

# Community energy

An analysis of public initiatives in the energy transition in Utrecht



**Bachelor thesis**



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## Summary

The aim of this paper is to analyse the individual conditions under which citizens can and will participate in community energy. This has been done by adopting the framework of Mees (2020). With the use of this framework, eight conditions of community energy are identified. Criteria and indicators for these conditions are set forth. These criteria are analysed and given a score from high to low. In order to draw a conclusion, the scores are then translated to scores of weak, moderate and strong. The main conclusions are that the conditions 'expected return on investment', 'perceived salience' and 'environmental values' are classified as strong conditions for the participation in community energy. Furthermore, the conditions 'group identification', 'subjective capacity' and 'sense of own responsibility' are graded as moderate conditions for the participation in community energy. Moreover, the condition 'objective capacity' is classified as a weak condition for community energy. Finally, the condition 'peer pressure' is not given a score because of misalignment of the data. These results can be used to increase the participation in community energy and to support the energy transition. The authorities can for example make education about climate change a compulsory subject. This will increase the perceived salience, which will stimulate the participation in community energy.

# 1. Introduction

At the end of 2020, the ratio of renewable energy to total energy should be at least 14% in the Netherlands. This has to rise to 27% in 2030 and ultimately 100% in 2050 (Rijksoverheid, 2020). To achieve these goals, alternative options of the energy production and consumption must be explored. One of these options is community energy. A Dutch example of community energy is 'Wind park Nijmegen- Betuwe'. Citizens of Nijmegen initiated and organized the construction of the wind farm and are the joint owners of the wind turbines. The project currently produces energy for 7100 households (Wind park Nijmegen-Betuwe, 2020). Community energy can play an important role in the energy transition process and in achieving the goals set by the EU (Walker et al. 2010; Seyfang et al. 2013). The importance of community energy has already been identified in several countries. The UK encourages the production of community energy and in Germany 51% of the renewable energy is produced by citizens (Seyfang et al. 2013; Nolden, 2013). Consequently, community energy has a lot of potential that can be untapped for the energy transition.

Several reports have analysed the general drivers, barriers and effects of community energy (Seyfang et al. 2013; Blanchet, 2015; Batson et al, 2012). However, a scientific knowledge gap exists concerning the individual conditions under which citizens are willing, able and feel ownership to contribute to community energy. Examples of existing questions in literature are: What kind of capacities do citizens need to participate in community energy? And when do citizens feel responsible to act on climate change themselves (Mees, 2020)? This paper is the first to identify and research several conditions under which citizens are willing and able to participate in community energy. This research on the individual conditions of coproducing energy will have an influence on the policy-making of community energy. It can help policy-makers create a favourable environment for citizens to participate in and organize community energy. This will contribute to the energy transition process and is therefore important for society.

The paper aims to analyse the individual conditions under which citizens can and will participate in community energy. To analyse this, several conditions for participating in community energy have been identified. These conditions are identified using the framework of Mees (2020). The purpose of this framework is to analyse why citizens engage in DIY governance. DIY governance is defined as the coproduction of public services (Mees 2020). Community energy is subject to the coproduction of public services because community energy is a coproduced public good (Hoffman & High-Pippert, 2005). Therefore the purpose of the framework matches the purpose of the paper. After the identification of the conditions the following research question is answered: "To what extent do the conditions of DIY governance for climate change influence the participation in community energy?"

This paper consists of six chapters. The second chapter includes a conceptual and an analytical framework. The conceptual framework explains the concepts used in the analytical framework. The analytical framework provides measurements to analyse the certain concepts in the result section. The third chapter is about the methods of the research. The fourth chapter presents the results of the research. The results are further interpreted in the fifth section. Moreover, this section discusses the limitation of the research. Finally, the chapter 'conclusion' is presented. This chapter summarizes the key findings and highlights a key take-home question.

## 2. Theory

### 2.1 Conceptual framework

#### 2.1.1 Community energy

The starting point of community energy is the production of private energy by citizens. These citizens produce and consume their own energy and are called 'prosumers'. These, 'prosumers' produce energy with solar panels, wind mills or heat and power installations. Following this, prosumers can start to develop social networks related to energy and scale the production up from the individual to the community level. This can evolve into the establishment of energy-cooperatives, which distribute energy to their own community (Van der Schoor & Scholtens 2015).

An unambiguous definition of this process cannot be identified in academic papers (Becker and Kunze, 2005). Becker and Kunze (2005) combine the definition of Seyfang and Smith (2007) and Seyfang et al. (2014) to conceptualize community energy as 'grassroots innovations' related to the production of energy grounded in local and collective values. This definition is used in this paper because this paper analyses local and collective energy transition projects. Moreover, the term community can have two definitions. It can refer to a community of locality or a community of interest (Walker, 2008). The thesis uses community as community of locality because it analyses local community energy initiatives in Utrecht

#### 2.1.2 Conditions for community energy

As stated in the introduction, the analysis is based on the framework of Mees (2020). Mees (2020) argues that there are three dimensions of individual conditions that are key to the coproduction of public services by citizens, such as community energy. These dimensions are motivation, capacity and ownership. The dimensions are inter-related and should therefore be analysed simultaneously (Mees, 2020). By analysing these three dimensions in the following paragraphs, eight conditions for community energy can be explored. It is hypothesized that a minimum level of all three dimensions should be present by citizens to coproduce energy (Mees 2020). So, it is assumed that a citizen should be both willing, able and feel ownership, but we do not know which specific conditions are necessary and most relevant.

Firstly, motivation. The motivation of community involvement is described as goal-directed forces induced by threats or opportunities linked to values (Lewin 1951). Mees (2020) hypothesizes that there are three different conditions of motivation.

The first motivation condition is the expected return on investment. Return is the reward minus the effort. The return is about both social and financial rewards and efforts (Mees, 2020). Four kinds of rewards are identified by Batson and Ahmad (2020), which follow from four motivation types. These motivation types are 'egoism', 'altruism', 'collectivism' and 'principlism'. The rewards on these motivation types differ. 'Egoism' is about increasing one's own welfare. The ultimate goal of an altruist motivation is to increase the welfare of one or more other people. 'Collectivism' is about increasing the welfare of a group and 'principlism' regards motivation following from moral principles (Batson and Ahmad, 2002). These motivation types can negatively influence each other, which lowers the total motivation. It is argued that by orchestrating the motivation types, the return will be the highest (Batson and Ahmad, 2002). This means that motivation for community energy will be higher if the motivation is orchestrated. Furthermore, the higher the effort is, the higher the motivation must be to participate in community energy (Verschuere et al. 2012). In short, the expected return of investment regards the investment and the reward of participating in the community energy.

The second motivation condition is the perceived salience. The salience of community involvement is described by Pestoff (2012) as the effect the public service has on

a certain individual, their life and life chances. Pestoff (2012) argues that if a service is very important for an individual and their loved ones, their motivation to participate is higher. The public services that have direct influence on the lives of people are called 'enduring services'. These services are also considered to have higher citizen interest. Projects, as community energy, have limited direct effects on climate change (Ferguson and Branscombe, 2010). Therefore, community energy cannot be considered an enduring service, which means that motivation is lower. However, citizens can be made aware of the effects of global warming via education, with higher motivation as a result. Education makes people aware of societal problems and increases the activism among these citizens (Lester et al. 2006). In conclusion, the perceived salience regards the awareness of the risks of global warming and the importance of community energy for certain individuals.

The last motivation condition is group identification. Two studies have shown the importance of group identification for the motivation of participating in renewable energy resources. A case study in Freiamt in 2012 showed that one of the main motivations of participating in a renewable energy resources is the sense of place and the local identity (Li et al. 2012). Another study by Doci and Vasileiadou (2015) also researched the motivations of participants in community energy in The Netherlands and Germany. They also found that a key condition for community energy is the integration of participants in a strong community.

Secondly, capacity. Capacity is defined by Fischlin et al. (2007) as the ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. In this paper community energy is discussed, therefore the system is limited to the coproduction of energy by citizens. Mees (2020) identifies two possible conditions of adaptive capacity, which are subjective and objective capacity.

Objective capacity concerns resources that are determined by socio-economic factors such as income and education (Mees, 2020). This condition is comparable with the dimension resources in the Adaptive Capacity Wheel of Gupta et al. (2010). The Adaptive Capacity Wheel is a framework to assess the capacity of institutions (Gupta et al. 2010). The other dimensions in the framework are only about the assessment of institutions and therefore not useful for this thesis. However, as stated, the dimension 'resource' is similar to objective capacity and therefore the criteria of 'resource' can be used to analyse 'objective capacity'. These criteria are 'human resources', 'authority' and 'financial resources'. In conclusion, 'objective criteria' is about the ability to generate and can be divided in three criteria: 'human resources, 'authority' and 'financial resources'.

Subjective capacity is about whether an individual thinks that he/she can make a difference (Mees, 2020). This condition is also described by Grothman et al. (2013). It is argued that subjective capacity can be analysed by looking at the self-efficacy belief. The self-efficacy belief is about whether an individual believes she can make a difference (Grothman et al. 2013). Thus, subjective capacity is about the degree to which one thinks that he/she can make a difference and can be analysed by looking at the self-efficacy belief.

Thirdly, ownership. Ownership is described as the conditions that give citizens the moral obligation. A citizen feels in this case responsible for the energy transition and takes matters in their own hand (Tonkens, 2014). Mees (2020) hypothesizes that there are three conditions of ownership related to the community energy.

The first ownership condition is peer pressure. Peer pressure is a feeling that one must do the same things as other people of one's age and social group in order to be liked or respected by them. A case of Hoffman and High-Pippert of the Phillips Community Energy Project (2010) showed that peer pressure can have an influence on the participation. Moreover, a study by Valkengoed and Vlek (2019) showed that peer pressure also is a condition to participate and invest in community energy.

The second condition is the sense of own responsibility. This condition is about the extent to which citizens feel responsible because of a lack of responsibility by the government (Mees, 2020). This is also illustrated by Tonkens (2014), she says that citizens feel responsible because they lost their faith in the democracy and in the ability of the government to solve big issues like global warming. This means that the feeling of responsibility is bigger when the trust in the government is smaller.

The third condition is environmental values. Environmental values are considered to be a key condition for participating in 'green' initiatives as community energy (Seyfang et al. 2014). This is also agreed upon by Dutcher et al. (2007), who states that having environmental values increases the will to sustain nature.

In conclusion, two or three conditions are proposed for every dimension as shown in table 1. In the remainder of this thesis, the effect of every condition on the production of community energy is analysed.

dimension	Condition 1	Condition 2	Condition 3
<b>Motivation</b>	Expected return on investment (M1)	Perceived salience (M2)	Group identification (M3)
<b>Capacity</b>	Objective capacity (C1)	Subjective capacity (C2)	
<b>Ownership</b>	Peer pressure (O1)	Sense of own responsibility (O2)	Environmental values (O3)

Table 1: Dimensions and conditions of the community energy

## 2.2 Analytical framework

In the following paragraph operationalisations for the conditions are proposed, so that the conditions can be measured in empirical research. The conditions are analysed with one or more criteria. Every criterion has three indicators ranging from high to low. A high score means that this particular criterion highly contributes to the related condition. If every criterion of a condition has a high score, it means that the condition is highly important for participating in community energy.

### 2.2.1 Motivation

The first condition of motivation is expected return on investment. This condition is measured by the criterion 'return'. 'Return' is about the extent to which the reward is bigger than the effort.

The second condition of motivation is perceived salience. This condition is measured by the criterion 'awareness' and 'importance'. 'Awareness' regards the degree to which the participants are aware of the risks of global warming. 'Importance' is about whether participants think that global warming is a significant problem that need to be dealt with.

The third condition of motivation is group identification. This condition is measured by the eponymous criterion 'group identification'. This criterion is about the extent to which the participants want to belong to the community.

Criterion	Indicator (low)	Indicator (medium)	Indicator (high)
<b>Return (M1)</b>	The reward is smaller than the effort and return is therefore negative	The reward is approximately equal to the effort and return is therefore zero	The reward is bigger than the effort and return is therefore positive
<b>Awareness (M2)</b>	Participants are not aware of the risks of global warming and fossil fuels	Participants are partially aware of the risks of global warming and fossil fuels	Participants are totally aware of the risks of global warming and fossil fuels
<b>Importance (M2)</b>	Participants do not think that global warming is a significant problem	Participants think that global warming is a small problem that needs to be dealt with in the coming 50 years	Participants think that global warming is a big problem that needs to be dealt with immediately
<b>Group identification (M3)</b>	Joining a community is not a reason for joining community energy	Joining a community is a small reason for joining community energy	Joining a community is an important reason for joining community energy

Table 2: Criteria and indicators of the conditions of motivation

### 2.2.2 Capacity

The first condition of capacity is objective capacity. This condition is measured by the criterion 'human resources', 'authority' and 'financial resources'. 'Human resources' is about the extent to which the participant has the knowledge and skills about the production of community energy. The criterion 'authority' regards the degree to which participants feel that authorities support community energy with for example favourable laws. 'Financial resources' is about the extent to which the participants need financial resources to participate in community energy.

The second condition is subjective capacity. This condition is measured by the criterion 'self-efficacy belief'. This condition regards the degree to which citizens believe that they can make a difference by coproducing community energy.

Criterion	Indicator (low)	Indicator (medium)	Indicator (High)
<b>Human resources (C1)</b>	Participants do not have the skills and knowledge related to community energy	Participants have some skills and knowledge related to community energy	Participants have many skills and knowledge related to community energy
<b>Authority (C1)</b>	Participants do not feel supported by the authorities to participate in community energy	Participants do partly feel supported by the authorities to participate in community energy	Participants totally feel supported by the authorities to participate in community energy
<b>Financial resources (C1)</b>	Participants need very limited amounts of financial resources to participate in community energy	Participants need medium amounts of financial resources to participate in community energy	Participants need large amounts of financial resources to participate in community energy

<b>Self-efficacy belief (C2)</b>	Participants do not think they can make a difference by participating in community energy	Participants think they can make a small difference by participating in community energy	Participants think they can make a big difference by participating in community energy
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Table 3: Criteria and indicators of the conditions of capacity

### 2.2.3 Ownership

The first condition of ownership is peer pressure. Peer pressure is analysed by the criterion 'peer pressure'. This criterion is about the extent to which participants feel peer pressured by their surroundings to participate in community energy.

The second condition of ownership is sense of own responsibility. This condition is analysed by the criterion 'lack of responsibility by the government'. The criterion is about the degree to which the participants feel that the government is not contributing enough to the energy transition process.

The last condition of ownership is environmental values. This condition is measured by the criterion 'environmental values'. The criterion is about the extent to which participants feel a moral obligation to care for the environment.

<b>Criterion</b>	<b>Indicator (low)</b>	<b>Indicator (medium)</b>	<b>Indicator (high)</b>
<b>Peer pressure (O1)</b>	Participants did not feel any pressure by their peers	Participants felt some pressure by their peers	Participants felt much pressure by their peers
<b>Lack of responsibility by the government (O2)</b>	The participants feel that the government does enough in the energy transition process	The participants feel that the government needs to do a bit more in the energy transition process	The participants feel that the government doesn't do nearly enough in the energy transition process
<b>Environmental values (O3)</b>	The participants do not have a moral obligation for the environment	The participants have some moral obligation for the environment	The participants have a moral obligation for the environment

Table 4: Criteria and indicators of the conditions of ownership

## 3. Methods

### 3.1 Method

This research conducts an embedded case study. This type of study uses quantitative and qualitative research methods, and includes a main case comprised of sub-cases (Yin, 2002). This has been done because by picking different cases a more general conclusion can be drawn from the results. The five cases used in this paper are 'DECZs', '2030.nu', 'Buurtstroom', 'Rijne energie' and 'USV Hercules solar panels'. The cases are all located in the province of Utrecht, which ensures homogeneity of institutional factors like laws and subsidies. Moreover, some cases differ in type of payments and size. This helps capturing all kinds of community energy initiatives in the analysis. Semi-structured interviews and online questionnaires are carried out to collect the data.

#### 3.1.1 Semi-structured interviews

The semi-structured interviews are located in Annex B. They are carried out to get qualitative background information about the cases. A semi-structured interview is executed with a leader of every case. Thus, this results in a total of five interviews. One interview per case has been chosen to be performed because this gives sufficient background information of the case. The interviews are performed via the mobile phone. This allows for recording of the interview on the computer. Furthermore, it is a relatively approachable way of conducting interviews because the interviewee can be interviewed during other activities like travelling.

The interviews are used for multiple reasons. First of all, the interviews help to get extra information about the organization, size and purpose of the case. Furthermore, the interviews help to finalize and test the online questionnaire. Statements can be tested on their feasibility and validity. Finally, the interviews can be used to deepen the understanding of the results from the online questionnaire, which helps to declare and give context to the results of the research.

#### 3.1.2 Online questionnaires

The online questionnaires can be found in Annex A. They are executed among the participants of the five cases of community energy initiatives cases. A total of approximately 100 questionnaires are collected. This range has been chosen because it is both feasible and allows for significant results. The participants are reached by contacting a leader of every case. Every leader has been asked to send the online questionnaire to the participants of the particular case. Google forms is used as tool for the questionnaires.

The questions in the survey allow for a quantitative research. Participants are asked to answer the questions according to a five point Likert scale, ranging from totally disagree to totally agree. Every criterion is related to two questions to check for response bias. The variable corresponding to a criterion consists of the average of the two questions related to that criterion. After the collection of the data, the information is processed in SPSS. SPSS is used to check for significance with the one sample T-test and to calculate averages (Utts and Heckard, 2014). Then, the averages are conformed to the indicators. This is done by using table 5.

Moreover three open questions in the questionnaire are used. These questions are used to further explain possible results and support the quantitative data with quotes.

Range Likert scale		Corresponding indicator
1-2,999	→	Low
3-3,999	→	Medium
4-5	→	High

Table 5: Likert scale and corresponding indicator

### 3.2 Ethics

The research takes the ethical principles into account. The participants of the interviews are asked to read an information letter and sign a form of consent. Furthermore, the participants are asked permission for the recording of the interview. Participants of the questionnaires are informed about the research before the start of the questionnaire. Moreover, the participants are allowed to withdraw from the research at any moment. After the collection of the data, the data is kept according to the General Data Protection Regulation (GDPR).

### 3.3 Cases

In this part of the method section tables are provided that contain the main characteristics of the cases used in this research. This information is gathered from the semi-structured interviews. A more in depth description of the cases is located in Annex 3.

Case	Fixed annual payment	Variable payment
<b>USV Hercules solar panels</b>	X	
<b>Rijne Energie</b>	X	
<b>DECZ</b>	X	
<b>2030.nu</b>	X	
<b>Buurtstroom</b>		X

Table 6: Type of payment

Case	Smaller than 100 members	Bigger than 100 members
<b>USV Hercules solar panels</b>	X	
<b>Rijne Energie</b>		X
<b>DECZ</b>	X	
<b>2030.nu</b>	X	
<b>Buurtstroom</b>		X

Table 7: Size

## 4. Results

In the following paragraph the results are presented. The results consist of the quantitative data from the online questionnaires supported by open questions in the online questionnaires and the interviews. The quantitative data is, as mentioned in the previous section, checked for significance with the one-sample T-test. Although the results are not normally distributed, this method can still be used because the sample size is greater than 30 (Utts and Heckard, 2014).

### 4.1 Motivation

#### 4.1.1 Expected return on investment

'Expected return on investment' can be researched by analysing questions 8 and 19 of the online questionnaire. The distribution of the answers is shown in the histogram and the boxplot below. The boxplot displays that 75% of the answers are between 4 and 5, which means that at least 75% of the respondents find the return of participating in community energy positive. The mean of 'expected return on investment' is 4.41, which is significantly higher than 4 ( $\alpha=0.05$ ). This means that 'expected return on investment' has a strong influence on the participation in community energy. This is supported by statements about the return on investment from the participants.



Figure 1: Histogram of expected return on investment

Figure 2: Boxplot of expected return on investment

Two positive returns are identified by looking at the answers of the participants. These are 'sustaining the world for future generations' and 'earning money by participating in community energy'. These returns are captured by the four motivation types mentioned in the conceptual framework. The positive return of earning money is an egoist motivation type because people participate in community energy to improve their own welfare. Furthermore, 'sustaining the world for future generations' is captured by 'altruism', 'collectivism' and 'principlism'. By sustaining the world for future generations, the welfare of the collective and your surrounding will be increased. Furthermore, wanting to sustain the world for future generations is also a motivation following from a moral principle.

The investment is in contrary very small according to the participants. Many participants state that other than a small amount of money and some time, nothing has to be invested to participate in community energy.

In conclusion, 'expected return on investment' is a condition that strongly contributes to the participation in community energy. This is supported by statements of the participants and the data.

### 4.1.2 Perceived salience

'Perceived salience' is measured by the criteria 'awareness' and 'importance'. The criterion 'awareness' is quantified by questions 9 and 20 in the online survey. The distribution of data is shown in figure 3 and 4. The boxplot shows that 99 of the 105 participants are strongly aware of the risks of global warming and fossil fuels. The average is 4.71, which is significantly higher than 4 ( $\alpha=0.05$ ). This results in a high score for the criteria awareness.



Figure 3: Histogram of awareness

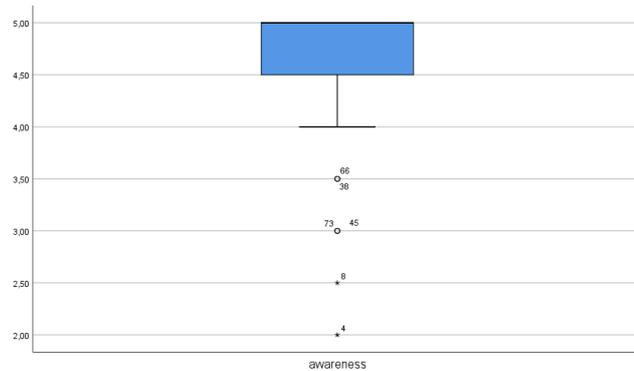


Figure 4: Boxplot of awareness

'Importance' is measured by the questions 10 and 21. The histogram and boxplot of the data are shown below. By analysing the data one can conclude that over 90% of the people in the sample find that global warming is a big problem that need to be dealt with immediately. The mean is 4.69, which is significantly higher than 4 ( $\alpha=0.05$ ). As a result, the criterion 'importance' has a high score.

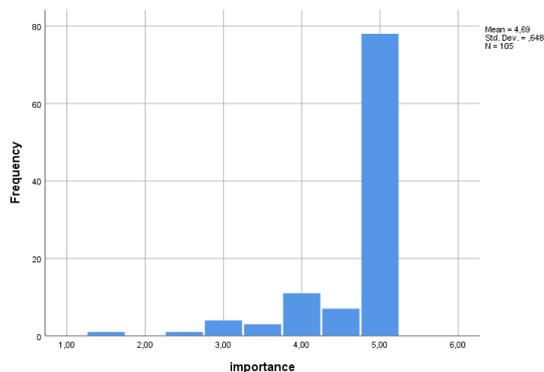


Figure 3: Histogram of importance

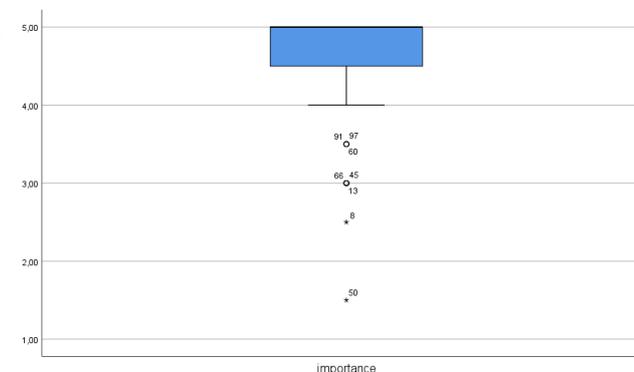


Figure 4: Boxplot of importance

With a high score for the criteria 'awareness' and 'importance', 'perceived salience' is regarded to strongly influence the participation in community energy. This can be underpinned by statements of the participants and data regarding the education of the participants. Many participants are saying that they are worried about the consequences of climate change. A participant, for example, says: 'Climate change is the biggest issue human kind has ever experienced'. Another participants says: 'I am doing everything to keep the planet habitable for future animals and future generations'. Furthermore, as stated in the conceptual framework, education can increase the level of perceived salience. Regarding perceived salience as a strong condition for the participation is therefore further supported by the high level of education among participants in community energy. The fact is that more than 60% of the participants have a master degree and over 80% have at least a Higher Vocational Education degree (figure 5).

In conclusion 'perceived salience' is regarded to strongly contribute to the participation in community energy. This conclusion is supported by the high level of education and statements of the participants.



Figure 5: Highest certificate of community energy participants

### 4.1.3 Group identification

'Group identification' is analysed by looking at questions 11 and 22 of the questionnaire. The histogram and boxplot in figure 6 and 7 show a deviation of results between 1 and 5. Despite this deviation, most results are between 2.5 and 4. The mean of group identification is 3.37, which is significantly higher than 3 ( $\alpha=0.05$ ). As a result, the criterion 'group identification' gets a medium score, which means that 'group identification' moderately influences the participation in community energy.

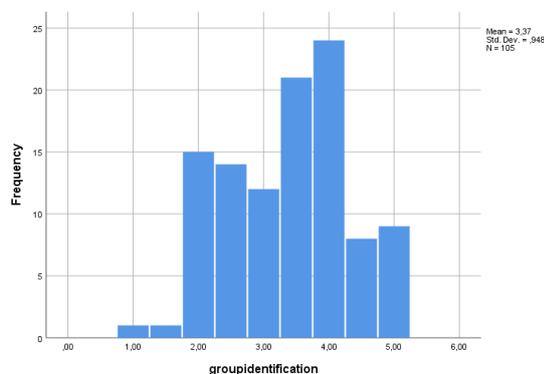


Figure 6: Histogram group identification

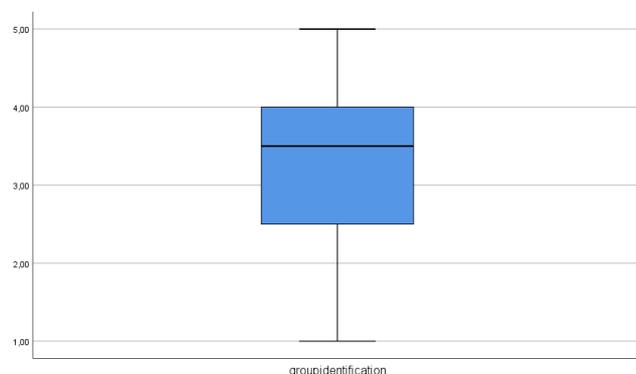


Figure 7: Boxplot group identification

The medium score is partly supported by the qualitative data. According to the participants, belonging to a group is not an important motivation for the participation in community energy. However, the leader of DECZ mentioned that an important motivation for starting DECZ was to bring people with the same interest for sustainable energy together. Furthermore, the leader of USV Hercules solar panels said that part of the success of the project was to reach less active members of USV Hercules. This increased the integration of them in the association. Moreover, many participants touched upon their local identity. For example, one participant said: 'I want to support sustainable development, especially by supporting local projects related to sustainability'. This shows the motivation for participants to support local projects rather than projects outside their community.

In conclusion, 'group identification' is a moderately contributes to the participation in community energy. People did not regard belonging to a group important. However,

contributing to local projects is important and leaders of community energy try to unite the local people.

## 4.2 Capacity

### 4.2.1 Objective capacity

'Objective capacity' is measured by the criteria 'human resources', 'authority' and 'financial resources'. The criterion 'human resources' is quantitatively analysed by looking at questions 12 and 23. As shown in figure 9, 50% of the people have given a score between 2.5 and 4. The mean of 'human resources' is 3.24, which is significantly larger than 3 ( $\alpha=0.05$ ). This results in a medium score for the criterion 'human resources'.

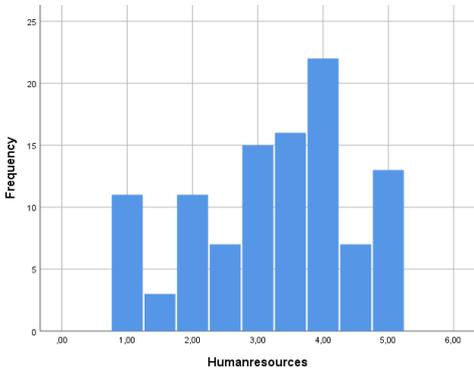


Figure 8: Histogram human resources



Figure 9: Boxplot human resources

'Authority' is measured by the questions 13 and 24 of the online questionnaire. As shown in figure 8 and 9, 50% of the participants do not feel supported by the authorities. The mean of 'authority' is 2.82, which is significantly lower than 3 ( $\alpha=0.05$ ). As a consequence, the criterion 'authority' has a low score.

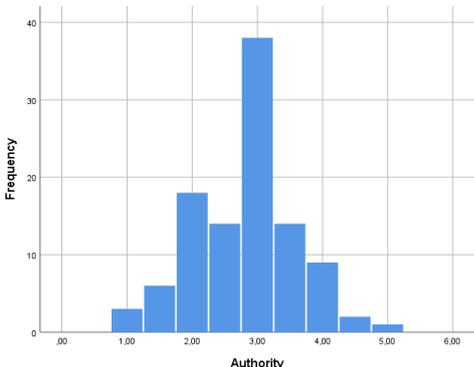


Figure 10: Histogram authority



Figure 11: Boxplot authority

'Financial resources' is measured by questions 14 and 25 of the questionnaire. More than 50% of the people indicate that they only need limited amounts of money to participate in community energy. As a result, the mean of the criterion 'financial resources' is 2.69, which is significantly smaller than 3 ( $\alpha=0.05$ ). Thus, 'financial resources' is given a low score.

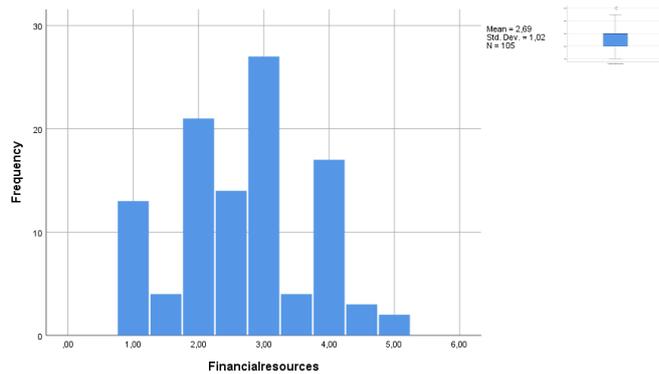


Figure 12: Histogram financial resources

Figure 13: Boxplot financial resources

A medium score for 'human resources' and a low score for 'authority' and 'financial resources' mean that objective capacity weakly influences the participation in community energy. This can partly be underpinned by the qualitative data. In most cases very little financial resources are needed to participate in the community energy. The payment of the participants is mostly seen as an investment rather than an expense. This is because nearly all cases pay back the investments of members with a fixed annually amount.

This being said, the qualitative information on the criterion 'authority' does not support 'objective capacity' being a weak condition for participating in the community energy. According to the participants in the quantitative data, authorities do not support participating in community energy. However, the existence of community energies in the Netherlands is partly based on a regulation of the government called 'postcoderoos'. With the 'postcoderoos', participants can get tax advantages on their energy bill. This makes participating in community energy much more profitable. Thus, in contrary to what participants feel, there is a need for support of authorities to participate in community energies.

As opposed to 'authority', qualitative information on 'human resources' can further explain 'objective capacity' being a weak condition for the participation in community energy. Participants argue that only some basic knowledge about subsidies of renewable energy and energy communities is needed. The leader of Rijne Energie even argues that the only thing needed to participate is some common sense. However, organizing a community energy is a different story. The leaders of the cases say that very deep technical knowledge about renewable energy is necessary. Furthermore, it is very important as a leader to have the ability enthuse people for community energy.

In conclusion, 'objective capacity' weakly contributes to the participation in community energy. This is justified because overall very little resources are required to participate in community energy.

## 4.2.2 Subjective capacity

'Subjective capacity' is measured by questions 13 and 24 in the online questionnaire regarding the self-efficacy belief. The mean of this criterion is 3,992 , which is significantly higher than 3 ( $\alpha=0.05$ ). 3.992 is not significantly lower than 4 ( $\alpha=0.05$ ).The dispersion of the data is really small. Over 50% of the scores are between 3.5 and 4.5. As a result of the mean being between 3 and 4, 'self-efficacy belief' is given a medium score.

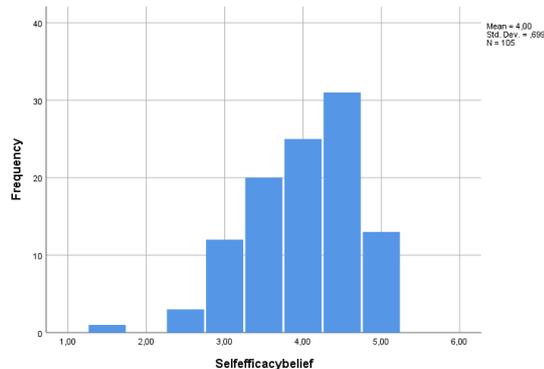


Figure 14: Histogram self-efficacy belief



Figure 15: Boxplot self-efficacy belief

A medium score of 'self-efficacy belief' results in 'subjective capacity' moderately influences the participation in community energy. This is underpinned by the qualitative information. Many participants think that big improvements in the energy transition process can be made by working as a collective. Quotes as: "Together we are strong" and "Together we need to save the world" support this statement. The participants think they are part of a bigger movement, in which the individual can only make a small difference. This justifies the medium contribution of subjective capacity to the participation in community energy because as an individual, participants think that they can make a small difference. However, it is thought that the big movement can make a greater difference in the energy transition process.

Thus, 'subjective capacity' moderately contributes to the participation in community energy. This is explained by the general thought of participants that only a group can make a big difference.

## 4.3 Ownership

### 4.3.1 Peer pressure

The condition 'peer pressure' is measured by questions 14 and 25 in the online questionnaire. As shown in figure 16 and 17, 75% of the participants have given a score of 3.5 or lower to 'peer pressure'. The mean of the data 2.64, which is significantly lower than 3 ( $\alpha=0.05$ ). As a result, 'peer pressure' has a low score.

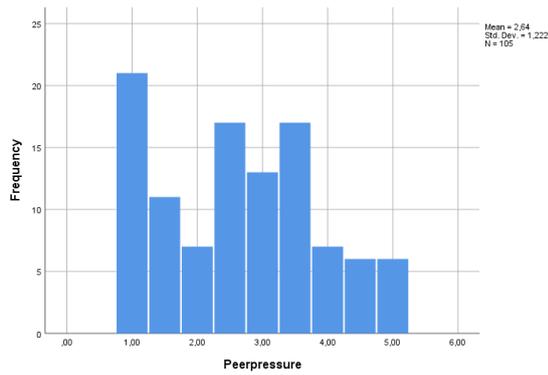


Figure 16: Histogram peer pressure



Figure 17: Boxplot peer pressure

According to the quantitative data, 'peer pressure' weakly contributes to the participation in community energy. This is not supported by the qualitative data. The leaders of the cases indicate that peer pressure is a condition that greatly contributes to the participation of community energy. They say that an active campaign is necessary to enlist new members. Most effective in this campaign is word of mouth. Advertising in this way requires some kind of peer pressure. Furthermore, a participant even says: "the main motivation of participating in community energy, is to say to other people that I am doing everything I can to produce sustainable energy". A reason for the quantitative and qualitative to not be aligned can be the growing emphasis on self-identity and individualism associated with the late modern society. People can wrongly reject to be peer pressured into doing something because peer pressure challenges their own autonomy (Denscomb, 2001). This can be the case in this research, where people do not admit to be peer pressured into participating in community energy.

Thus, a justified conclusion about the extent to which 'peer pressure' contributes to the participation in community energy cannot be drawn from the data due to misalignment of the quantitative and qualitative data.

#### 4.3.2 Sense of own responsibility

The criterion for 'sense of own responsibility' is 'lack of responsibility by the government'. This criterion is measured by questions 15 and 26 of the survey. 75% of the participants think that the authorities need to do more in the energy transition process, as can be seen from figure 18 and 19. The mean of 'lack of responsibility by the government' is 3.89, which is significantly higher than 3 ( $\alpha=0.05$ ). 3.89 is not significantly lower than 4 ( $\alpha=0.05$ ). Because the mean is between 3 and 4, a medium score is given to the criterion 'lack of responsibility by the government'.



Figure 18: Histogram sense of own responsibility

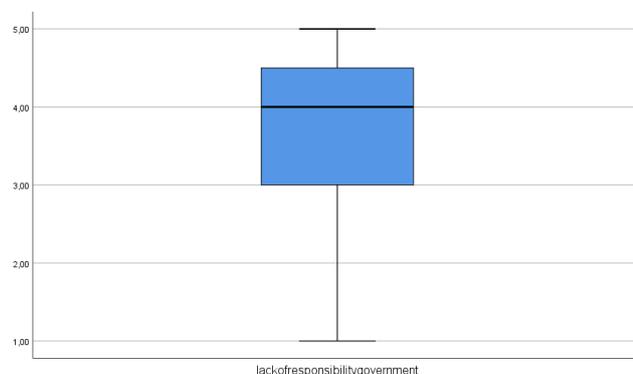


Figure 19: Boxplot sense of own responsibility

A medium score for 'lack of responsibility by the government' results in the condition 'sense of own responsibility' having a moderate influence on the participation in community energy. This is underpinned by qualitative data retrieved from participants. Participants are mentioning a lack of measurements related to the transition to renewable energy by the government. They for example say: "The government does not do enough, so civilians need take measures into their own hands." Moreover, they state: "I participate in the movement because authorities do not do enough". Others nuance this opinion a bit by saying: "The government tries to do something about climate change, however more need to be done to solve the problem.

Thus, 'sense of own responsibility' contributes moderately to the participation in community energy. This is justified by the qualitative and quantitative information.

### 4.3.3 Environmental values

The criterion 'environmental values' is measured by questions 16 and 27 of the questionnaire. As can be retrieved from the boxplot in figure 21, 75% of the participants have a moral obligation to the environment. This is also reflected in the mean of 'environmental values', which is 4.17. The mean is significantly higher than 4 ( $\alpha=0.05$ ). As a result, 'environmental values' has a high score. Thus, 'environmental values' strongly contributes to the participation in community energy.

This is underpinned by many quotes of the participants and leaders. The leader of Rijne Energie for example says: "In a way I feel morally obliged to help sustaining a good environment". This opinion is shared with the other leaders of the cases. Furthermore, most participants feel a moral obligation as well. They say things such as: "Yes, I do feel a huge responsibility. A transition is necessary to sustain the environment as it is".

Thus, the qualitative and quantitative data support 'environmental values' having a strong influence to the participation in community energy.



Figure 20: Histogram environmental values

Figure 21: Boxplot environmental values

## 4.4 Other results

### 4.4.1 personal characteristics

In the online questionnaire, questions were asked about the gender, education level and age of the respondents. This section points out significant differences between the personal characteristics using the independent T-test (Utts and Heckard, 2014). This has been done to support and give suggestions for further research related to community energy.

Significant differences ( $\alpha=0.05$ ) between women and men were only found in the criteria 'awareness'. The average score of woman is significantly higher than the average score of men. This means that women are generally more aware of the risks of global warming. This statement is supported by scientific literature. Lieske et al. (2014) for example states that females are mostly predisposed to regard climate change as a serious threat.

To research the significant differences in age, two age groups were made. The first group is people younger than 60 and the second group is people older than 60. The only significant difference between the groups is the condition 'group identification' ( $\alpha=0.05$ ). The data suggests that on average people older than 60 find joining a community a more important reason for joining community energy. This difference cannot be explained with the scientific literature. Therefore, more research on this subject needs to be done to explain the differences in group identification in the age groups.

Regarding education level, two groups were made. This first group is the 'high education' group and consists of people with a Higher Vocational Education degree or a University degree. The second group is 'low education' and consists of the rest of the participants. A significant difference between the groups is found in the criteria 'human resources' ( $\alpha=0.05$ ). People with 'high education' claim to have more skills and knowledge related to community energy than people with 'low education'. This significant difference between the two groups can be logically explained. People with 'high education' generally have more knowledge than people with 'low education'. This also results in more knowledge related to community energy.

### 4.4.2 Cases

Two characteristics of the cases are identified, which are related to payment and size. The cases are categorized in tables 6 and 7 of the method section. This section identifies significant differences between the characteristics with the independent T-test (Utts and Heckard, 2014). This can support future research and be the beginning for further research on the subject.

The characteristic 'payment' is divided in two groups. The first group is 'fixed annual payment' and the second group is 'variable payment'. With a fixed annual payment, the cases ensure a pre-arranged annual payment. The payment of cases in the second group depend on the revenue of the organization. The two groups significantly differ in two criteria 'financial resources' and 'lack of responsibility by the government' ( $\alpha=0.05$ ). Regarding 'financial resources', the second group has a significant higher score than the first group. The reason for this is that the participants in the cases with a fixed annual amount get paid more in return for their investment. Similar to 'financial resources', the group 'variable payment' has a higher score on 'lack of responsibility by the government' than the group 'fixed annual payment' ( $\alpha=0.05$ ). This means that the people participating in a case with a variable payment generally think that the government is doing less in the energy transition process than the cases in the first group. The scientific literature does not give an explanation for this statement, thus more research on the topic should be carried out.

The characteristic 'size' is divided in two groups. The first group is cases with less than 100 members and the second group is cases with more than 100 members. The cases

differ in the criterion 'self-efficacy belief'. The group with less than 100 members has given a significant lower score to 'self-efficacy belief' than the group with more than 100 members ( $\alpha=0.05$ ). This can be explained by section 4.2.2. Section 4.2.2 states that people think that they can make the biggest difference by working as a collective. The collective in a case with more than 100 members is bigger than in a case with less than 100 members. Therefore, people belonging to a case with more than 100 people generally think to make a bigger difference than people belonging to a case with less than 100 people.

## 5. Discussion

### 5.1 Interpretation of the results

In this study, the conditions are divided into three groups, representing the extent to which a condition contributes to the participation in community energy. The scores of the conditions are summarized in table 8. As for peer pressure, no aligned conclusion can be drawn from the data. As a result, further research is needed to draw a well substantiated conclusion.

The condition ‘objective capacity’ is classified as a weak condition for community energy. This means that objective capacity has little influence on the participation in community energy. In reality, this means that the amounts of financial resources, human resources and support of authorities have little influence on the participation in community energy.

The conditions ‘group identification’, ‘subjective capacity’ and ‘sense of own responsibility’ are graded as moderate conditions for the participation in community energy. This means these conditions moderately influence the participation in community energy. For group identification, this means that the urge to support local initiatives moderately influences the participation in community energy. Considering subjective capacity, it means that self-efficacy belief has a medium influence on the participation in community energy. Whereas for sense of own responsibility, thinking that authorities are not doing enough to stimulate the energy transition process, moderately influences the participation in community energy.

The conditions ‘expected return on investment’, ‘perceived salience’ and ‘environmental values’ are classified as strong conditions for the participation in community energy. This means that these conditions strongly influence the participation in community energy. In practice, this means that the return on investment strongly contributes to the participation in community energy. Furthermore, awareness of the problem related to climate change and finding this problem important, has a strong influence on the participation in community energy. Moreover, moral obligation to protect the environment and environmental values strongly influences the participation in community energy.

The results are for the most part in line with the scientific literature. After studying the scientific literature in the conceptual framework, it was hypothesized that significant amounts of the conditions would be required for the participation in community energy. This hypothesis is applicable for the conditions with a moderate or high score. However, ‘objective capacity’ has a low score, which means that the condition ‘objective capacity’ is not required in significant amounts for the participation in community energy. As a result, the conclusion

Condition	Weak	Moderate	Strong	No aligned result
Expected return on investment			X	
Perceived salience			X	
Group identification		X		
Objective capacity	X			
Subjective capacity		X		
Peer pressure				X
Sense of own responsibility		X		
Environmental values			X	

regarding objective capacity is not in line with the scientific literature.  
Table 8: scores of the conditions

## **5.2 Limitations and implications**

A limitation of this research is the subjectivity of the quantitative data. This limitation can be identified in the research on peer pressure. From the perspective of the participant, peer pressure did not play a role in their participation in community energy. However, considering the participation in community energy more objectively, one can identify some form of peer pressure. Therefore, further research can have a more intensive focus on the process of recruiting citizens for community energy. This limitation is not present in the research for the other conditions because those conditions are subjective to the participants.

Another limitation of this research is the limited amount of qualitative information. Qualitative information is provided by the questionnaire and the interviews. However, more qualitative information could make for a more decisive conclusion.

Despite the limitations, this research can be used to improve the amount of participation in community energy. This research is the first to identify to what extent conditions are required for participating in community energy. By looking at the extent to which the conditions are required, authorities can stimulate the participation in community energy. In order to do this, the authorities need to stimulate conditions that are classified as strong more extensively than conditions that are classified as weak. The authorities can for example make education about climate change a compulsory subject. This will increase the perceived salience, which will stimulate the participation in community energy.

## **6. Conclusion**

To conclude, eight conditions for participating in community energy were identified. These conditions were used to answer the research question: To what extent are the conditions of community energy required to participate in community energy required? The conditions 'expected return on investment', 'perceived salience' and 'environmental values' have a strong influence on the participation in community energy. Furthermore, the conditions 'group identification', 'subjective capacity' and 'sense of own responsibility' contribute moderately to the participation in community energy. Moreover, the condition 'objective capacity' weakly influences the participation in community energy. Finally, the condition 'peer pressure' was not scored.

I hope that the conclusion of this thesis will be a contribution to the energy transition process. Ideally, authorities will increase the participation in community energy, using the results presented in this thesis. Thus, creating an energy production that is sustainable.

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# Annex A: Online questionnaire

## Participatie in het gemeenschappelijk produceren van duurzame energie

Beste meneer/mevrouw,

hartelijk dank dat u wilt meedoen aan dit onderzoek. Dit onderzoek voer ik uit in het kader van mijn bachelor thesis op het gebied van duurzame ontwikkeling. Met de uitkomsten van het onderzoek kan ik een beter beeld krijgen van de beweegredenen van burgers om te participeren in het gemeenschappelijk produceren van energie. De uitkomsten van dit onderzoek kunnen van invloed zijn op het beleid van overheidsinstanties aangaande het gemeenschappelijk produceren van energie. Dit kan een positieve invloed hebben op de algehele energie transitie. Om de uitkomsten te genereren is uw deelname van groot belang. Het onderzoek bestaat uit 20 verplichte stellingen en drie optionele open vragen en zal ongeveer 5 minuten duren. Uw antwoorden zullen anoniem worden verwerkt. Uw toestemming is daarvoor nodig. Dit kan onderaan worden aangegeven.

\* Required

1.

Bij welke organisatie of welk initiatief bent u aangesloten? \*

Mark only one oval.

Rijne Energie

Zonnepanelen bij USV Hercules

DECZ

2030.nu

2.

Tot welke leeftijdscategorie hoort u? \*

Mark only one oval.

0-20 jaar oud

20-40 jaar oud

40-60 jaar oud

60-80 jaar oud

80 jaar en ouder

Other:

3.

Wat is uw gender? \*

Mark only one oval.

man

vrouw

zeg ik liever niet

Other:

4.

Wat is uw hoogst afgesloten opleidingsniveau

Mark only one oval.

Basisschool

Vmbo

Havo

Vwo

Mbo

Hbo

wo bachelor

wo master

Other:

5.

Wat is uw motivatie om te participeren in het gemeenschappelijk produceren van energie?

6.

Welke kennis, vaardigheden en middelen heeft u nodig om te participeren in de coproductie van energie?

7.

In hoeverre voelt u een morele verantwoordelijkheid om te participeren in het gemeenschappelijk produceren van energie? Kunt u dit toelichten?

8.

Het meedoen aan het gemeenschappelijk produceren van energie heeft voor mij een voornamelijk positief effect. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

9.

Ik ben me bewust van de effecten van het opwarmen van de aarde. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

10.

Ik vind dat de energietransitie hoog op de politieke agenda moet staan. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

11.

Ik vind het fijn om bij de groep mensen te horen van Rijne Energie/Buurtstroom/ Hercules zonnepanelen. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

12.

**Ik heb kennis en vaardigheden op het gebied van eigen energie productie. \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

13.

**Ik word voldoende ondersteund door overheidsinstanties om te participeren in het gemeenschappelijk produceren van energie. \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

14.

**Ik heb veel geld nodig om te participeren in het gemeenschappelijk produceren van energie. \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

15.

**Ik kan een groot verschil maken in de energietransitie door te participeren in het gemeenschappelijk produceren van energie \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

16.

**Ik ben door anderen mensen betrokken geraakt in het gemeenschappelijk produceren van energie. \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

17.

**De Nederlandse overheidsinstanties doen te weinig om de energietransitie te bevorderen. \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

18.

**Ik voel me moreel verplicht om bij te dragen aan de energietransitie. \***

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

19.

Het meedoen aan het gemeenschappelijk produceren van energie heeft een voornamelijk positief effect op de samenleving. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

20.

Ik ben me sterk bewust van de negatieve effecten van de uitstoot van fossiele brandstoffen. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

21.

Ik vind de opwarming van de aarde een belangrijk probleem, waar zo snel mogelijk wat aan gedaan moet worden. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

22.

Een reden voor het participeren in Rijne Energie/ hercules zonnepanelen/ buurtstroom is het gemeenschapsgevoel dat je er door krijgt. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

23.

Ik heb kennis die te maken heeft met het gemeenschappelijk produceren van energie. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

24.

De overheidsinstanties maken het mij makkelijk om te participeren in het gemeenschappelijk produceren van energie. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

25.

Ik heb veel financiële middelen nodig om te participeren in het gemeenschappelijk produceren van energie. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

26.

Door te participeren in de coproductie van energie draag ik bij aan duurzame ontwikkeling. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

27

Ik ben door mijn directe omgeving beïnvloed om te participeren in het gemeenschappelijk produceren van energie. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

28.

De Nederlandse instanties doen te weinig om de opwarming van de aarde tegen te gaan. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

29.

Ik vind het een ethische verplichting om zelf de opwarming van de aarde tegen te gaan. \*

Mark only one oval.

helemaal niet mee eens 1 2 3 4 5 helemaal mee eens

Door het verzenden van deze vragenlijst ga ik ermee akkoord dat mijn antwoorden anoniem mogen worden in het onderzoek en naderhand ook anoniem mogen worden gepubliceerd in de uiteindelijke documentatie van het onderzoek

Hartelijk dank voor het invullen van de enquête! Uw antwoorden zijn een waardevolle toevoeging aan dit onderzoek.

## Annex B: Guide Semi-structured interview

Welkom.....,

heel erg bedankt voor het participeren in dit online interview. Zoals ik heb verteld is mijn naam Steven Bosma en zit ik in mijn 3<sup>e</sup> jaar Liberal Arts and Sciences aan de universiteit van Utrecht. Op het moment ben ik mijn scriptie aan het schrijven over de motieven voor de coproductie van energie van burgers. In mijn onderzoek probeer ik de condities waaronder burgers in staat worden gesteld om energie te coproduceren te onderzoeken.

Voor het begin van het onderzoek zou ik willen vragen of ik dit interview kan opnemen? Daarnaast zullen uw antwoorden strikt vertrouwelijk behandeld worden en de digitale gegevens zullen in beveiligde computerbestanden opgeslagen worden die alleen voor de onderzoekers toegankelijk zijn. Geen enkele publicatie over dit onderzoek zal uw naam of enige andere informatie bevatten die naar uw persoon zou kunnen leiden. Ook heeft u de mogelijkheid om op elk moment met het interview te stoppen.

Heet u nog vragen?

1. Met welk doel heeft u de organisatie/ het initiatief (mede) opgezet?
2. Hoe veel leden heeft de organisatie/ het initiatief?
3. Hoe is het initiatief georganiseerd?
4. Wat is uw motivatie om te participeren in het gemeenschappelijk produceren van energie?
5. Welke kennis, vaardigheden en middelen heeft u nodig om te participeren in de coproductie van energie?
6. In hoeverre voelt u een morele verantwoordelijkheid om te participeren in het gemeenschappelijk produceren van energie? Kunt u deze toelichten?

Bedankt voor het participeren in mijn onderzoek en een fijne dag nog verder!

## **Annex 3: Cases**

### **USV Hercules solar panels**

USV Hercules solar panels is an energy community initiative organized by the sport club 'USV Hercules'. USV Hercules is located in Utrecht. The energy community 'USV Hercules solar panels' started with the idea of making the sport complex more sustainable. A research on this topic was carried out and the idea of putting solar panels on the sport hall was born. After some final checks, 500 solar panels were placed. These solar panels were financed by members of USV Hercules. The former treasurer of the sport association made 100 certificates, each worth 500 euros. By buying a certificate, a member basically bought a part of the solar panels of USV Hercules. The certificate ensured a 3% yearly return, which made it profitable for members. Furthermore, members were eager to take part in the energy community because it helped their local sport association and was good for the environment.

### **Rijne Energie**

Rijne Energie is an energy community focussing on building solar panels and wind mills in the polders of Rijnenburg and Reijerscop near the city of Utrecht. The energy community started with the question on what to do with the empty space in the two polders. After considering the ideas, the parties involved eventually agreed to assign the areas for the production of renewable energy. Then Rijne Energie was established. Rijne Energie is led by several volunteers and is a non-profit organization with 150 members. Rijne Energie is financed in three ways. First of all, all members need to pay 10 euro membership fee on a yearly basis. Secondly, members can invest in the Research and Design phase of the project. This phase is projected to take place in 2020. In the final investment phase the members can invest in the solar panels and wind mills. By investing in solar panels and wind mills the members get money for the produced energy in return.

### **DECZ**

DECZ is an energy community with around 10 members located in the municipality of Zeist. DECZ tries to bring together people who want to finance renewable energy projects located on external roofs and grounds. The first two projects are the placement of solar panels on the roof of a school and a farm. These are just the first projects and according to the board of DECZ there are many more to come. The projects are financed through the members. The members can buy a certificate for around 300 euro, which will give 250 Kwh of energy in return. This energy will be sold and the yield will be for the owner of the certificate. This return will be enough to pay the investment of the certificate back in 7-8 years.

### **2030.nu**

2030.nu is located in the municipality 'Stichtse Vecht'. 2030.nu focusses on several projects mainly related to solar panels and has around 20 members. The energy community wants to put solar panels on privately owned buildings like schools. Furthermore, 2030.nu is in the process of building a solar field in Loenersloot. To participate in the investment of the projects one first need to be a member, this costs 10 euros a year. After being member, one can invest in projects. By investing in the projects, a certain amount of revenue will be returned on a yearly basis.

### **Buurtstroom**

Buurtstroom is in 2016 established to increase the use of sustainable energy in the city of Utrecht. It has many active projects, which mainly consist of solar panel projects. Buurstroom has a board that is responsible for the maintenance of running projects and

gives orders to what they call the team. The team consists of three or four people who are responsible for executing the projects. They investigate for example how many solar panels can fit on a particular roof and whether a roof is appropriate for the placement of solar panels. Buurtstroom earns money, by selling the produced power to big energy producers. The money is reinvested in new solar panel projects and used for the payment of the people in the team. The remaining revenue is paid out to the 300 members Buurstroom.