and the flexibility of governmental institutions concerned with the use of public or private space.

res	infrastructure	payback period
1	infrastructure is sufficient for consumer/ producers, small producers, average producers and big producers. (refers to study Boot, 2014)	payback period is not such a good measurement for potential future RE production because energy collectives are driven by other motivations than strictly economical
2	Infrastructure is quite sufficient for consumer / producers, sufficient for small producers and insufficient for medium sized and big producers. Windmills can be considered as large producers (3 MW) but can produce locally by a collective. Infrastructure is marginal to insufficient, for solar energy infrastructure is insufficient because of the high costs and the difficult regulations). Wind energy is marginal because of insufficient recognition by authorities, problems with risk investment etc.	The payback period is crucial as a measurement for potential future RE production. Especially for risk calculation and to prevent capital to be frozen (otherwise you mostly just pay interest. For a small organisation with little money / cashflow frozen capital is a nuisance because it limits flexibility. For larger organisations this is often less of a problem.
3	The current infrastructure is sufficient for consumers / producers, but (too) marginal for small producers and not up-scalable. For mid-size producers the infrastructure can work in rare occasions, but can work for big producers. A consumer / producer can produce energy just for his own use. For bigger producers (some dozens or hundreds of households) it is possible with SDE-support (national subsidy for RE), but there is nothing in between.	Payback period is certainly a good measurement for potential future RE-production. You ask for money from society and the giving of money is rarely based on altruism. Therefore you have to tell something about efficiency and payback.
4	Infrastructure is present for consumer/producers, in future this needs to be adapted. For small and middle sized producers infrastructure needs to be improved. For big producers, infrastructure is good, but policies and infrastructure within energy companies needs to be changed.	Payback period is, unfortunately, a good measurement for potential future RE production. Investing is money driven.
5	If the current netting-regulations do not change, the current structure is sufficient for consumer/ producers. For small producers the "postcoderoos" policy is not possible without extra subsidies. For big producers, the SDE-policy is a fine instrument.	Yes, more or less. In the end it should be possible.
6	The electricity grids are robust enough to allow decentralised renewable energy (solar and wind). In the long run, when more than 20% of the electricity is from renewable sources, the balance between supply and demand becomes important and could become a limiting factor: on sunny and windy days when everybody is on holiday problems will emerge, or when there is no wind. Network operators do already anticipate this. To me this is a technical challenge for which we will certainly find a solution.	Absolutely. Financial considerations are determinant. Civic collectives are willing to accept longer payback periods than energy companies, but it is no charity what they do. Many collectives want to earn money for the community and therefore projects need to be economically viable unlike social care projects where service is the core business.
		Remark of respondent 6
		A motivation for RE production that was not included in the questionnaire was the importance of diversification, decentralisation and democratisation of energy supply.

Appendix J: Questionnaire for (experiential) experts

Welkom en hartelijk dank voor uw deelname!

Beste energietransitie (ervarings)deskundige,

Omdat u vanuit uw functie, als initiatiefnemer of in een andere hoedanigheid met burger-initiatieven te maken heeft bent u door mij benaderd voor het delen van uw inzicht en opvattingen over wat de productie van groene energie door burger-initiatieven beïnvloedt . Mijn naam is Thomas Roos en ik studeer sociaal beleid en sociale interventies aan de Universiteit van Utrecht. Ik heb een achtergrond als sociaal werker en ben vanuit die achtergrond geïnteresseerd in burgers die een gezamenlijk doel nastreven.

Met mijn afstudeeronderzoek wil ik een bijdrage leveren aan de kennis omtrent burgers die gezamenlijk duurzame energie opwekken. U kunt mij daarbij helpen door uw kennis en opvattingen met mij te delen. Aan het einde van deze vragenlijst kunt u ervoor kiezen of alleen uw functie en het soort organisatie waar u actief voor bent vermeld mogen worden, of u vermeld wil worden in de dankbetuiging van mijn scriptie of eventueel als referent genoemd mag worden (waarbij uw naam en functie aan uw antwoorden gekoppeld kunnen worden).

Als u vragen of suggesties heeft kunt u mij per mail (t.p.roos@students.uu.nl) of per telefoon (06 4204 6222) benaderen. Ik dank u alvast hartelijk voor uw medewerking!

Met vriendelijke groeten,

Thomas Roos

* 1. Kunt u in het kort beschrijven vanuit welke functie en wat voor soort organisatie u deze vragenlijst invult en welke activiteiten u verricht vanuit deze functie?

functie

soort organisatie

activiteiten die u verricht vanuit uw functie

In mijn afstudeeronderzoek maak ik een onderscheid tussen individuele factoren, economische factoren en overige factoren die een rol spelen bij de productie van groene energie door energiecollectieven.

Onder individuele factoren versta ik de mate waarin iemand zich verantwoordelijk voelt iets te doen aan klimaat verandering, belang hecht aan de wederzijdse afhankelijkheid tussen de mens en zijn omgeving en de consequenties van ons handelen voor anderen.

Onder economishce factoren versta ik de financiële risico's van investeringen in groene energie, de financiële uitdagingen waar energiecollectieven mee te maken hebben, de toegang tot financieel kapitaal en subsidiemogelijkheden.

Onder overige factoren versta ik de mate waarin de infrastructuur, het politieke klimaat en ondersteuning van overheidsinstanties bevorderend zijn voor de productie van groene energie door energiecollectieven.

De volgende vragen hebben betrekking op bovenstaande factoren.

* 2. Kunt u een rangorde aangeven wat volgens u de belangrijkste (1), een minder belangrijke (2) en de minst belangrijke (3) factoren zijn die invloed hebben op de productie van groene energie?

- Individuele factoren
- Economische factoren
- Overige factoren zoals de infrastructuur, het politieke klimaat en ondersteuning vanuit de overheid

* 3. Waarom heeft u gekozen voor deze rangorde?

* 4. Kunt u een rangorde aangeven wat volgens u de belangrijkste (1), een minder belangrijke (2) en de minst belangrijke (3) individuele factor is die van invloed is op de productie van groene energie?

- De wederzijdse afhankelijkheid tussen de mens en zijn omgeving.
- Consequenties van ons handelen voor andere mensen, toekomstige generaties en de natuur.
- De verantwoordelijkheid iets te ondernemen tegen klimaatverandering.

* 5. Waarom heeft u gekozen voor deze rangorde?

* 6. Kunt u in de volgorde lijst van economische factoren aangeven welke de productie van groene energie volgens u het meest beïnvloeden?

(lage nummers = meeste invloed, hoogste nummers = minste invloed)

- financiële risico's van investeringen in groene energie
- de financiële uitdagingen waar energiecollectieven mee te maken hebben
- de toegang tot kapitaal
- subsidiemogelijkheden

* 7. Waarom heeft u gekozen voor deze rangorde?

* 8. Kunt u in de volgorde lijst van contextuele factoren aangeven welke de productie van groene energie volgens u het meest beïnvloeden?

(lage nummers = meeste invloed, hoogste nummers = minste invloed)

- infrastructuur
- het politieke klimaat
- ondersteuning van overheidsinstanties

* 9. Waarom heeft u gekozen voor deze rangorde?

Tot slot nog vier vragen:

Energieproducenten zijn onder te verdelen in vier categorieën:

1. Consument / producenten, die minder energie produceren dan ze afnemen van een energiebedrijf.
2. Kleine producenten, die voldoende energie produceren voor één of enkele huishoudens.
3. Middelgrote producenten, die energie produceren voor enkele tientallen huishoudens.
4. Grote energie producenten, die energie produceren voor meer dan 100 huishoudens.

* 10. Gebaseerd op de hierboven genoemde categorieën:
In hoeverre denkt u dat de huidige infrastructuur afdoende is voor de verschillende categorieën van producenten en waarom?

consument / producenten

kleine producenten

middelgrote producenten

grote producenten

* 11. Kunt u in een paar zinnen beschrijven of de huidige infrastructuur voor groene energie afdoende is voor kleine producenten en waarom dit volgens u zo is?

* 12. En voor grote producenten?

Uit een recente enquête die ik hield onder deelnemers van energiecollectieven kwam naar voren dat de meesten niet wisten hoeveel energie er door hun collectief werd geproduceerd. De meesten konden echter wel aangeven hoe lang het zou duren voor een investering in groene energie technologie terug verdiend zou worden.

* 13. Denkt u dat deze terugverdien tijd wel of niet een goede maatstaf kan zijn voor mogelijke toekomstige groene energieproductie en waarom denkt u dat?

Hartelijk dank voor uw medewerking!

Ik wil u hartelijk danken voor uw medewerking. Graag zou ik uw toestemming hebben om uw naam te noemen als referent en / of in de dankbetuiging van mijn scriptie. U kunt daarvoor onderaan deze pagina toestemming geven en uw gegevens achterlaten. Als u toestemming verleent als referent betekent dit dat uw naam genoemd kan worden in verband met de antwoorden die u gegeven heeft.

Met vriendelijke groeten,

Thomas Roos

* 14. Ik geef toestemming voor:

15. Naamsvermelding

Naam

titel

organisatie

Hartelijk dank!

Dit is het einde van de vragenlijst.

Appendix K:

notes from a meeting of energy-ambassadors

and conversations resulting from that meeting (in Dutch)

Verslag 2e EnergieambassadeursTop, 13 juni 2015
Gemeentehuis Apeldoorn

Opening door Detlev Cziesso, wethouder

De wethouder vindt dat de rol van ambassadeurs belangrijk is omdat ambassadeurs de gemeente informeren. Er wordt niet persé financieel een beroep op de gemeente gedaan, een roep op een gedragsverandering binnen de gemeente is evenzeer belangrijk.

Inleiding door Arien Scholtens (dagvoorzitter, deA)

Opmerkingen uit het publiek: er wordt vaak begonnen over zonnepanelen, maar zelden over “wat je al hebt” met minder lang douchen etc. bespaar je al een hoop.

“bewustwording is een eerste stap”
“mensen realiseren zich niet dat energie geld kost”
“tieners denken dat alles gratis is”
“het is een misvatting dat energiebesparing een financieel motief heeft”
“als alles een financieel motief had was het probleem (van duurzame energie) zo opgelost”
“waarom doen mensen het niet?”

Presentatie van een TED talk
Peer effect: als mensen zich met anderen vergelijken heeft dit het meest effect op gedragsverandering. Dit wordt vanuit het bezoek bevestigd: “ik blijf het een sport vinden (om een lager energieverbruik te hebben)”
“zonnepanelen op het dak geeft voer voor gesprekken in de buurt vanwege de zichtbaarheid”
“andere stappen zijn vaak effectiever (qua energiebesparing), maar minder zichtbaar”

Een vertegenwoordiger van een corporatie voor studentenhuisvesting: het is een belemmering dat vergroten van energiezuinigheid een grote investering vergt. Vragen om maatregelen komen vaak van studenten. Dit zijn “natuurlijke ambassadeurs”.

Energielabels voor huizen schijnen te werken (volgens bezoekers).

Workshop 1: Hoe word je een financieel gezonde organisatie
Energiecoöperatie deA
door Michael Boddeke

Ondernemingsplan beschikbaar
360 leden, een participatie van € 50 en maximaal € 100 per lid.
Startkapitaal van € 70.000: deels subsidie (verdubbeling van oorspronkelijk opgehaalde bedrag)

Vraag in de groep: “kun je overmorgen stoppen?”
“Het (initiatief) groeit in jezelf”
“Je voelt een verantwoordelijkheid voor toekomstige generaties”

De energie-expeditie (is collectief met als doel nul op de meter) : de tijdelijkheid is in de doelstelling vastgelegd.

Doel ondernemingsplan: Heldere afspraken, vastleggen van financiele bijdragen, blik op de toekomst (continuiteit)
Start: met zonnepanelen
Belangrijke vraag: wat maakt het interessant voor de deelnemer?
Verdienmodel: een vergoeding per opdracht uitgevoerd door gecontracteerde werd later een vaste bijdrage per deelnemer omdat dit er voor zorgt dat je niet zo afhankelijk bent dat je opdrachten moet binnenharken. Wederverkoop via greenchoice.
800 klanten betalen € 22,50 contributie, daarmee bedraagt het werkkapitaal € 18000,-
D.m.v. subsidies bestaat de terugverdientijd op investeringen 12 jaar.
De subsidiemogelijkheden ontstonden in gesprekken met gemeenten en provincie.

Workshop 2 Collectief inkopen
Collectieve inkoop van vloer- en spouwmuurisolatie.
Belangrijk bij collectief inkopen is het ontzorgen van klanten en installateurs.

Workshop 3 Buurtkracht
Door een vertegenwoordiger van een netbeheerder
Doelgroep: woningeigenaren, huurders worden wel meegenomen als ze belangstelling hebben.
Motivatie van Enexis: gemeenten zijn (mede)eigenaren van Enexis en hebben een duurzaamheidsdoelstelling. En door energiebesparing is er minder druk op het netwerk en dat scheelt in kosten voor onderhoud.
Begeleid initiatieven van bewoners (als een soort opbouwwerker)
stappen: 0-meting energiescan, presentatie van resultaten, werkgroepvorming, 2e energiescan.

Plenaire afsluiting door Arien Scholtens

Op energieplein komt een groep EAtop waar bezoekers van de top toegang toe hebben
ikinvesteerslim.nl (leningen voor verbouwingen)
voordorpopeigenkracht.nl (cv afstellen)

Gesprek met energie-u
Vrijdagmiddag 19 juni op milieucentrum Utrecht
Sander Willemsen, directeur energie-U
en een zelfstandig ondernemer (ZZPer) werkzaam voor energie-u als projectleider energieambassadeurs

ZZPer: aan informatie delen wordt niet veel gedaan de VNG (CP Sandra Taal)

Sander Willemsen: er is een spanning wanneer je werkt met de overheid, er zijn uitvoerende ambtenaren, maar er is ook sprake van politiek. Draagvlak is erg belangrijk, het plaatsen van windmolens roept vaak weerstand op (horizonvervuiling) en het plaatsen van zonnedaken bij een VVE kan vertraging oplopen omdat mensen samen moeten komen. Daar kan soms jaren overheen gaan en dat kan de motivatie doen afnemen.
Campagne voeren en promotie maken is een belangrijk onderdeel van activiteiten van energie-collectieven omdat het nodig is voor het ontwikkelen van draagvlak.
Geld verdienen is nodig om de kosten te dekken en nieuwe investeringen te doen.
Een vergelijking maken tussen zonnepanelen en windmolens is onzinnig omdat ze hetzelfde doel dienen en dit op een heel verschillende manier doen. Een vergelijking van een windmolen en een kolencentrale gaat wel op omdat deze beiden buiten de woonkern stroom opwekken.
De salderingsregeling verkort de terugverdientijd van investeringen, maar met de huidige ontwikkelingen op het gebied van energie-opslag, zoals accu's die zowel thuis als in de electrische auto gebruikt kunnen worden, bestaat de mogelijkheid dat hernieuwbare energie ook zonder salderingsregeling voldoende winstgevend is.

Gesprek met Karin Keizer (RVO) 23-06-2015
Coordinator van team Lokale initiatieven.

Subsidieregelingen:
Salderingsregeling voor particulieren
Postcoderoosregeling (= naam in de volksmond) voor collectieven en VVE's. Dit is een fiscale regeling waarbij deelnemers een korting krijgen op de energiebelasting.
FDE regeling voor grote installaties waar bijvoorbeeld de kosten van een installatie te groot zijn voor de eigenaar van de locatie waar ze geplaatst worden.
De FDE regeling verloopt gefasseerd van kleine projecten (die minder geld nodig hebben) naar grotere projecten, daardoor lopen de indieners van plannen aan het begin meer kans om gehonoreerd te worden, terwijl de deelnemers in een latere fase kans hebben op een hogere bijdrage. De bijdrage is voor investeringen en exploitatie (om het verschil in de prijs voor groene en grijze stroom te compenseren.)

In de beleidsvoering is er een verschuiving geweest van de financiering van grote projecten naar "alle kansen pakken".

Windcooporaties werden en worden vooral opgericht om maatschappelijk draagvlak (horizonvervuiling) te creeren, financiering gebeurt vaak via crowdfunding. Burgers worden mondiger en willen participeren.

Zoncooperaties hebben minder behoefte aan het vergroten van maatschappelijk draagvlak, maar juist behoefte aan financieel draagvlak. Dit bereiken zij door collectieve inkoop acties te organiseren. Urgenda was hierin een aanjager, maar doordat er nu meer kennis beschikbaar is omtrent zonnepanelen en de markt rijper is geworden is de behoefte verschoven naar "ontzorgen" (het verminderen van het gedoe)

Gesprek met Detlev Cziesso 24-06-2015
Wethouder gemeente Apeldoorn

De deelnemers aan de energiecollectieven Kerschoten en deA zijn belangrijke ambassadeurs voor de energietransitie. "Raad en daad van anderen is nodig, met name van specialisten".

Informatie en kennis zijn niet altijd aanwezig bij de gemeente. De energieambassadeurs zijn belangrijk bij het verkennen van mogelijkheden. Met name op technisch gebied, maar ook bijvoorbeeld bij het aanwijzen van geschikte locaties.

Als gemeente proberen wij zo open mogelijk te zijn en wij treden op als intermediair.

De gedragsverandering die wij als gemeente hebben doorgemaakt is dat wij meer zijn gaan optreden als facilitator en intermediair. "deA doet het beter dan de gemeente zou kunnen". In het beleid zijn wij meer gaan vertrouwen op de kracht van anderen. "We zijn er nog niet" de gedragsverandering moet verder doorgevoerd worden en "het besef moet toenemen".