Residents and Renewables - Research Report

Topic 5: Climate-Neutral Heuvelrug

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1. Introduction

In order to reduce the negative impacts of climate change caused by burning fossil fuels, Europe has to solve a major technological, societal and governance challenge. Significant changes will need to be made on all societal levels to reach the European and National Climate Agreement goals: climate neutrality by 2050 (MEACP, 2019). According to the Climate and Energy report, becoming carbon neutral is not possible without shifting the power industry towards renewable energy sources (Klimaat- en Energieverkenning 2020, 2020). These adjustments are going to alter the daily life of Dutch citizens in many ways.

Therefore, the energy transition is considered a social transition. The participation and support of residents is essential to reach climate targets (Koirala et al., 2018). While it is the Dutch government's duty to implement laws promoting sustainability, it must consider citizens' livelihoods and opinions along the process (MEACP, 2019). In recent years, a bottom-up approach has been given more consideration in realising environmental targets. In fact as this transition is embedded in social context, involving the relevant actors at lower levels is becoming progressively more important (May, Levin, & Sugihara, 2008). The public perception of the energy transition is crucial in determining to what extent residents will participate in it.

As this research paper focuses on the municipalities around the Utrechtse Heuvelrug national park (UH), its residents have to be considered. They can be considered first hand witnesses to the positive and also negative consequences of the area's evolution over the last decades.

1.1 Research Aim

The general aim of this research is to study the flexibility and accessibility of using renewables in Utrechtse Heuvelrug, and to find out whether sustainable energy systems that are in tune with residents can be achieved.

Koirala et al. states that the energy transition discussion calls for energy consumers to obtain a more active function (2018). In regard to this, this research project also aims to find out what the attitudes of residents are relating to renewables, what barriers might be obstructing their support and propose some solutions. This can assist the Utrechtse Heuvelrug in becoming climate neutral.

1.2 Research Questions

To guide this research and get a better understanding of what is technologically, economically and socially possible for an energy transition, the focus is on the following research question:

What are the social, technological and economical relationships or challenges between residents and the transition towards renewable energy sources in the Utrechtse Heuvelrug?

For more clarity and precision, the main research questions comprises five guiding research points:

1. *How are the plans to make the Utrechtse Heuvelrug climate neutral envisioned as of now, and how are the residents of the Utrechtse Heuvelrug involved?*

2. *To what extent is the transition to a climate-neutral Utrechtse Heuvelrug a social transition?*
3. *What are the perceptions of the residents concerning the different forms of renewables?*
4. *What are the conditions for resident involvement and community support in the energy transition?*
5. *What policy recommendations will ensure that the transition towards renewable and affordable energy is both successful and supported by local residents?*

2. Literature Review

This section will review sustainability plans relevant to the UH and similar case studies.

2.1 Roadmaps to Sustainability

The first roadmap relevant to making the Utrechtse Heuvelrug more sustainable is the Klimaatakkoord. This general roadmap for the Netherlands focusses on renewable energy production, a circular industry, climate neutral agriculture and land use as well as mobility without emissions (MEACP, 2019).

Secondly, there is a concept Regional Energy Strategy (RES) for the U16 region (RES, 2020; U16, 2020). These are 16 municipalities, one of which is Utrechtse Heuvelrug, and 4 regional water authorities in and around the province of Utrecht. This document has similar goals to the Klimaatakkoord, the main one being a reduction of emissions of 49% compared to 1990 (MEACP, 2019). On top of making houses more energy efficient by e.g. insulation, it is mainly about increasing solar and wind energy production. The goal is to produce at least 1.8 TWh of renewable energy in 2050 (RES, 2020). Stimulating Renewable Energy subsidies will help U16 finance these plans. As for residents' views on these plans there is nothing to take from these roadmaps as there doesn't seem to be any active participation from residents in these plans.

Thirdly, there is a roadmap specifically for the municipality Utrechtse Heuvelrug that was designed with the help of citizens and other stakeholders in the municipality (Putman & de Wit, 2017). The municipality's goal is to become climate neutral in 2035, 15 years before the U16 plan. It aims to achieve this by making new development plans either energy neutral or even energy positive. There is a focus on maximizing insulation for both new and existing buildings, as well as installing solar panels where possible. Which is in line with the U16 plans. However, the plans deviate from the U16 and national plans in that there is less focus on wind turbines. This can be explained by an inability to reach consensus in meetings with residents, as they are generally less supportive of wind turbines. Why that is the case will be further explored in the results and discussion.

Out of all three roadmaps discussed, only the municipality had active citizen participation when it comes to the decision making process. In that case, the stakeholders decided on differing scenarios. If there was a consensus, it has been taken into account in the planning of the roadmap (Putman & de Wit, 2017). Apart from this, the only clear citizen involvement in the roadmaps is the passive role they play in the adoption of renewables as well as trying to minimize energy consumption. In the National Climate Agreement, there is a requirement for citizen participation, however, it is not clear to what extent citizens are actually involved in the planning of this climate agreement (MEACP, 2019). In conclusion, there is no clear indication on the residents' stances toward the current plans in the Utrechtse Heuvelrug as a whole.

2.2 Citizen Support of the Energy Transition & Case Studies

2.2.1 Residents & Types of Renewables

With the energy transition comes opinions and conflicts. In this research on residents' stance towards renewables in the Utrechtse Heuvelrug area, it is relevant to look at case studies of other locations to get an idea of the general preference and factors affecting residents' stance. Research generally shows that residents prefer solar energy over wind turbines (Salak, Lindberg, Kienast, & Hunziker, 2021; Liobikienė, Dagiliūtė, & Juknys, 2021). There are factors that influence this preference. The most important factors identified in

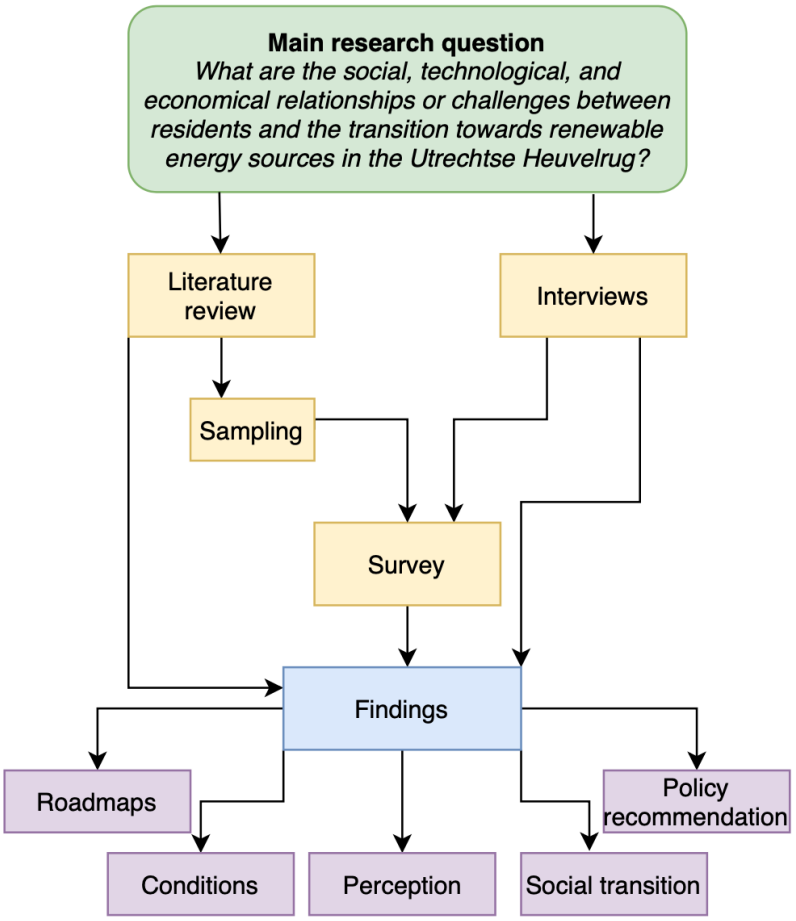
Liobikienè's et al. paper were: financial abilities, the perceived level of development of renewable energy sources (2021).

2.2.2 Residents & Location of Renewables

To minimize the NIMBY effect, it is also important to know what proximity residents are comfortable with having renewable energy sources in the area. The study on Swiss citizens of Salak also talked about this specific issue (Salak et al., 2021). Its general conclusion: the Swiss citizens prefer renewable energy sources to be on the 'urban platform' and not in the natural area of the Alps.

There are sure to be spatial differences in appreciation of culture between Switzerland and the Netherlands. Some might include: different attitude towards nature (higher or lower value), different population densities, different attitude towards renewable energies or sustainability in general. It is useful to also analyse this for the residents of the Utrechtse Heuvelrug area. On top of these factors, this research in Switzerland also researched other factors that are taken into account in the survey. Among these factors are sex, nationality, exposure to renewables and membership of an environmental organization.

3. Methods



3.0 - Methodology Diagram

The following section will introduce the methodology of conducting the interviews and surveys, which is pictured in the above diagram. It will provide a complete description and justification for all procedures used in our research report to answer our research questions. The design of this research resembles a case study design as it is most fitting to conduct an “intensive study of a single unit or place”, the Utrechtse Heuvelrug in this case (Bryman, 2021). Since the gathered data is only from a particular moment, the research is fast and inexpensive. Furthermore, this design is ideal to allow comparison of variables such as income and gender.

3.1 Interviews

The interviewing process served as a foundation for the residents survey by providing additional information on the transition. Furthermore, the interviews gave us the opportunity to dive deeper into some questions surrounding the attitude of relevant actors in the Utrechtse Heuvelrug. From the public sector, we contacted municipality representatives working in the energy and sustainable development sectors. From the private sector, we contacted owners or representatives of small energy companies that have experience in installing renewables in the Utrechtse Heuvelrug area as well as renewable energy consultants. Lastly, we contacted individuals from the non-profit sector who are focusing on involving residents of the area in the energy transition, for example via Energy Ambassador programmes.

The contact list of representatives and draft questions can be found in Appendix 2. We prepared the questions based on literature review and based on our understanding of the problem. As advised, we have stayed in touch with the experts after the interview to be able to ask them follow-up questions.

The interviews helped us map the specific barriers that stand in the way of achieving a successful social transition towards climate neutrality and secondly. Furthermore, they introduced good practices from private and public sectors which currently help to overcome these.

3.2 Survey

Conducting the survey among the residents of the Utrechtse Heuvelrug corresponded with research questions 3) to 5). The survey can be viewed in two parts. One part concerned the perception of residents on existing plans for renewables. I.e. physical factors (spatial), preference for which renewable technologies, willingness to contribute (financially or otherwise). The other part concerned the needed social change to realise the energy transition. This helped identify the weight of different conditions for resident support and community involvement. The survey questions are located in Appendix 4.

For the first part, the survey was composed in a personal manner to give the respondents a realistic feel of their own responsibility and their place in this issue. This personalization can also be translated to the question of what location for renewables is prefered. A few general categories were compiled to conceptualize the options rather than have abstract terms like “countryside” or “urban area”. We used this hand in hand with the concept maps found in the RESs, where renewable energy production locations are described (RES, 2020).

Next to these questions on the current plans, residents’ perspectives on another essential part of the energy transition were examined: the bottom up approach and the needed social change. The current consumption patterns of energy will not hold up in a renewable energy system. Therefore, residents will have to move to a form of ‘prosumerism’ (). Because of this need, respondents were asked whether they are willing to do this and why.

To formulate questions and know what to search for, possible factors that shape residents’ perceptions of the energy transition first had to be identified. Conditions that determine people's support of and involvement in the energy transition can be categorised in either ‘desire to act’ or ‘ability to act’:

- Desire:
    - environmental concern caused by awareness (of climate change, renewables, sustainability roadmaps), beliefs and group identification (community feeling or peer pressure)
    - interest for financial reasons (long term profit), image or interest in technology
- Ability: income, homeownership, time, location, climatic conditions.

The reasons people chose for being involved or not in the energy transition were collected in 4.4 Results and analysed in 5.1.4 Discussion.

3.2.1 Practicalities

Due to the Covid-19 regulations the survey took place online. This seemed like a major obstacle to receiving a high response rate. In getting the surveys to the residents, there were two approaches: either going door-to-door to hand out QR codes leading to the survey in the

form of flyers, or putting the QR codes in public places, e.g supermarkets. Considering the response rate issue, our preference lay with going door-by-door.

Image 3.3 - Fieldwork: Flyer Distribution

With the practicalities and the limits of this research project in mind, the group members have made a selection on what areas of the Utrechtse Heuvelrug to examine. This was done by a form of probability sampling, stratifying sampling. The population of the Utrechtse Heuvelrug was divided in different municipalities (*strata)*. Within these strata, a number of streets or neighbourhoods were randomly selected. When using a form of probability sampling, it is critical that everyone in the population has an equal chance of being included in the sample. The second approach, putting the QR codes in public places, most likely sees a decrease in participants of older age. In the discussion, the effect of this sampling bias on results was analyzed. The gathered data is analysed using frequency, pie and bar charts. Representing the data this way deems optimal for visualising patterns within the researched population.

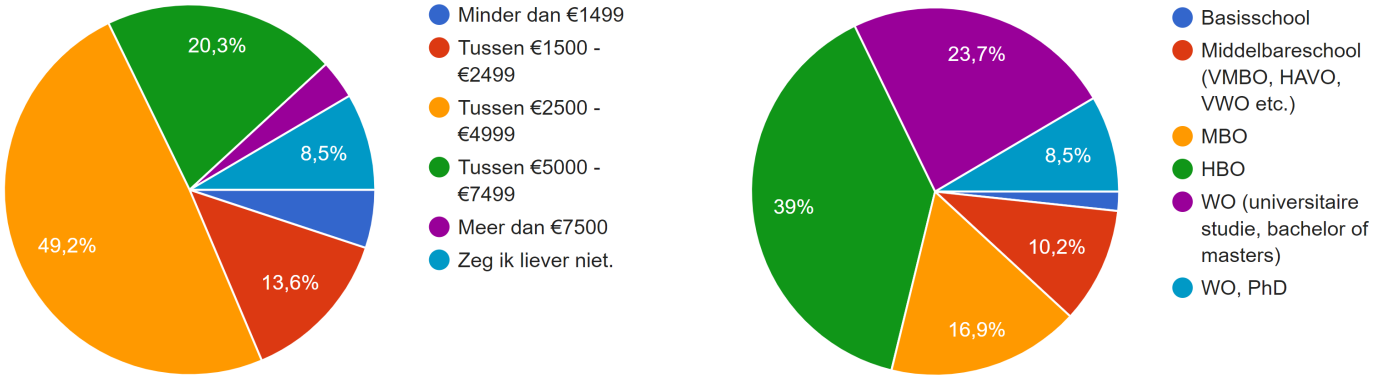
Additionally to the data collection method described above, relevant organisations were asked to share this survey online via Facebook in Dutch. The group members have also joined Facebook groups with an invitation to fill it in. Few examples of groups and pages contacted can be found below.

Facebook Page	Status	Facebook Groups	Status
COC Midden-Nederland	approached	Amersfoort & Daggakraal (online Market)	admitted, posted
Gemeente Utrechtse Heuvelrug	approached	Rhenen actueel	admitted, posted, received replies
OdpeHeuvelrug.nl	approached	Amersfoort class(forum)	waiting for admission
Tussen Heuvelrug & Wetering	approached	EuroParcs Resort De Utrechtse Heuvelrug	denied

Image 3.3 - Online Facebook Outreach

4. Results

This part compiles relevant results gathered through the interviews and surveys. They are analysed in 5. Discussion.
5 stakeholders were interviewed and 59 Utrechtse Heuvelrug (UH) residents responded to the survey. 71,2% indicated to be men, 27,1% women and 1,7% non-binary. Ages of respondents range from 21 to 84.



Graphs 4.1-2 Net monthly income and highest education ranges

4.1 How are the plans to make the Utrechtse Heuvelrug climate neutral envisioned as of now, and how are the residents of the Utrechtse Heuvelrug involved?

4.1.2 Literature review

The literature review showed a lack of explicit citizen involvement in the Climate Accord and U16 RES, although they both state that citizen involvement is important (Putman & de Wit, 2017; MEACP, 2019). It was also found that when there is active resident participation in the design of roadmaps, the roadmaps seem to differ from those without citizen participation. As previously mentioned, in the UH municipality roadmap, which had active citizen participation in its design process, there is a significant lack of focus on wind turbines (Putman & de Wit, 2017).

4.1.3 Interviews

Regarding the feasibility of the roadmaps, interviewees were asked to identify social, economical and technological barriers. All agreed the inclusion of residents in the preparation of the road maps is pivotal to carrying them out in time. Secondly, they all believe the current level of citizens' engagement in the climate plans is insufficient. Heleen Mees, an Utrecht University researcher, found the “City talks” held by the UH municipality, were a significant and a successful step towards a broad implementation of individuals in the energy transition (Mees, personal communication, May 27, 2021). Energy consultant Jeroen Buunk, on the other hand, was critical of the way the type of renewable energy was distributed spatially in the municipality's roadmap. It seems a “renewable type per neighbourhood” division was employed instead of considering the local energy grid options favoring one renewable energy type over another (Buunk, personal communication, May 25, 2021).

Interview	Main barrier of achieving road maps	Current state of inclusion of residents	Main barriers to involvement	How to improve citizens' involvement	Main technological or economical barrier
Jeroen Buunk	Citizen involvement	Insufficient	Financial availability, public image of renewables	Energy ambassador, transparent finance mechanisms of renewables (from supplier to individual support)	The energy grid problem in sunny parts of Netherlands with energy grid
Peter Brouwer	Citizen involvement	Insufficient	Little to no sharing in benefits	Raising awareness, financial compensation,"Burden ánd the Benefits"	Windmill parks cause too much noise and horizon pollution
Nick Verkade	Citizen involvement	Insufficient	Lack of urgency in population	Energy cooperations	Technological and business models not yet being fully developed
Heleen Mees	Citizen involvement	Insufficient	Motivation, capacity (community feeling, lack of sense of ownership and salience	Energy ambassadors, transparent finance mechanisms of renewables	Financial mechanisms favoring large corporation not residents
Kees Stap	Citizen involvement	Insufficient	Lack of time commitment of residents, lack of awareness	Energy ambassadors, individual convenient solutions, educate citizens on the 'bigger picture', insulation	Ecological solutions to housings being more expensive

Image 4.1 Qualitative findings overview from interviews

4.2 To what extent is the transition to a climate-neutral Utrechtse Heuvelrug a social transition?

Relevant interviewees identified making resident housing more sustainable as the critical step of the energy transition to climate neutrality (Stap, 2021; Buunk, 2021). The social aspect of the energy transition also lies in taking proactive steps of decision-makers to ensure it is a just transition. This is a particular issue because it includes implementing

financial mechanisms that ensure no resident is excluded from access to energy as a result of more renewable sources in the Dutch energy mix both in heating and electricity. These mechanisms, therefore, have to take into the socio-economic spectrum of the Utrechtse Heuvelrug population to be - economically and socially - inclusive.

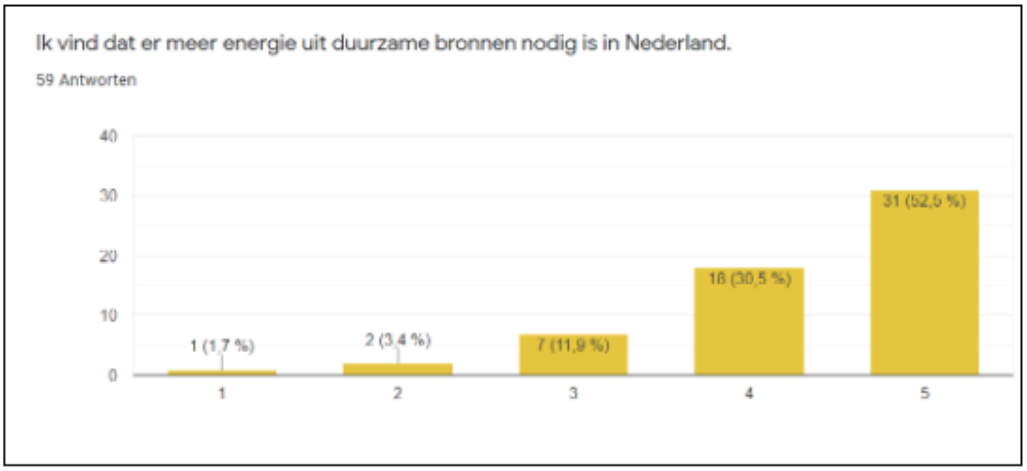
On an individual scale, the energy transition requires a change in habits and spendings. 91,6% of survey respondents agreed or strongly agreed that they *would like to reduce their energy consumption* and not a single resident completely disagreed. Mees identified the main factors influencing citizen engagement “motivation, capacity and a sense of ownership and responsibility”, confirming it is a social problem (Mees, 2021). All interviewees also found that achieving climate neutrality is no longer a problem of technological innovation and instead, lies in a successful social transition.

Respondents of the survey are aware of the many issues regarding climate change.. However, this awareness is not enough. Nick Verkade remarks that there is a lack of urgency among people. This along with barriers such as cost, ease and availability is hindering the ability of people to act. He states that time is an important factor in this social transition, making the cautious prediction that with time there should be advancements in technology, as well as business models providing these technologies. These advancements should help lower the aforementioned barriers of cost, ease and availability and thus provide more access to renewables for more people (Vercade, 2021).

4.3 What are the perceptions of the residents concerning the different forms of renewables?

From the interviews, some conclusions with regards to residents’ views on different types of renewables can be drawn. Most importantly, people tend to be more cooperative in projects regarding renewables if they know where the gains from these projects go. When there is resistance to projects, for a large part this can be solved by giving people a share in the benefits along with the downsides of projects.

Furthermore, from the interviews and also from the survey, it is clear that nowadays there is significant support for renewable energy. More than half of survey respondents agreed the Netherlands should obtain more of its energy from renewable sources.



Graph 4.3.1 Agreement with the statement ‘I think there should be more renewable energy in the Netherlands’

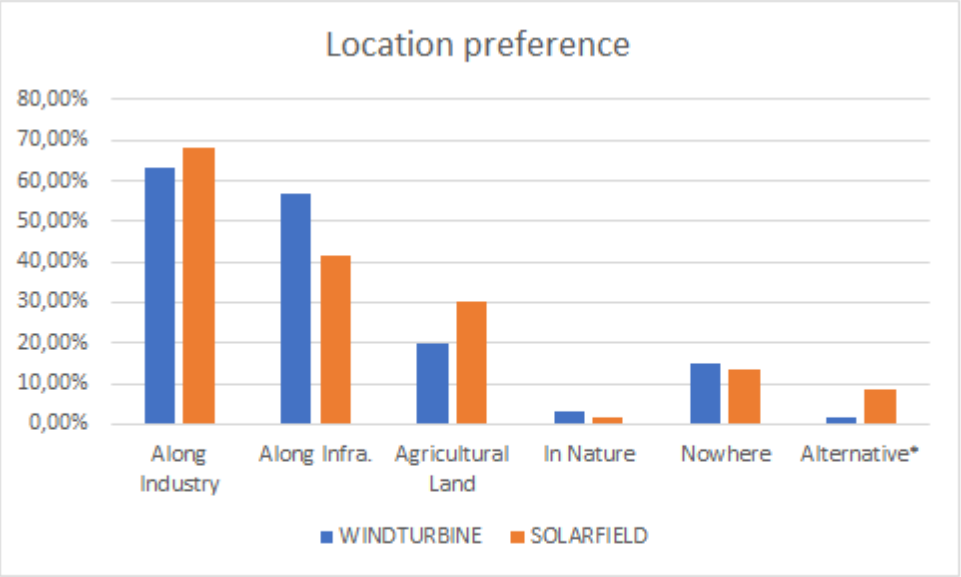
Image 4.1 - Fieldwork: Sun-on-roof Implementation in Leusden

4.3.1 Location Preference

Respondents indicated to prefer locations *along infrastructure* and *along industry terrain* most often. With importantly *nowhere* being the next most indicated preferred location for both *windturbines* and *solar fields*. Also notable is respondents' indication of preferring alternative locations (e.g. off-shore wind, on-roof solarpanels).

Table 4.3.2 Percentage of respondents' indicated preferred location categories per renewable energy source type. (*Alternatives were mostly off-shore for wind turbines and on-roof for solar fields)

	WINDTURBINE	SOLARFIELD
Along Industry	63,33%	68,33%
Along Infrastructure	56,67%	41,67%
Agricultural Land	20,00%	30,00%
In Nature	3,33%	1,67%
Nowhere	15,00%	13,33%
Alternative*	5,00%	8,33%



Graph 4.3.2 Percentage of respondents' indicated preferred location categories per renewable energy source type. (*Alternatives were mostly off-shore for wind turbines and on-roof for solar fields)

4.3.2 Concerns

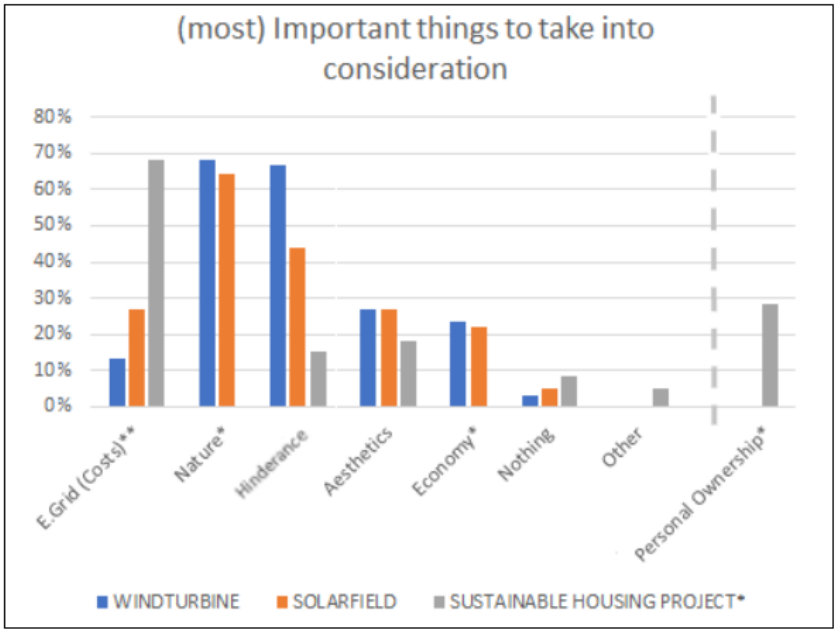
Respondents indicated the most to be concerned about disturbing nature and possible hinderance to residents in the case of both *windturbines* and *solar fields*. For *sustainable housing projects* respondents were more concerned about *costs for residents**.

Table 4.3.3 percentage of respondents that indicated to be concerned about different factors.

	WINDTURBINE	SOLARFIELD	SUSTAINABLE HOUSING PROJECT*
E.Grid (Costs)**	13,33%	27,12%	68,33%**
Nature*	68,33%	64,41%	*
Hinderance	66,67%	44,07%	15,00%
Aesthetics	26,67%	27,12%	18,33%
Economy*	23,33%	22,03%	*
Nothing	3,33%	5,08%	8,33%
Other	0,00%	0,00%	5,00%
Personal Ownership*			28,33%*

(*Some questions were determined to be irrelevant and thus excluded (Economy, Nature) or only relevant (Personal Ownership) for sustainable housing projects)

(**The question on Costs was posed differently for wind turbines and solar fields than for sustainable housing project)



Graph 4.3.3: Percentage of respondents that indicated to be concerned about different factors.

(*Some questions were determined to be irrelevant and thus excluded (Economy, Nature) or only relevant (Personal Ownership) for sustainable housing projects)

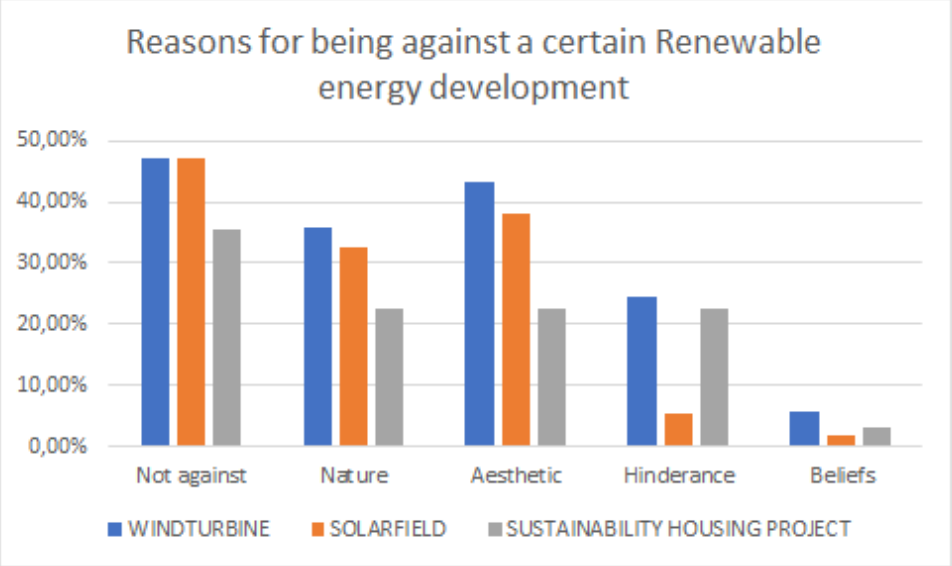
(**The question on Costs was posed differently for wind turbines and solar fields than for sustainable housing project)

4.3.3 Reasons to be against different types of renewables

The reasons for being against the types of renewables did not differ significantly overall. However, there is one outlier: respondents indicate significantly less frequently that *solarfields* would hinder residents. Another important thing to highlight is that for every category the most selected option was 'not against'.

Table 4.3.4: Percentage of responses that indicated a certain factor to be a reason to be against renewable types; wind turbines, solar fields or a sustainable housing project

	WINDTURBINE	SOLARFIELD	SUSTAINABILITY HOUSING PROJECT
Not against	47,17%	47,27%	35,48%
Nature	35,85%	32,73%	22,58%
Aesthetic	43,40%	38,18%	22,58%
Hinder	24,53%	5,45%	22,58%
Beliefs	5,66%	1,82%	3,23%



Graph 4.3.4: Percentage of responses that indicated a certain factor to be a reason to be against renewable types; wind turbines, solar fields or a sustainable housing project

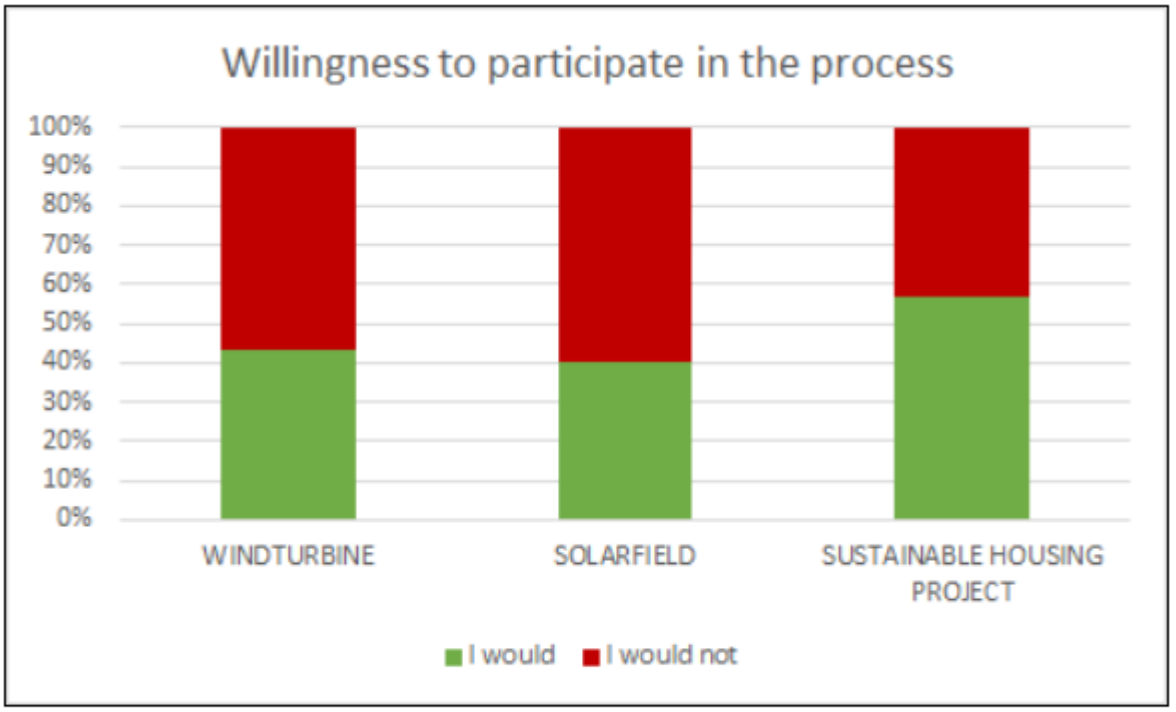
For an answer to research question 4) which explores these different reasons in further detail, please refer to this section.

4.3.4 Participation

The majority of respondents in both cases of *wind turbines* and *solar fields*, indicated that they would not want to participate financially nor in the process.

4.3.5 Table: Percentage of responses indicating to be willing or not to participate in the process of renewables per renewable.

Process participation	WINDTURBINE	SOLARFIELD	SUSTAINABLE HOUSING PROJECT
I would	43,10%	40,00%	56,67%
I would not	56,90%	60,00%	43,33%



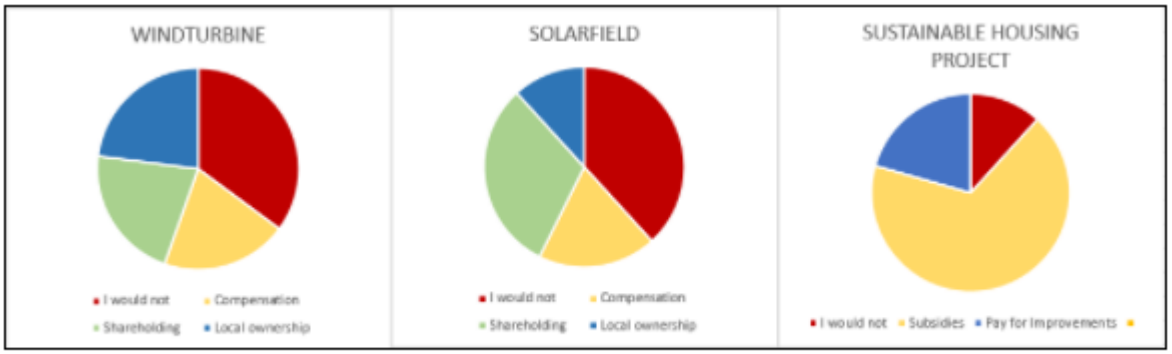
4.3.5 Graph: Percentage of responses indicating to be willing or not to participate in the process of renewables per renewable.

4.3.6A Table: Respondents preference for how to participate financially with types of renewables

	WINDTURBINE	SOLARFIELD
I would not	44,07%	43,33%
Compensation	25,42%	21,67%
Shareholding	27,12%	35,00%
Local ownership	28,81%	13,33%

4.3.6B Table: Respondents preference for how to participate financially with sustainable housing project

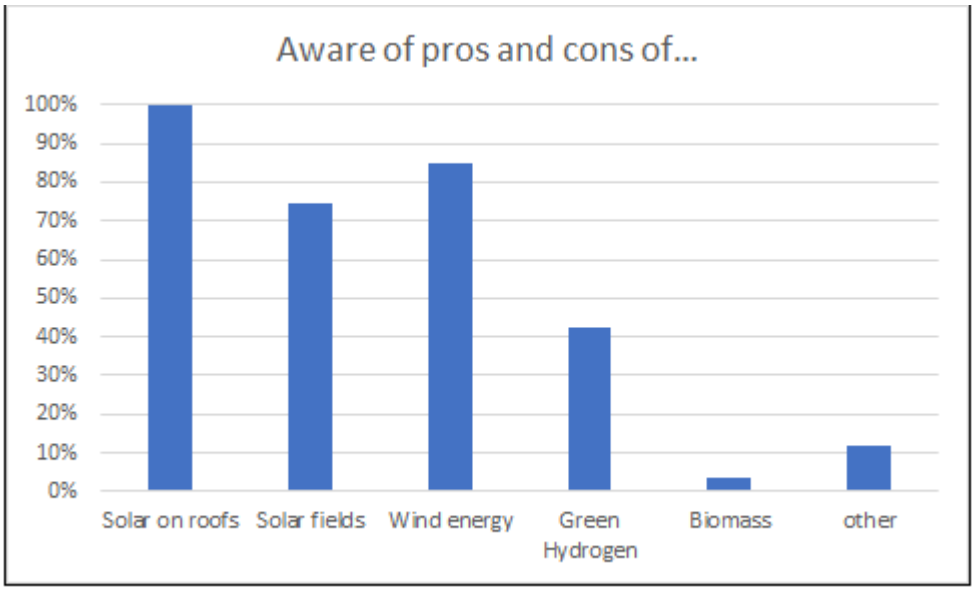
	SUSTAINABLE HOUSING PROJECT
I would not	13,33%
Subsidies	76,67%
Pay for Improvements	23,33%



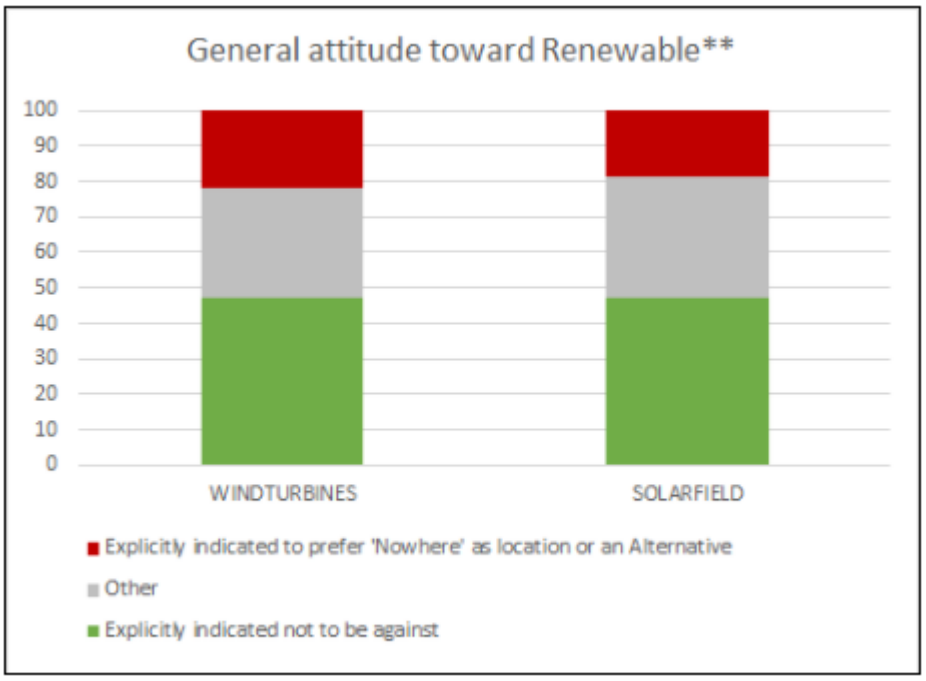
4.3.6 Graph: Respondents preference for how to participate financially with types of renewables

4.3.5 General Support

The survey results show that respondents are most aware of, and evaluate slightly more positively *solar energy* than *wind energy*.



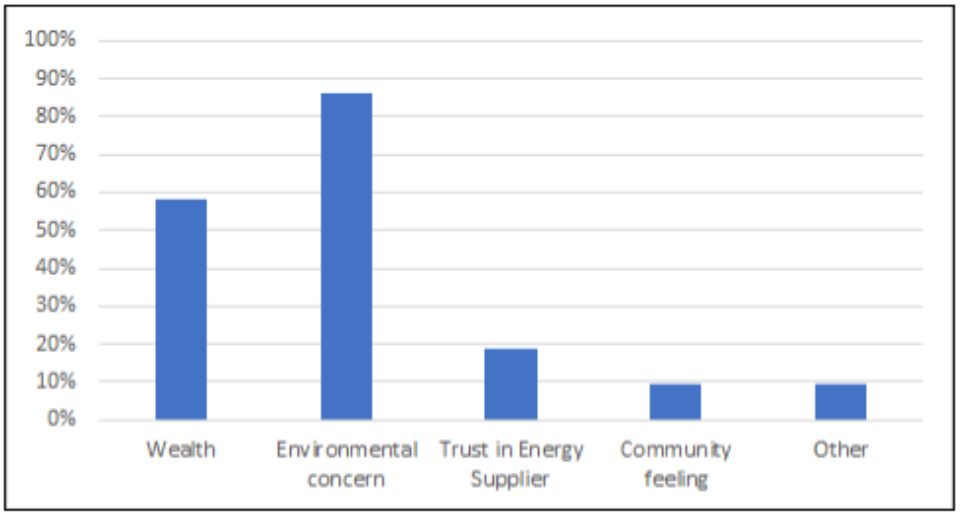
4.3.7 Graph: respondents awareness of the pros and cons of renewable energy source types



4.3.8 Graph: Respondents general support of renewables

4.4 What are the conditions for resident involvement and community support in the energy transition?

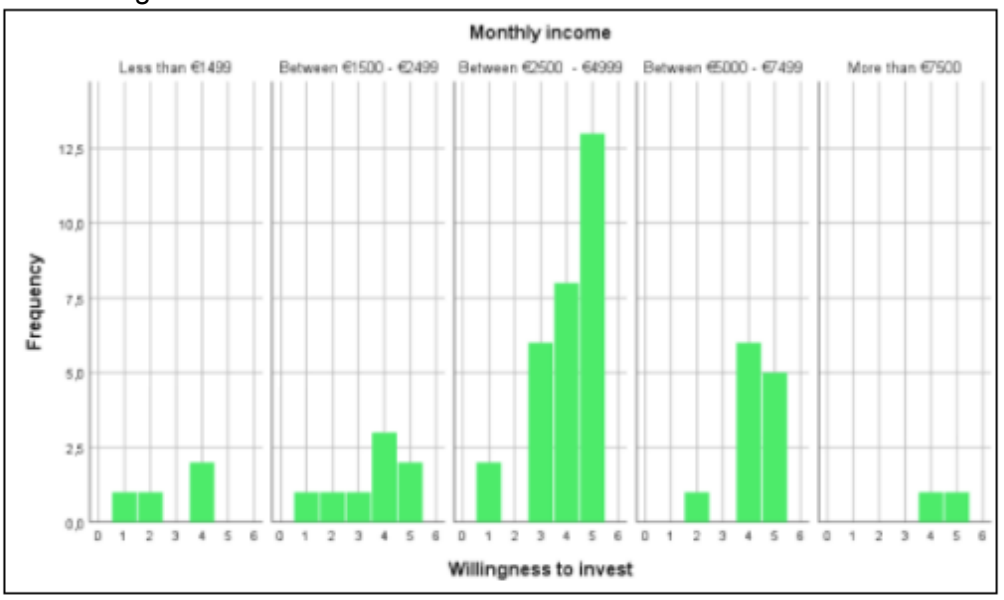
Various factors come into play to predict resident involvement and community support of the energy transition. Some were identified in 3. Methods. Overall factors that convince people to install renewables can be found in the graph below.



4.3.1 Graph: Factors that convinced citizens to install renewables

4.4.1 Funds

First, respondents were asked to indicate the range of their monthly income. This question was intended to measure a possible correlation between economic security and perception of renewables (assessed by the answers to *willingness to invest)*. 91,5% of the respondents agreed to share their income. How it affects their willingness to invest in renewables is shown in the histogram below.

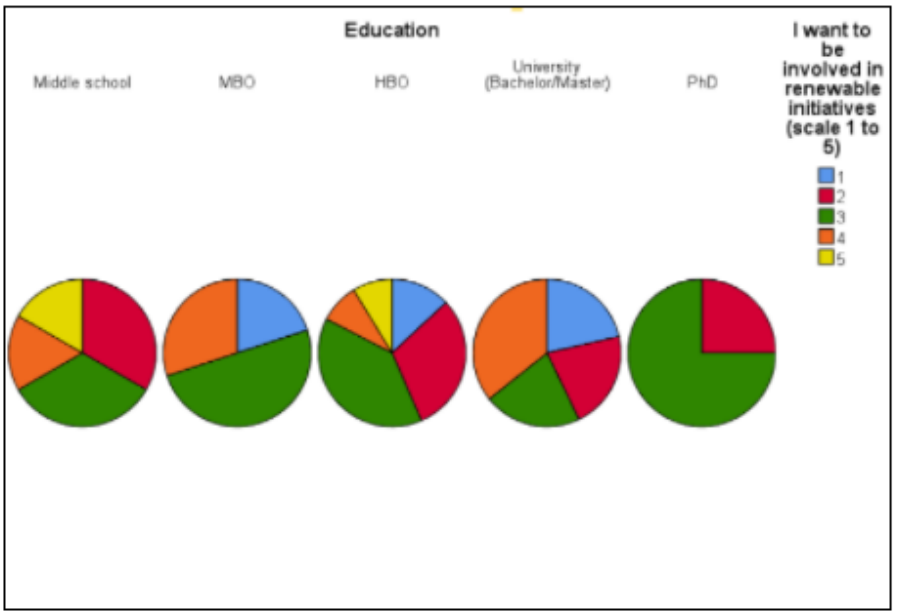


4.4.2 Graph: Histogram of willingness of residents to invest in renewables scale 1-5, plotted against monthly income.

In parallel, 68,4% of people that have not yet installed renewables indicated financial aid would help convince them.

4.4.2 Education

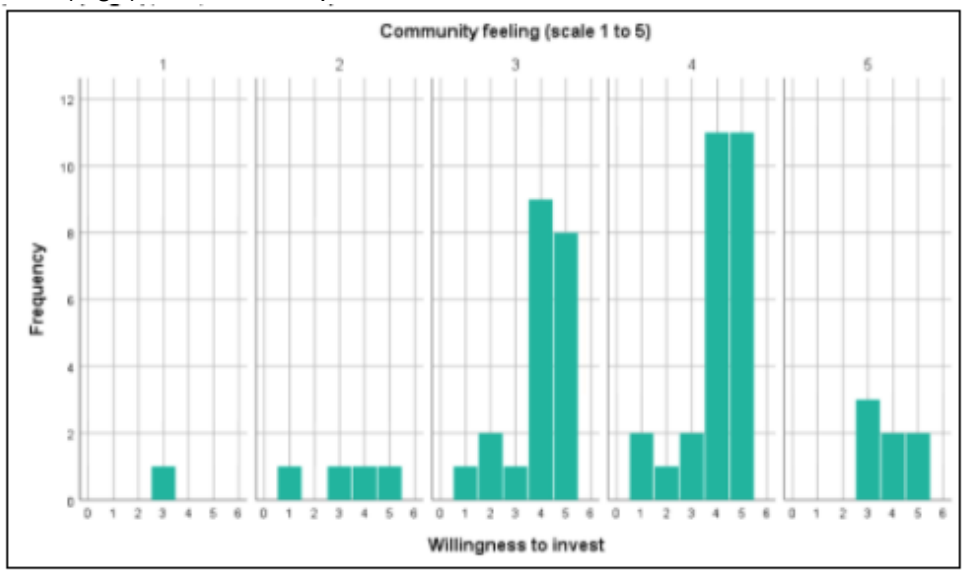
As can be seen in the pie charts below, it is difficult to distinguish a clear correlation between respondents' education and willingness to join renewables initiatives. A low willingness (scale 1 and 2) can be found across all groups. However, the amount of people who chose these scales is the lowest in those who pursued a MBO diploma, followed by PhD alumni. The only respondents that indicated being very willing (scale 5) have graduated from Secondary School and HBO.



4.4.3 Graph: Pie charts on residents willingness to join renewable energy a initiative scale 1-5, together with their level of education

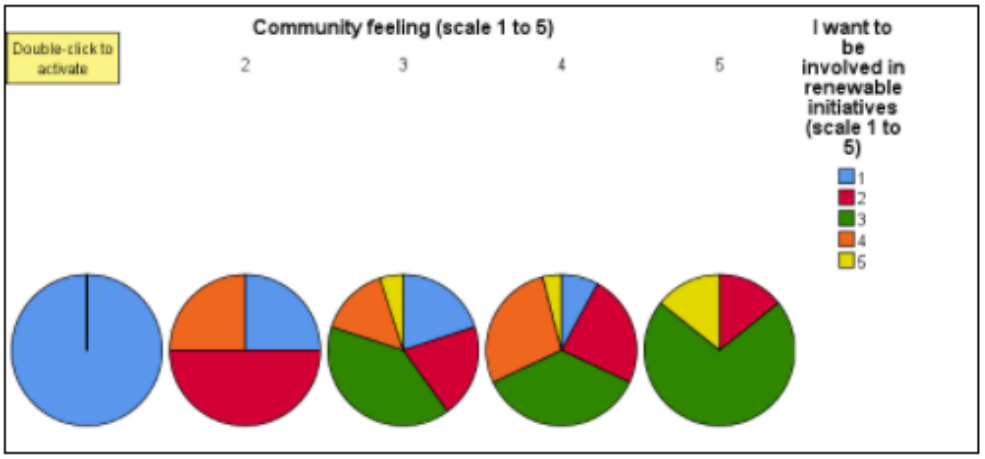
4.4.3 Community feeling

When asked how they would rate the sense of community in their neighbourhood on a scale of 1 (low) to 5 (high), 57,7% of respondents estimated it as a 4 or 5.



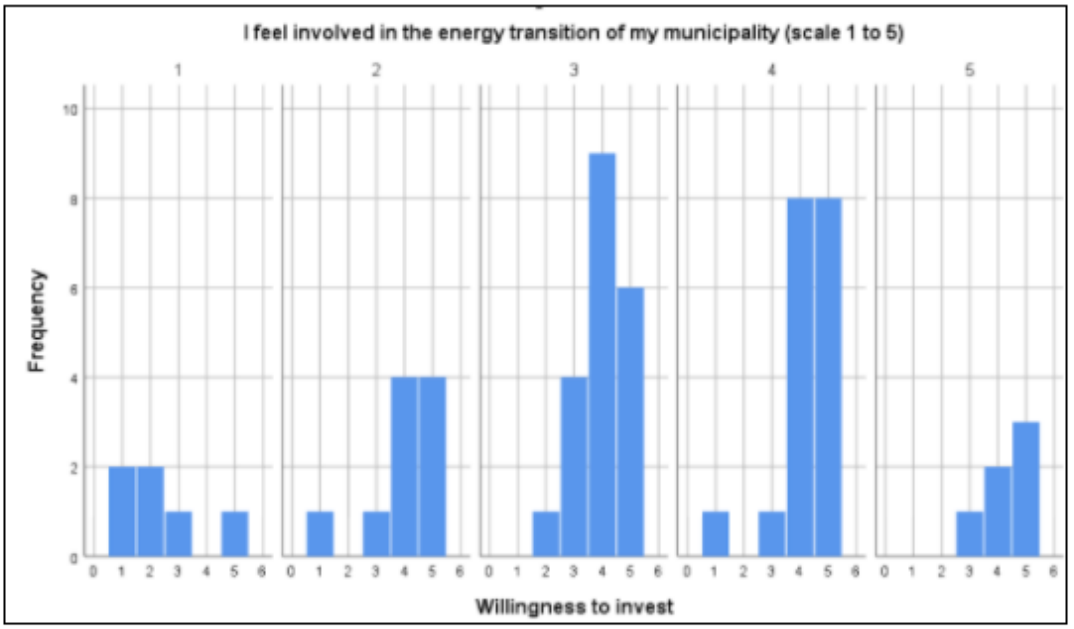
4.4.4 Graph: Histogram on residents willingness to invest in renewables scale 1-5, plotted against their community feeling scale 1-5

Out of those who do not wish to be involved in renewable energy initiatives, most people also tend to rate their feeling of community the lowest, as indicated by the following pie charts.



4.4.5 Graph: Pie charts on residents willingness to join renewable energy a initiative scale 1-5, together with their community feeling scale 1-5

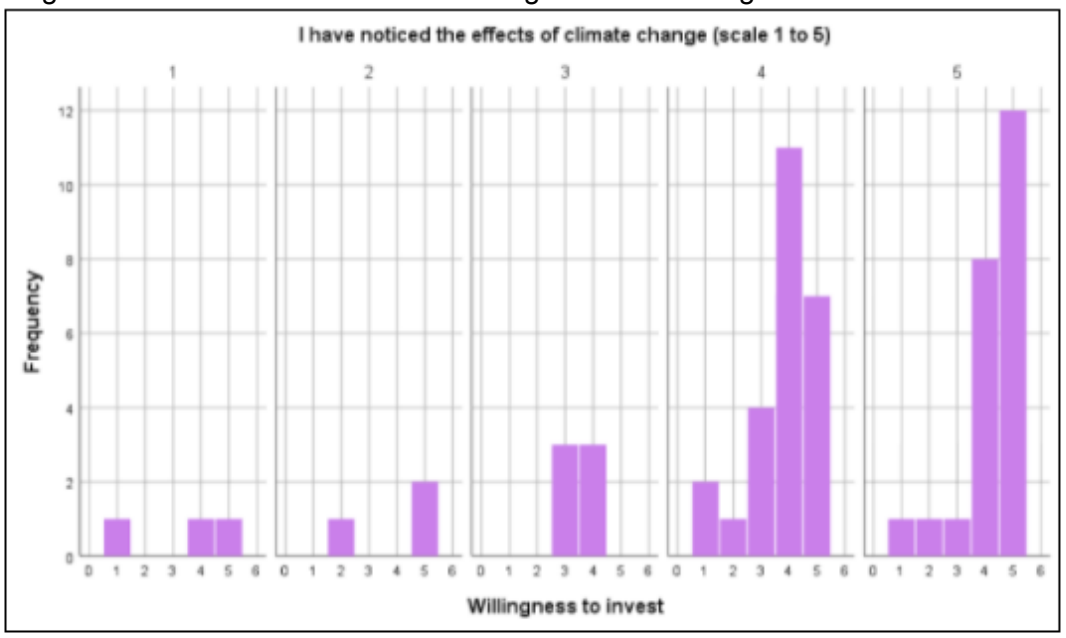
When asked what would convince people to install renewables, 52,6% said financial support for the whole community would help change their minds. The histogram below showcases the willingness to invest in renewables plotted against the respondents' feeling of involvement in the transition.



4.4.6 Graph: Histogram on the willingness of residents to invest in renewables scale 1-5 , plotted against their feeling of being involved in the transition scale 1-5

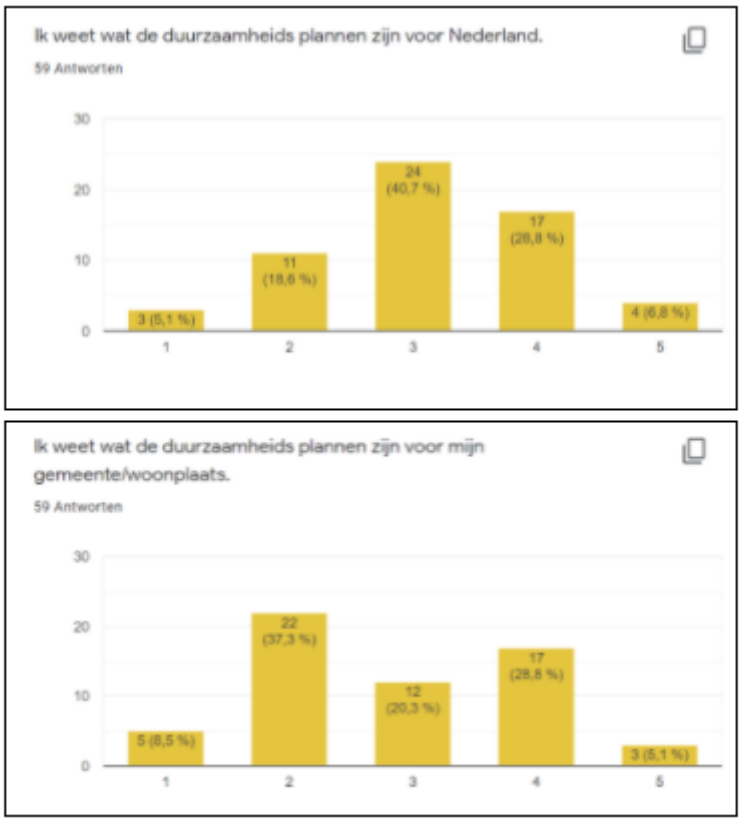
4.4.4 Awareness

A total of 79,7% of respondents indicated they have definitely or very definitely (scales 4 and 5) noticed the effects of climate change such as more droughts or extreme temperatures. The histogram below considers this variable together with willingness to invest.



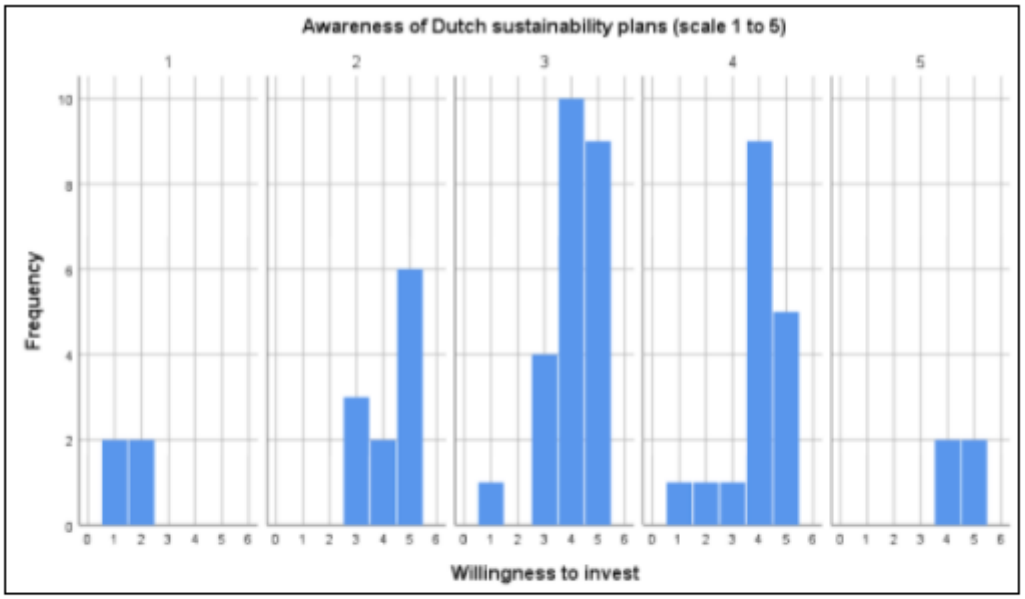
4.4.7 Graph: Histogram on the willingness of residents to invest in renewables scale 1-5 , plotted against noticing the effects of climate change scale 1-5

Then, on average, residents pointed out that they have limited knowledge about the sustainability plans that concern them.



4.4.8 Graphs: Awareness about Dutch (above) and municipal (below) sustainability plans

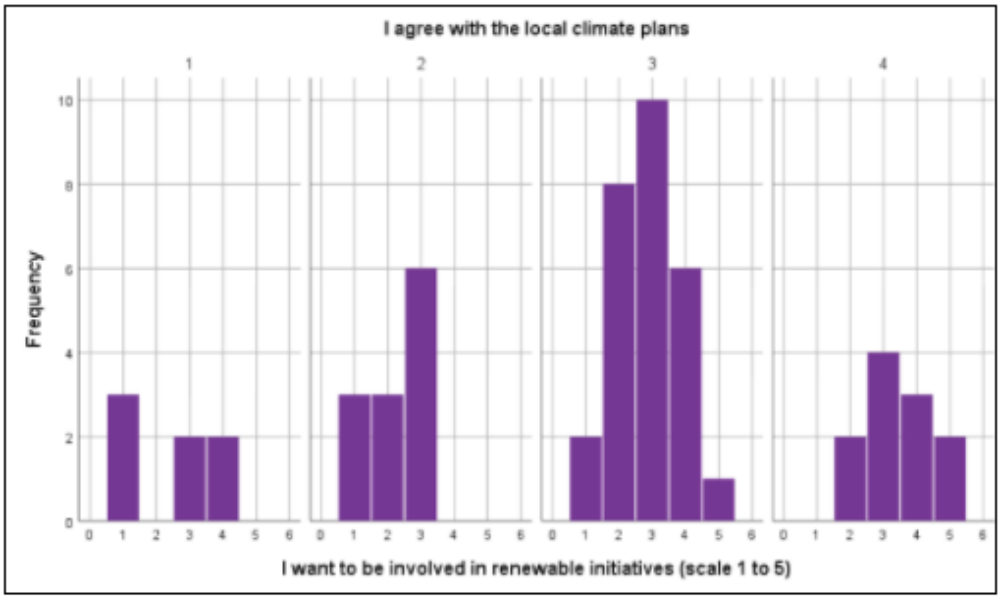
The histogram below plots this awareness against respondents' willingness to invest.



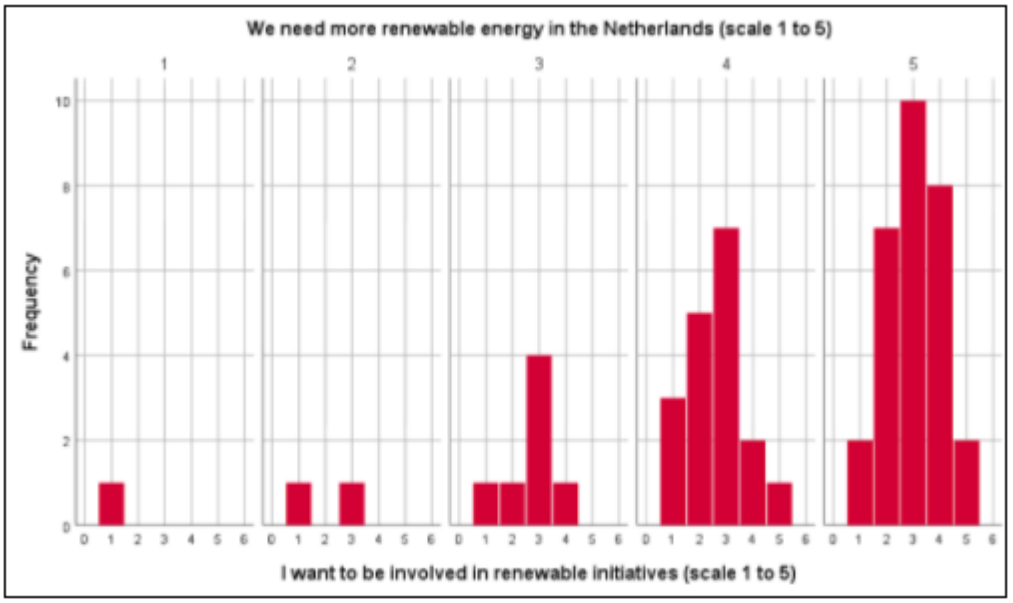
4.4.9 Graph: Histogram on the willingness of residents to invest in renewables scale 1-5 , plotted against their knowledge on Dutch sustainability plans scale 1-5

4.4.5 Environmental Concern & Action

The two histograms below visualise environmental concern and action together with willingness to be involved in renewable energy initiatives.



4.4.10 Graph: Histogram on the willingness of residents to join a in renewable energy initiative scale 1-5 , plotted against agreeing with local climate plans scale 1-5



4.4.11 Graph: Histogram on the willingness of residents to join a in renewable energy initiative scale 1-5 , plotted against feeling the need for more renewables in the Netherlands scale 1-5

4.5 What policy recommendations will ensure that the transition towards renewable and affordable energy is both successful and supported by local residents?

The aim was to gain insights on policy recommendations through conducting interviews with the municipality. Due to no response, these interviews were not conducted and the policy recommendations will be incomplete. This issue is also evaluated in 5.2 Limitations. Results from the other interviews and surveys can be found in 5. Discussion.

5. Discussion

This part restates the research questions and subsequently describes how the results answer these questions. With the use of the literature review, the findings are confirmed or contradicted. Furthermore, the uncertainties of our results are examined through identifying research limitations.

5.1 Answering the Research Questions

What are the social, technological and economical relationships or tensions between residents and the transition towards renewable energy sources in the Utrechtse Heuvelrug?

5.1.1 How are the plans to make the Utrechtse Heuvelrug climate neutral envisioned as of now, and how are the residents of the Utrechtse Heuvelrug involved?

Currently, the plans to make the Utrechtse Heuvelrug climate neutral depend massively on solar and wind energy, as well as making homes more energy efficient. These plans are outlined in roadmaps like the national Climate accord. As for citizen involvement in the planning of these roadmaps, there is hardly any. Consequently, roadmaps which do have active citizen participation can differ from these previously mentioned large scale roadmaps. This is backed up by the energy roadmap from the municipality Utrechtse Heuvelrug which was partly designed by citizens; in this roadmap there is significantly less focus on wind energy when compared to the Climate Accord and the U16 roadmaps (MEACP, 2019; U16, 2020). In several interviews, the energy ambassador program - of either the municipality, NGOs or business - was identified as a solution in improving citizens' involvement in the fulfillment of the climate plans. Meaning that if citizens were to be more involved in the planning and design of roadmaps, there might be more citizen involvement in the fulfilment of climate plans. Leading to a smoother and more efficient energy transition.

5.1.2 To what extent is the transition to a climate-neutral Utrechtse Heuvelrug a social transition?

According to the survey and interview with Verkade, these last couple of years, there has been a positive trend regarding awareness about the energy transition and its importance. If this trend of rising awareness continues, this could help in solving the lack of urgency among citizens. Which in turn, would help citizen involvement in the transition. In short, time is of the essence in gaining citizen support and involvement in the energy transition.

As much as time is important in the social part of the energy transition. Nick Verkade stressed that it is also important in the technical part of the energy transition. He said, “As time progresses, technologies and also the business models regarding the implementation of these technologies will likely evolve. Which would help make it easier, more efficient and most importantly cheaper to implement these technologies in development projects and existing infrastructure.”

Hence, as Buunk mentioned, to avoid a further widening of the social scissors, household energy should not be additionally taxed per a consumed unit. That is because the poorest families also generally occupy less insulated buildings. Using the same amount of energy, they end up with far less heat or electricity (Buunk, 2021).

5.1.3 What are the perceptions of the residents concerning the different forms of renewables?

Differences on preference of location were more apparent. Locations did show the same ranking of locations for both wind turbines and solar fields; *along industry* is the most prefered location, followed by *along infrastructure*, *agricultural land*, *nowhere* and then *alternative* or *in nature*. This is similar to case studies of previous research (Salak et al., 2021). However, this is only an ordinal similarity. The biggest differences are that respondents indicated 15% less often to prefer solar fields along infrastructure and 10% more often to prefer solar fields to be located on agricultural land. In addition only a small number of respondents have indicated an alternative to wind turbines in the area or solarfields.

Evaluation of wind turbines, solar fields and sustainable housing projects

While, generally, respondents evaluate renewable energies more positively than negatively. Contrary to previous research (Salak et. al. 2021; Liobikienė et. al., 2021) our results show almost no difference between RES types. Differences lie mostly in their concerns and potential reasons to be against can be an indication of what residents value and what factors of these renewable energy sources residents perceive as barriers. The most notable results will be discussed.

Firstly, the difference in importance of costs between wind turbines and solar fields versus a sustainable housing project. With it being the most important factor for sustainable housing projects but not even half as much for solar fields let alone wind turbines. The difference shown in our results cannot be fully relied on. The questions on costs were different between *wind turbines* and *solar fields* versus *sustainable housing projects*. The question was formulated more specifically on close proximity to the existing energy grid to reduce cost for the first two RESs and for the latter more specifically on costs for residents.

Secondly, the importance respondents assign to *not disturbing nature* with wind turbines and solar fields. Respondents indicated to find *not disturbing nature* an important factor the most out of all. This is also in line with research done in Switzerland (Salak et al., 2021).

Lastly, the difference between the answers of respondents on the question on concerns and on reasons to be against is stark. While the question on concerns shows what residents find important factors, the question on reasons to be against speaks to the factors respondents perceive are actual potential issues with the RESs. Here aesthetic factors are considered as important as nature. Respondents also indicated less *hinderance to residents* to be a reason to be against solar fields.

Participation

Evident from our results is that respondents are not interested in participating in the process. Which is not in line with expectations. However, respondents are more inclined to financially participate in sustainable housing projects.

5.1.4 What are the conditions for resident involvement and community support in the energy transition?

Perhaps the most significant factor for resident involvement and community support is the awareness of the current environmental issues. Residents who noticed the effects of climate change more severely tend to have more willingness to invest (see Awareness). Furthermore, residents with knowledge on Dutch and local climate plans tend to have an increased willingness. Dr. Heleen Mees also agreed that ‘salience’, or environmental

concern is most important in determining people's perception and engagement in the energy transition..

Another essential condition is the sharing of benefits. When residents are not clearly assured of any of these benefits, support tends to decrease. Some interviewees mentioned this phenomenon where residents view the investment in renewable energy as an investment without return. This sharing of benefits also helps to involve people with lower income. Histogram 4.4.2 showcases people with higher income are more willing to invest in renewables, which indicates a possible relationship between financial security and perception of renewables. Therefore financial security is proven to be crucial for people to consider getting renewables.

A third condition is a feeling of involvement in their community. Based on histogram 4.4.4, it seems the higher the sense of community (meaning solidarity between neighbors, group identification and possibly some peer pressure), the more people are willing to invest in renewables. Community feeling through installing renewables collectively also gives residents a feeling of impact and involvement, which helps to motivate them. In parallel, the result that half of respondents were in favor of financial support for the whole community shows the power of the community.

5.1.5 What policy recommendations will ensure that the transition towards renewable and affordable energy is both successful and supported by local residents?

From the interviews can be derived that a pro-active effort of the municipality to include residents in the process of setting plans on achieving the climate goals leads to their implementation with significantly stronger support of local residents. Residential support is key for carrying out the plans and thus makes it much more likely to be successfully achieved. From the survey, the conditions for residents to support the transition were gathered, with financial security, nature conservation and avoidance of hindrance being the most significant. These findings are considered in the policy recommendations, which can be found in Relevance.

5.2 Limitations

The results from the research do carry some limitations, which must be acknowledged. The survey had a lower response rate than expected (n=59). Since a larger sample reflects the population more accurately, it is possible that our limited sample size resulted in a sampling error. With 71,2% of male and only 27,1% female respondents, it was not possible to see if gender results in different perceptions or willingness to engage in the energy transition.

There is also a probability of sampling bias, meaning part of the population was favored. Before handing out the survey, the residents were told they were participating in a research regarding renewable energy, and people with interest in sustainability are more likely to take the survey. Additionally, since the survey was conducted through an online medium, the likelihood of excluding old people increased. Some of the flyers were placed in mailboxes instead of handed out in person as a result of time restrictions, which might affect how residents perceived the survey and cause response bias.

Non-sampling errors also need to be mentioned. The findings can have some errors due to non-response. This might have been caused by the length of the survey. In future research, this can be prevented by contemplating which variables are fundamental to compare or run tests on: many questions that were asked in the survey have not been included in the data

analysis. When revising the questionnaire, there were some wording and leave-out errors. When questioning about the spatial factors of placing a wind turbine, the phrase ‘in my municipality’ was missing. Preventing these errors could have led to a more accurate data analysis.

The survey was integral in identifying the conditions for resident involvement and community support in the energy transition. The low response has resulted in difficulties drawing conclusions from the gathered data. Running correlation tests was proven to be ineffective, which makes the pie charts and histograms less statistically significant. Also keeping the sampling bias in mind, the conclusions drawn can thus paint a distorted picture and cannot be trusted entirely. Additionally, the original proposal suggested including spatial factors as one of the conditions for involvement: because of the limited responses and time this has been excluded in the final research report.

Interviews

The research group was not able to hold interviews with all types of key stakeholders it envisioned as crucial for answering the research question. To answer subquestion five on policy recommendations, it was envisioned as crucial to interview the municipality. Due to no response, this has not been included in the results.

The first interview differed from all the following ones in method because the interviewee was sent questions in advance and a full transcript was made, which could have impacted the way results are managed. This was a result of a change in method over the course of the research.

The initial plan, to conduct semi-structured interviews, as outlined in the report proposal, was not realised. Instead, open interviews were conducted. This approach was deemed as more tangible given the large variety of stakeholders, different group members conducting the interviews, varying time limitations for the interviews, different response delays of participants, as well as downtime in between the individual interviews. This differed from the planning, however, since no semi-structured interview took place, it should not have impacted data obtained.

6. Conclusion

The following section will summarize the key results by restating and concisely answering the main research question: *What are the social, technological and economical relationships or challenges between residents and the transition towards renewable energy sources in the Utrechtse Heuvelrug?*

This research has helped interpret the current roadmaps towards a climate neutral Utrechtse Heuvelrug, and the technological and economical relationships in this energy transition. From the findings of this research it can be concluded that the transition is no longer a technological issue. As the technological feasibility of the transition towards renewable energy is increasing, the transition is becoming more a social issue: The energy transition must be just and inclusive, otherwise it will “not happen at all” because the energy has to be clean, affordable, “secure and safe” all in once (European Commission, 2020).

As mentioned in the introduction, in recent years more emphasis has been given to the bottom-up approach to also involve lower-level actors. The findings have identified the perceptions of residents towards different forms of renewable energy, and helped understand the conditions for residents to be involved in the transition. The survey provided the insight that residents slightly prefer solar energy over wind energy, as horizon and noise pollution (described as hindrance in the results) are two of the main aspects for residents to be against renewables. The interviewees all stated that citizen’s involvement currently is insufficient.

Based on these results, the conclusion is that it is of great importance to keep including more people throughout the transition. Local governments must support activities that aim to improve public image and knowledge of renewables. Make sure the energy transition is a just transition by considering various systems of financial support, so also the less wealthy are included in the proces. Ensure that residents are actively involved in developing the roadmaps towards climate neutrality, so their voices regarding horizon pollution, noise pollution, and nature disruption are taken into consideration.

Implications for further research these findings have are numerous. First, it seems that more research, and thus more policies, are focusing on the technological aspects of the energy transition. Since the main barrier to climate neutrality lies in society, it is key to focus on the social or psychological aspects of the energy transition instead (Whittle, Whitmarsh, Hagger, Morgan, & Parkhurst, 2019). Second, it was also established that more research on the community aspect of citizens in the energy transition is needed. At Utrecht University, Helen Mees is currently putting forward research focusing solely on this area to uncover hidden community factors predicting citizen's involvement such as “peer pressure”. These include creating a new framework taking into consideration for instance theory of perceived social norms or theory of planned behavior (Mees, 2019). Lastly, a research incentive should be placed on finding the optimal financial methods of participating in the transition for households, as current research is mainly done by local business or NGOs, but should be tackled more at national and european level.

7. Relevance and Integration Possibilities (Max 500)

7.1 Relevance

First, awareness must be raised, which can be done through education in schools, and also awareness programs specified for the municipality's plans. To have specific transition plans for each municipality is another recommendation, as this will not only make the transition more effective, but will provide residents with a feeling of collective action, which is pivotal for their support (Mees, 2021). When specifying the plans, it is also important to consider and analyse residents' reasons to be against renewables to mitigate these uncertainties.

A third recommendation is to ensure financial security through funds and subsidies. Ensuring this has proven to be successful, as was seen with the German Feed-in tariff. This policy mechanism ensured return when investing in renewables, and production from renewables increased drastically when this policy mechanism came into force (World Future Council, 2016). Financial security is crucial to also make sustainable housing affordable for everyone, so the less wealthy are also included in the transition (Buunk, 2021).Overall, the findings of this report are in line with the key goals of the EU energy strategy Accelerating Clean Energy Innovation, focusing on “energy efficiency first” and offering “a fair deal for consumers” (European Commission, 2016).

7.2 Integration possibilities

From a system perspective, recommendations suggested in the energy sector have to be considered in relation to solutions to sustainability problems complicating the achievement of climate neutrality in the area. Within the topic of Climate Neutral Heuvelrug, these are, in relation to roadmap feasibility, mobility and aqua thermal energy. Otherwise, the solutions are not approached with a sustainable systematic mindset (Meadows, 2008).

It was found that focusing only on one aspect, typically technology, is not enough to tackle a sustainability problem. This also has similarities with the research group focusing on mobility. An innovative solution to reducing GHG emission from transportation, same as from energy, can be shared mobility (Watson, 2013). Similarly to energy corporation systems, this solution demands “new business models and social practices” to be put in place. While searching for innovative solutions in technology, such as hydrogen in heatings, boilers or hydrogen as a car fuel, is wanted and is the easiest to implement, societal changes towards a low-emission future offer economical, societal and environmental benefits (Whittle, et al., 2019). While energy transition remains more important than mobility - it accounts for more than 75% of the EU’s greenhouse gas emissions - exploring community-based options should also be the case in low-carbon transportation (European Commission, 2020).

Finally, behind the scope of climate neutral Heuvelrug, it can be found that local governments need to cater to people’s needs and ideas if they want to be successful. Therefore, involving citizens in local governance and decision-making processes is crucial. All issues involve many stakeholders that are influenced or caused by social factors. Often, they are also found to be a part of the solution. Scenarios imagined by regular citizens can help shape a more sustainable Heuvelrug in the future. Furthermore, their perceptions on green energy and the ecosystem need to be considered by policy-makers or they might collide and even back-pedal policies.

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Images

All photographs documenting the fieldwork were taken by the group members.

9. Appendix 1: *Data Management Plan*

Before conducting the surveys and taking the interviews, we have clearly established our identity. By doing so, we wanted to make clear that we are not part of any of the municipalities, and that the data we gathered will not directly affect any policy-making process. To prevent any issues regarding privacy, we have plainly illustrated for what purposes the data will be used. By making sure that the data is anonymous and only stored throughout the duration of this project, the data will not be able to be tracked to the persons in question. Furthermore, we have asked the interviewees and survey takers for their permission to send the end result of the report to them. In doing so, they will be able to see first hand how the data has been used.

Information for interviewees

Thank you for agreeing to participate in this research as an interviewee.

We are a group of students from Utrecht University – Thom, Maya, Thijs, Barbora and Laurens - carrying out research on the residents and renewables in the Utrechtse Heuvelrug area until July 2021. The aim of the research is to identify the technological and economical potential of Utrechtse Heuvelrug in shifting towards renewable energy forms, map the willingness and ability of residents to participate in this energy transition, as well as suggest possible improvements that lead to a successful social transition towards climate neutrality. The expected outcome of our academic work is one public digital report whose findings may later be used for recommendations for policy-making process, but not necessarily will be.

Your information is intended to be held in accordance with applicable laws and used for research purposes only. By participating in this research, you are giving us your consent to do so for the duration of the research. The data is kept private to researchers and any unused material will be deleted after publication. Should you wish to leave the research prior to publication, you will be given our contact information to do so.

Prior to publication, we will share the report with you and will kindly ask you to give us feedback and your permission to publish. Should you have questions in the meantime, please, do not hesitate to contact us. Lastly, thank you once again for your time.

Information for survey participants

Thank you for agreeing to participate in this research as a survey respondent.

We are a group of students from Utrecht University – Thom, Maya, Thijs, Barbora and Laurens - carrying out research on the residents and renewables in the Utrechtse Heuvelrug area until July 2021. The aim of the research is to identify the technological and economical potential of Utrechtse Heuvelrug in shifting towards renewable energy forms, map the willingness and ability of residents to participate in this energy transition, as well as suggest possible improvements that lead to a successful social transition towards climate neutrality. The expected outcome of our academic work is one public digital report whose findings may later be used for recommendations for policy-making process, but not necessarily will be.

Your information is intended to be held in accordance with applicable laws and used for research purposes only. By participating in this research, you are giving us your consent to do so for the duration of the research. The data is kept private to researchers and any unused material will be deleted after publication. Should you wish to leave the research prior to publication, you will be given our contact information to do so.

Prior to publication, we will share the report with you and will kindly ask you to give us feedback and your permission to publish. Should you have questions in the meantime, please, do not hesitate to contact us. Lastly, thank you once again for your time.

10. Appendix 2: *Interview Questions*

The overarching goal of our research was to find out what the technological potential of the Utrechtse Heuvelrug in shifting towards renewable energy forms is, and how supportive we can consider its citizens of the energy transition. As explained in *3. Methods*, this was done by performing a literature review, gathering qualitative data from interviews with professionals knowledgeable or active in areas relevant to this project, and by surveying residents of the Utrechtse Heuvelrug.

Interviews

The goal of the interviews with public sector representatives was to identify the barriers that stand in the way of a successful social transition towards climate neutrality. In interviews with private sector representatives, the aim was to map good practices which currently help to overcome these. The desired outcome of the interviews with academic representatives were concrete points of improvements of the energy transition and citizens' involvement in it, relevant frameworks, as well as suggestions for further research.

The series of open interviews of approximately 30 to 60 minutes have been conducted either in Dutch or in English. All participants' gave permission to record all their answers. If that was not the case, it was planned that an additional member of the research group would have joined passively to take notes.

The following were the starting points for interviews we had with four different stakeholder groups. It was assumed that the questions were likely to change after the first interviews were conducted. This process took place to ensure more concrete and relevant questions could have been asked later, which is what happened. Second, each interviewee was also asked specific questions that were related to their work or research, which in the end were crucial for finalising the survey.

1. Interviews with municipality representatives

Technological

1. What is the current state of fulfilling plans to make the Utrechtse Heuvelrug climate neutral?
    a. Can you identify both its strongest and its weakest points?
    b. Can you comment on the feasibility of the current energy road maps?
        i. het Klimaat Akkord
        ii. Regional energy strategy (RES) or U16
        iii. municipality roadmap
    c. How do you plan to compensate to achieve the plans by 2035, 2050 should they not be on track?
2. What renewables are technologically and economically possible to use in the area?
    a. Can you identify the main barriers on both the technological and economical aspect?
        i. Why is the main focus on wind and solar energy? Do you look for alternatives? If yes, which?
    b. How do you overcome or plan to overcome these?

Social

3. Why should residents of the Utrechtse Heuvelrug be involved in the energy transition?

    a. Do you think they are generally aware/educated about the renewable energy options in their area? How is the municipality trying to increase awareness about this?
4. How are the residents of the Utrechtse Heuvelrug involved?
    a. Can you identify groups that are the most and least involved (ex. youth, elderly)? Why do you think that is?
5. What are the perceptions of the residents concerning the different forms of renewables and the roadmaps? Do you have any data supporting this?
    a. What are the opinions of the residents on the municipality's climate plans?
    b. What renewable energy sources are the most popular among residents today? Why do you think that is (ex. financial availability, prestige, prejudice, environmental impact)?
    c. Based on analysis found, people currently prefer solar over wind energy. Why do you think that is?
6. What are the barriers to citizens' support of and involvement in the energy transition?
    a. Can you identify the main geographical (ex. land availability, urban, rural or natural location) and demographical (ex. location, socio-economic status) urban problems?
7. What steps do you take now to overcome them?
    a. Are you improving land availability for renewables?
    b. Are you improving citizens' awareness about renewables (ex. energy ambassadors)?
8. Based on our literature review, energy transition is also a social transition. What do you think stands in the way of achieving a successful social transition towards climate neutrality?
9. What concrete policy recommendations will ensure that the transition towards renewable and affordable energy is both successful and welcomed by local residents?
10. How do you support the integration of renewables?
    a. Can you provide affordable renewable energy for the residents of Utrecht Heuvelrug?
    b. How do you encourage for instance financial participation in the energy transition and local ownership of renewables for the citizens?
    c. How do you include the residents in the decision-making process?
        i. Based on our research, the residents were involved in the preparation of the municipality energy road map. How? Can you see any benefits of that?
11. What less conventional solutions to the energy transition do you consider relevant?
    a. Can you identify specific examples?
12. Are you aware of Community Energy Systems? How frequent are they in the area?
    1. What are CES and how do CES work?
    2. What is your role in energy community systems?
    3. What are the main weak and strong points of this alternative solution?

Business

13. With which actors in the energy sector do you cooperate?
    a. How do you communicate with businesses in renewables
    b. Do you find cooperation sufficient? Do you see any barriers?
    c. How can this be improved?

14. How does the process of implementation of a new renewable energy source for a household initiate?
    a. What is the role of the municipality in this?
    b. Who is involved and what are the relations?
    c. What are the most common barriers?
    d. How can you overcome them?

2. Business or consultancy representatives

Technological

1. What is the role of your business in the energy system?
2. How does the Utrechtse Heuvelrug climate plans translate directly into your work?
    a. What did, do or will you have to change/advise in order to comply with the plans?
    b. Based on your experience, what are the strongest and weakest points of the implementation of current climate goals for Utrechtse Heuvelrug?
3. Can you comment on the feasibility of the current energy road maps?
        i. het Klimaat Akkord
        ii. Regional energy strategy (RES) or U16
        iii. municipality roadmap
4. What is the techno-economical potential of renewables in the area?
    a. Can you identify the main barriers on both the technological and economical aspect?
    b. How do you overcome or plan to overcome these?
5. What is your view on the economical situation (price, funding etc.) of renewables?
    a. What kind of improvements could help the implementation of renewable energy sources?

Social

6. What renewable energy sources are the most popular among residents/firms today?
    a. Why do you think that is (ex. financial availability, prestige, prejudice, environmental impact)?
    b. Based on analysis found, people currently prefer solar over wind energy. Why do you think that is? Is that true from your experience?
7. What are the barriers to citizens' support of and involvement in the energy transition from your experience?
    a. Can you identify the main geographical (ex land availability, location in urban vs rural vs natural area) and demographical (socio-economic status) urban problems?
8. What steps do you take now to overcome them?
    a. Are you trying to improve the financial availability of renewables?
    b. Are you trying to improve citizens' awareness about renewables (ex. energy ambassadors)?
9. What do you think stands in the way of achieving a successful social transition towards climate neutrality?
10. How does your business/consultancy communicate with customers?
    a. From experience, what does help to motivate customers?
        i. ex. Does having an online calculator showing the price of transition help? Does using graphics help? Does appealing to certain values of the consumers help, if yes, which?
11. What is the profile of your typical customer?
    a. citizens: is she/he young, single or family, gender
    b. firms: interests/motivations, size, location, sector
12. Do you actively try to motivate residents in the process as a company?
        i. If yes, how?

ii. What are the obstacles you have witnessed (concrete cases)?

Governmental/municipality cooperation

13. With which actors in the energy sector do you cooperate?
    a. Who are your key partners?
        i. Are these suppliers, retailers, municipalities, citizens? Why? What kind of interaction/relationship do you have with them? What are the specific channels through which you reach your members, customers and society?
    b. How do you communicate with municipalities?
14. Does the municipality help or stand in the way of the energy transitions?
    a. What steps can you take to improve this?
    b. Have you received any subsidy or grant for your work in the energy sector?
    c. Municipalities are too focused on solar and wind energy sources in comparison to other renewables. Why do you think that is?
15. What does the process of installing a new renewable energy source for a household look like?
    a. What is the role of the business in this?
    b. Who is involved and what are the relations?
    c. What are the most common barriers?
    d. How can or do you overcome them?

3. Academia representatives

Technological / Research

1. Can you comment on the feasibility of the current energy road maps?

    i.het Klimaat Akkord
    ii.Regional energy strategy (RES) or U16
    iii.municipality roadmap

    Based on our research, this is the only roadmap that included residents directly in the process of map preparation. In comparison to the other road maps, it is less focused on wind than on solar energy sources. Why do you think that is?
2. What motivated you to do academic work in this area?
3. According to you, what is the state of research on this topic? In the Netherlands, in Europe, worldwide?
    a. Can you think of any institutions focusing on this?
    b. Do you have any examples of ongoing research projects?
    c. Do you have any examples of successful research projects?
    d. Have you received any grant to do research about renewables?
4. With which actors in the energy sector do you cooperate?
    a. How do you communicate with them?
    b. Who, if at all, approaches you for advice?
5. According to your research, does the municipality help or stand in the way of the energy transitions?
    a. Have you received any grant for your work from them?
    b. Municipalities are focused on solar and wind energy sources in comparison to other renewables. Why do you think that is?
6. Where do you see the future of the renewable energy sector?
    a. What do you think is the role of renewables in society in 2030, 2050?
    b. Which technological advancements seem the most promising according to you?

7. What less conventional solutions to the energy transition do you consider relevant?
    a. Can you identify specific examples?
8. Are you familiar with Community Energy Systems in the area?
    a. What are CES and how do CES work?
    b. Where do you see the main weak and strong points of this method?

Social

9. Are you engaged in any initiative aiming to support the overall renewable energy sector?
10. How frequent are Community Energy Systems in the area?
    a. What are CES and how do CES work?
    b. What is your role in energy community systems?
    c. From your experience, what are the main weak and strong points of this alternative solution?
11. What are the barriers to citizens' support of and involvement in the energy transition from your experience?
    a. Can you identify the main geographical (ex. land availability, urban vs rural vs natural area) and demographical (socio-economic status) urban problems?
12. What could make renewables more financially accessible to residents?

11. Appendix 3: *Interview Transcripts*

What follows is a list of all the people that have been contacted asking for an interview. Those who responded positively are highlighted and transcripts of their interviews can be found thereafter.
This link provides a more elaborate contact list including the type of stakeholders, more detailed description of the persons, the progress of the interviews and communication sent.

Organisation / Institution	*Name of representative*
Heuvelrug Energie	Charlotte Derksen
Energie Garant	Hilbrand Does
Gray to Green	-
Energiepaleis	Kees Stap
Energie Pioniers Noordoostpolder	Peter Brouwer
Blue Terra	Jeroen Buunk
Blue Terra	Pim van Dijk
Blue Terra	Robin Teeken
Blue Terra	Stijn Schlatmann
Energie Samen	Brenda Harsveld
Energie Samen	Piet-Hein Speel
Energie Samen	Axel Posthumus
Gemeente Utrechtse Heuvelrug	Femke Batterink
EU	Aleksandr Stommels
Utrecht University	Heleen Mees
Utrecht University	Nick Verkade
Energie U	-
Regionaal Energieloket	-
TenneT	-
Energiewerkplaatsutrecht	-
Energie van Ons	-
The Dutch TSO	-
Energie Samen	-

Campus Landgoed Zonneheuvel	-
SDG House Utrechtse Heuvelrug	-

After the first interview transcription was carried out, the transcription method was collectively changed. It no longer seemed necessary for the report to document all parts of the interview. Instead, mainly summaries and key findings from the interviews were used. These were used along the course of the research and provide support to claims made in the report. Therefore, the majority of the interview transcripts contain this essential information only.

Jeroen Buunk

Interview took place May 25, 2021 on MS Teams from 15.00 until 16.00.
Energy consultancy firm Blue Terra

Technological aspect

1.What is the role of your business in the energy sector in the region of Utrecht?

I am focusing mostly on industry and bigger industrial firms, as well as supermarkets because these are also big energy users. I have also done some work on building or housing corporations and the way they move towards a more sustainable portfolio in the Utrecht area. We worked on a national level, not just the Utrecht area per say, but of course, I can say that all the regions have the same kind of problems regarding the implementation of solar on wind. In our firm, we are not really focusing on the implementations of winds. I have also done research on the implementation of wind energy in “not-understandable”, which is a region in the Netherlands in the South, making a local grid and also with hydrogen and more innovative approach. I am focusing on the business case, what is the economical situation of the firm and is it possible to implement renewables, energy savings, technologies.

2. How would you rate the potential of Netherlands to become climate neutral? How are we advancing to reach the goals set in the road maps? (i.e. comment on the feasibility of the current energy road maps: Klimaat Akkoord, Regional energy strategy for U16, municipality roadmap)

Technologically, I do not think there is much of a barrier. It is a complicated question in the long-run. If we focus solely on the wind and the solar implementation, there we are facing problems with the energy grid integration. Especially, if we look at different regions. The energy grid of the Netherlands is really oriented towards central production of electricity. From there, it is going to different cities and different users of electricity. Now, we have a more decentralized system of production, this is causing a problem with the grids. The energy grid cannot handle the energy produced, mainly during sunny periods. In some parts of the Netherlands, not yet in Utrecht, but it will occur that it is not gonna be possible to integrate solar projects anymore. This is a problem for the decentralized energy production,

Looking at the RES Strategy, the ambitions were great. They looked at “where is the room for us to implement solar fields or wind farms”, but they haven't looked at the need for grid extensions. The grid operator said it is going to cost us billions and also it is going to take a lot of time and a lot of effort to develop the whole grid.

Another point is the local (citizen) opposition to renewables, as you are probably already familiar with the NIMBY effect, which is very visible in the Netherlands right now. Wind and solar are the most popular energy sources, but already, there is more and more resistance towards wind. The opposite of wind has been here for long but now people are also opposing solar. They do not want solar fields. We just want solar systems on the roof, but then it is more expensive to put it on the roof. It is way better for those systems than biomass production of electricity because biomass has a bad public image and people do not want it in the area. Biomass has a bad image with people. People think it is not sustainable which causes a problem for the climate ambitions, not the electricity part, but the heat part. There, biomass plays a big role in making it sustainable and making it more climate neutral. So, if that is not possible anymore, that is a big problem.

2. 1 Is that the reason why your firms is focusing on types of renewable and not the wind turbines (i.e. are you trying to diversify the energy demand)?

No, it is also historical. The firm, in the past, was more focused on energy efficiency, industries and heat. industrial, electricity and heat production, We went into more solar because firms want it. But wind farms are a different kind of projects, we are looking into them only when combined with more innovative solutions, for instance hydrogen production or different kinds of fuel without CO2 for geo-thermal energy.

3. How does the Utrechtse Heuvelrug climate plans translate directly into your work?

With the “west”, it is not influencing our work too much.

3.1 What did, do or will you have to change/advise differently in order to comply with the plans?

The regions have a goal to reach, for example, install solar, and because that does not directly influence our customers, the firms, it is fine with us and is not changing our work.

3.2 When we were analysing different roadmaps, we have noticed only a few included residents in their preparation. Based on your consulting experience, what are the strongest and weakest points of the implementation of current climate goals for Utrechtse Heuvelrug?

They also heat plans, firms and companies. They are wondering how we are going to heat firms and the houses in a sustainable way. It is shocking to me that there is a neighbourhood approach. To explain, they go and say “oh this one is going to be heated by heat pumps, that one on something else”. Now, when the plans started, they noticed we have to convince all the people separately to implement the systems. So for the people, it is a hassle and it is more work. The people mostly have to invest in something and they do not know what they are dealing with and how they feel. They are used to heating in a certain way and suddenly they have to change that.

I agree they do not implement views of residents into the energy plans. However, that is really hard to do because there are so many viewpoints. If all the ideas of all the citizens are integrated, nothing will change. So, it must be said that we have to do this, but it is hard to make sure that they (residents) are getting along. It is one of the biggest problems of now - technologically there are problems with the grid, but it will go right with money and time - but getting people behind the plans is a big issue.

4. The road maps are mainly focused on wind and solar energy. What are different types of renewable energy alternatives?

Solar and wind are producing electricity, which is only a quarter or third of all the energy produced in the Netherlands. So to become climate neutral, we have to also improve the

heat and transportation. For part, it could be done by hydrogen - a different kind of energy that doesn't produce any emissions. The electric Hydrogen, it could be made of electricity. It is still difficult to implement and expensive process, also it is not clear how to overcome extra costs of this. Biomass can be used for electricity and heat. For heat, there is a problem of public opinion, i.e. organisations such as Greenpeace are against using it. Geo-thermal energy uses heat deep from energy to warm houses. We need a combination of all these solutions rather than just solar and wind.

4. 1 Is it realistic to get households for instance a boiler with hydrogen in its mix today?

Hydrogen is not a question of today. It is made out of natural gas, in the process, CO2 emissions are produced but you need to get it from green energy. It is a hype at the moment. Everybody is looking into hydrogen. Also, a lot of firms and environmental organisations are looking for it and demanding it. As with many solutions, there are some problems. The main problem here is on the economic side, we need a lot of it. We can't produce it in the Netherlands only.

Optimal would be to make it in Sahara, Africa and ship it to the rest of the world. It would be cheap because the sun is shining there a lot and there is also a lot of room but the mode of transportation is also problematic. So, hydrogen is realistic in the long-term, not today. Putting in the boiling instead of natural gas.

Social aspect and cooperation with government and municipality

5. What renewable energy sources are the most popular among firms and residents today? What convinces a firm to get renewables nowadays?

Especially for firms, it is about money. They are mainly interested in money: payback time and if risks are low. Sometimes, the payback time is too long of a payback time, but they can get some. Some firms can make use of the sustainable image, they say we are green, but that is just a part of the story. Mostly, it is just about looking into money. If the investment is longer than 3 years, they do not look at it. That is kind of frustrating because for them, it is too long. Another thing is, of course, there are some compliance issues. For firms, there is a list with measures that need to be taken, not the traditional lighting. Those two are the main reasons because of regulations and transfer that to citizens, I think that is the same. Also, if it is too complicated and if they are when you start heating your home with heat pumps, it means that the temperature of the, so you have to heat your home in a slightly different way, that makes them change their behaviour slightly. Still people are saying I do not want it, it is too complicated. On the other hand, some residents are more influenced by climate, if it is better.

5.1 You mentioned that 3 years of payback are too long for some firms. Can you be a bit more specific about the scale of payback time today?

If the payback time is below 5 years, they have to do it, we have a really good measure, they say ok but it is too long for us, we will do it. I have to say most firms have a lot of different international firms with headquarters in a different country, they think like: any investment is the same, if we are not obliged to, we will not do it.

5.2 Does the municipality or the government help or stand in the way of the energy transitions?

Governments do not stand in the way of the transition, the regulations do work.

5.3 What steps can we take to improve this?

I am not sure if you are familiar with the EU ETS European system of carbon pricing. It is getting more attention and as an expert on this topic in our firm, I get a lot of questions regarding that. That is something that will become more expensive. There are subsidies, of course.

Now firms are starting to realize they need action, putting a price on CO2 emissions really helps. With residents, it is a bit more complicated. If you increase the price of gas in your home, for example, or subsidize the use of renewables for residents, the people that can't invest in new ways of heating their home, they are going to pay more and more and you will get energy poverty. I would say it is, therefore, problematic. You can do more with subsidies, but you also need to make sure they are targeting the right people.

5.4 How can the economical situation be improved?

It is complicated, it is not like income, if you use more energy, you have to pay more per unit of energy because poor people live in less insulated homes so of course they will pay more. We can make the taxes, so we tax the rich more than the poor not on energy but on something else.

Currently, we are subsidising solar and wind energy, so there is an additional tax called the renewable energy tax. The income of the tax is going directly to the subsidies. The problem is that households are paying for a significant part of the income, but international firms are getting subsidies. I would say not to disconnect subsidies and taxing. It is the acceptability of our wind farms. when you see it, you can say i pay for that. But, you know you don't have any additional income from that but the firms are getting subsidies for that so that is really harming the image of renewables.

6. What do you think are the barriers to citizens' support of and involvement in the energy transition from your experience? (identify the main geographical (e. land availability, location in urban vs rural vs natural area) and demographical (socio-economic status) urban problems)

The NIMBY effect is at least for part, finding a way to get people involved. Local initiatives which are helpful, but it takes a long time. Therefore, multinationals are helping because they can implement a lot of renewable energy in a short span of time.

There are also BBA constructions. From the wind farm, we take all the energy produced and we buy it. It can be just administrative, for example buying it from a windfarm in FInland. Therefore, you can say you are getting it (renewable energy), because people are paying more for renewables. They know, of course, they are still getting electricity from a coal plant.

7. How do you work or communicate with municipalities?
There should be a bit more communication between different municipalities. Lot of people are doing research and projects that have already been done in a different municipality. I am not much in contact with them so I cannot say much about this.

8. What do you think of we should ask the residents in the survey?
I think it would be interesting to see if people who are realising that climate change is happening are more willing to get renewables. (...) So asking people things like “Have you experienced weather extremes? Do you want to do (social) good?”.

Conclusion

9. We have had some problems contacting the municipality. Do you have any tips on who to contact there? Additionally, do you have any tips on who to interview for our research?

I will think of some.

10. What is important to share yet we haven't talked about it?

I think we covered a lot, it is a complicated topic. In the past three years so much has been done and I am optimistic about the future of renewables.

Disclaimer: This transcript omits some incomplete sentences as well as discussions unrelated to research topics from the interview. Highlighted sections of text are selected as the most important information for creation of the survey and the research report. The interview questions were sent in advance per request. In the end, this was the only case for the interview.

Peter Brouwer

Interview took place May 27, 2021 on MS Teams from 12.30 until 13.15.
Energie Pioniers Noordoostpolder

- Peter's renewable energy organization is extremely busy at the moment and focuses on delivering results.
- A balance of Burden and Benefits is essential for good participation from residents. This is because people with little financial power have a hard time installing solar panels or insulating their houses.
- Citizen engagement needs to be planted through the use of the education system.
- Peter is pretty satisfied with the involvement of local governments, subsidies etc.
- There are many ongoing projects in his field.
- Their approach resembles the 'Trias Energitica' strategy:
    1) Make people become aware of energy use to minimize it
    2) Insulation
    3) Use of green energy on large scale
- Involving citizens now is not happening the way it should, there is currently way too little involved.
- For many people, the energy transition is a "ver van mijn bed show". In Dutch, this statement describes something that does not keep people occupied since they don't feel like they have anything to do with the transition.
- Windmills seem more cost-effective than solar panels.

- The involvement [of citizens] is not sufficient. That is the problem we are trying to tackle at EPN. The transition still is for many people something that does not keep them busy.
- People only experience the burdens of the windmills, and not yet the beneficial effects. Experience has shown us that when residents have a larger share in the beneficial effects, the controversy will shrink. With beneficial effects, I mean financial compensation for example.

- Apart from the obvious, such as the effects on their view and the noise pollution from windmill parks, there is a problem of shadow from these parks.
  But, I would like to repeat that these complaints cease to exist when people get their contribution of the benefits. That is why it is of great necessity that, in our renewable energy projects, everyone has their share. We also realize that people need financial support to go through the process of transitioning their homes. And when there is no support for this, or no compensation, people do not have a large incentive to follow through.
- Financial aspects are some of the main obstacles in the social transition.

Heleen Mees

Interview took place May 27, 2021 on MS Teams from 14.00 until 15.00.
Assistant professor and researcher at the Copernicus Institute of Sustainable Development
Conducts research on climate change adaptation, local (climate change) governance and interactions between city governments on the one hand, and citizen and local businesses on the other hand. Also interested in citizen engagement, self-initiated and self-managed citizen initiatives.

- She developed a theoretical framework on individual conditions for citizen engagement with three dimensions:
  1. motivation
     - whether the citizen wants to join such an initiative
     - group identification: based on literature, she believes ‘peer pressure’
  2. capacity
     - whether they can join
  3. ownership, responsibility
     - whether they feel the moral obligation to do something and join
- Other factors:
  - Salience
  - Money is not that big of a convincing factor, only for those who are already interested and care for the environment. It is, however, a barrier, along with space, knowledge and sense of ownership. (sharing benefits)
- Barriers to citizen engagement:
  - no motivation
  - no capability: money, space, knowledge
  - no sense of ownership (when people don’t get anything from the renewables nearby and they feel all the benefits go to big companies)
  - NIMBY effect

- How to increase salience:
  - educate
  - awareness campaigns
  - sermon, not carrot

- Examples of citizen engagement:

  - being a participant in policy processes in local governments

    - co-deciding with local gov on projects, more interactive
    - energy ambassadors
    - stadsgesprekke

- contact or look into:
    - Thomas Bauwers
    - Buurkracht
    - Opgewecht

Nick Verkade

Interview took place May 26, 2021 on MS Teams from 11.30 until 12.00.
Junior Lecturer at the Copernicus Institute of Sustainable Development
Interest on energy consumption and production, innovation and decentralization.

PhD in Eindhoven, about the role of citizens and cooperatives in organizing the smart grid. Which is closely related to the rise of renewables, the grid needs to be developed alongside the energy sources. Nick looked at this from a social science view. For instance, how citizens are seen in the eyes of corporations and cooperations.

Motivation to get into the field: thesis about the smart energy meter in everyone's households. This was his introduction to cooperatives, after that he came across the energy grid PhD project.

Current plans: There are always Technological, Social and Economical factors which have to be taken into account. The local level is also important in 'the transition'. This is where you can gain your support. And this process needs to also be democratic on the local level. If this generates enough generation capacity is quite difficult to know. Whether or not the current plans will be enough in the grand scheme.

The current work of cooperatives is marginal at best. Even within the total renewable energy being generated.

How can citizens be motivated, and which actors are important in this initiation?
Most people will probably see the point of doing something renewable, but the question is what people can do, and the more people do, the more expensive it gets. Insulation is doable, solar panels are getting more affordable, however, things like energy neutral homes or anything related to heating it gets quite difficult and expensive. Making it more difficult for people to get on board. Different regions will have different ideas on how to get people on board and get them to act. Renewables being tailor made for people and places is very important in the 'energy transition'.

Time is also quite important in developing technologies and a market with better business models in order to make renewables and things like sustainable heating an attractive idea for people to partake and invest in, as well as for the companies selling. These companies will know what the better options are from a sustainability perspective, but this can't be done overnight. Which is why time is of the essence. Supply-demand is important to consider. To make sure shift in the market can happen, there need to be the right policies in place so that the technologies that are currently expensive to work with are supported and that there are some guarantees, and that investing is not all-risk.

Energy communities

500/600 energy cooparatives, which is a kind of business where all shareholders have an equal vote. They are often started because people want to act, but they don't want to do so on their own. This organization can help in developing anything from solar panels to solar fields to maybe even wind turbines. These people will often have some expertise in energy, management, finance which can be combined into the cooperatives in order to develop a project. Early cooperatives had to be pioneers in a way, but the new ones can kind of copy what others have done in the past. The role of these cooperatives are not necessarily to make a big technical impact, but they are key in the social process of gaining backing for projects like wind turbines and solar fields. This view is not shared across the board, however.

Generally if a company or government plans a park without people close having a say they will resist. If you can involve people in the descision making process you will generally have more backing but there will still (and always) be some opposition. Debates also tend to get quite polarizing (social media plays a part)

Focus on wind turbines and solar panels.
Regional level means that citizens organizations will be involved. A rule and goal from the government is that energy projects need to have a certain percentage of local ownership, community energy systems can fill that role and help make that possible.

It used to be that most people don't really have an opinion on things, but a small minority try to create a debate, which in turn influences the opinions of this majority. Generally there is a lot of support for renewables however, once you get specific and when plans get 'close to the people' then you will run into a lot more resistance and support might differ from general levels of support.
The challenge is that there is a need for a certain amount of energy, but this can't really be done without disrupting anyone. Especially because people don't feel urgency to ask for more and for projects to do more.

If the bottleneck is this urgency then once more, the solution might come from time. More acceptance, the younger generation becoming more prominent, etc. Not a sure thing though. People need to feel urgency, and technology needs to become more accessible.

An important thing to know in order for people to become more accepting of renewables is knowing where potential gain from projects goes to.

- Include/ask residents about actual plans, these will always give a different reaction than abstract ideas or support.
- Energy cooperations are essential.
- Most people will probably see the point of doing something renewable, but the question is what people can do, and the more people do, the more expensive it gets. Insulation is doable, solar panels are getting more affordable, however, things like energy neutral homes or anything related to heating it gets quite difficult and expensive. Making it more difficult for people to get on board. Different regions will have different ideas on how to get people on board and get them to act. Renewables being tailor made for people and places is very important in the 'energy transition'.
- Generally if a company or government plans a park without people close having a say they will resist. If you can involve people in the decision making process you will generally have more backing but there will still (and always) be some opposition. Debates also tend to get quite polarising (social media plays a part).
- An important thing to know in order for people to become more accepting of renewables is knowing where potential gain from projects goes to.

Kees Stap

Interview took place June 8, 2021 on MS Teams from 16.30 until 17.30.
EnergiePaleis

- The key to making houses more ecological is when people have time for this, which is, when the houses need to be renovated.
- This also makes the transition very easy to sustain, hence, it is happening in times of need. When people need to renovate, for instance, leaking roofs or broken heating, this is when the green energy transition comes into play. This way, it is sustainable.
- Information about this is key, but there is not enough of it in the energy road maps.
- We need to educate people about the bigger picture of the transition. For instance, explain to them that "we have 10 years to do this and this", so they know what is going on and what they can do about it.
    - how can we get some energy in some area (wind turbines)
    - how can we be more efficient with the energy we already use (housing)
- Demographics: often older people with more money, or people who have to renovate their houses (after, for example, buying a new one)
    - "ppl who think sustainability is more important" more money + elderly
- Motivation

        - Does having an online calculator showing the price of transition help? Does using graphics help? Does appealing to certain values of the consumers help, if yes, which?
        - appeal to “your home” = take care it of sustainability
- See energy efficiency actions as just a necessary thing for your house.

12. Appendix 4: *Survey Questions*

Survey questions were developed based on literature review and interview sessions. Specific questions can, therefore, be traced back to the interview transcript. The online Google Form that was distributed was in Dutch and can be found under this link: *bit.ly/watdenkjij2021*. Therefore, what follows, is the English translation of the survey:

Introduction

First of all, thank you for choosing to participate in our survey, we really appreciate it! We are five students at Utrecht University, and this survey is part of a research project exploring what renewable energy forms can be implemented in the Utrechtse Heuvelrug and how its citizens would view them. Your opinion is highly valuable to us because we want to know what you think of the energy transition of your region, what concerns you might have and why, and whether you would be interested in getting involved.

The survey starts with a disclaimer and privacy statement, after which a few demographic questions will follow. The rest of the survey is divided into four parts. The survey will take about 10 minutes of your time.

Disclaimer

Your answers will only be seen by us and will only be stored until the project ends on July 2nd 2021. We will make sure all gathered data remains anonymous. You can address any privacy concerns you might have to m.c.a.perazadidion@students.uu.nl. We would also love to keep you updated and send you our final report if you wish. Lastly, please be assured that while we hope the relevant municipalities and actors will take interest in our findings and listen to your concerns, it will not be possible to trace your opinions back to your personal identity.

Do you agree with us using your data for research purposes and as explained above?

- Yes
- No

Demographics (1/6)

Age: ___

Gender:

Woman/Man/Other/Prefer not to say

Highest level of education attained (diploma):

Primary school/ Middle School/MBO/HBO/University (Bachelor and/or Master)/University (PhD)

What is your monthly disposable income?

- Under 1499
- 1500 - 2499
- 2500 - 4999
- 5000 - 7499
- 7500 and over
- Prefer not to say

What is your housing status?

- Homeowner
- Tenant

Town of residence:
- Rhenen
- Leersum
- Doorn
- De Bilt
- Veenendaal
- Amerongen
- Leusden
- Maarn
- Other:____

Rate the community feeling in your neighborhood: 1/2/3/4/5

Awareness (2/6)

To what extent do you agree with the following statements?
Strongly agree / Agree / Undecided / Disagree / Strongly disagree

I am noticing the effects of climate change. (For example: droughts, extreme temperatures, news about natural disasters)

I am familiar with strengths and weaknesses of (you can click multiple answers)
- [ ] Solar roofs
- [ ] Wind energy
- [ ] Hydrogen
- [ ] Solar fields
- [ ] Other, namely: ....

I know what the sustainability plans are for the Netherlands.

I know what the sustainability plans are for my municipality.

Opinion (3/6)

To what extent do you agree with the following statements?
Strongly agree / Agree / Undecided / Disagree / Strongly disagree

I believe we need to acquire more energy from renewable energy sources in the Netherlands

I agree with the current climate plans of the Netherlands

I agree with the current climate plans of my municipality

Which do you think is the most popular form of energy among your neighbours:
- Solar energy
- Wind energy
- Hydrogen energy
- Biomass
- Other ___

Which do you think is the least popular form of energy among your neighbours:
- Solar energy

- Wind energy
- Hydrogen energy
- Biomass
- Other ___

Action/ Engagement (4/6)

To what extent do you agree with the following statements?
Strongly agree / Agree / Undecided / Disagree / Strongly disagree

I feel involved in the 'energy transition' of my municipality

I am aware/engaged in my energy consumption

I would like to lower my energy consumption

I am willing to invest in a form of renewable energy for my household

I am willing to invest in a technological innovation of renewable energy

Do you use a form of renewable energy in your household?
- Yes
- No

If yes, which?
If no, why?

If yes, what has persuaded you in doing so?
- Wealth
- Environmental concern
- Trust in renewable energy suppliers
- Community feeling
- Persuaded by neighbours
- Persuaded by an energy ambassador
- Other ___

If not, what would persuade you in doing so?
- Financial aid
- Financial support to install for the community as a whole
- Others that are installing it
- Nothing
- Other ___

Are you involved in a renewable energy initiative?
An organisation by and for residents involved in energy issues.
- Yes
- No

Engagement, yes

You have implied to be involved in a renewable energy initiative.

Which?
How did you come in contact with this initiative?

Engagement, no

You have implied to not be involved in a renewable energy initiative.

Would you like to be involved in an energy initiative as mentioned above?

- yes
- no
-

Indicate to what extent you agree with the following statements.

Strongly agree / Agree / Undecided / Disagree / Strongly disagree

I feel sufficiently informed about such energy initiatives.

I would join such energy initiatives if my neighbours would do so.

I would be willing to contribute financially to such energy initiatives.

I think joining such an energy initiative would require me to spend time and effort in this initiative.

Opinion on existing climate plans and roadmaps (5/6)

We would like to know your current view on the climate plans in your current place of residence.

*If there were to be a **wind turbine** placed within my municipality…*

... my preference of location would be: (*one option*)

- Along infrastructure (ex. along A28 in Leusden between 'Rusthof' and the golfclub)
- On agricultural area
- Along industry (bedrijf terreinen)
- In the area of the park UH
- None

... the following is the most important to consider: (*one option*)

- Near grid to reduce cost (and taxes)
- Preserve Nature area and not disturb wildlife
- Preserve the comfort of the residents, i.e. no overlast
- Preserve the view (horizon vervuiling)
- Protect local economic activity, e.g. farmers, tourists

… I would want to participate financially: (*tick the box*)

- By receiving compensation (Tegemoetkoming, fondsen en vergoeding)
- By having a share of stocks (aandelen en obligaties)
- By local (co-)ownership

… I would want to participate: (tick the box)

- In the decision-making and negotiations
- In raising awareness
- Not

… I would be against because

- It will give me discomfort (overlast)
- It will diminish the natural beauty
- It will deter wildlife

- It will interfere with my beliefs
- I would not be against
- Other ___

...I am willing to invest money in renewable energy if the guaranteed payback is:
- Within a year
- Under 3 years
- Under 6 years
- Under 10 year
- Not willing

*If there were to be a **solar field** placed within my municipality…*

- *... my preference of location would be: (one option)*
  - Along infrastructure (ex. along A28 in Leusden between 'Rusthof' and the golfclub)
  - On agricultural area
  - Along industry (bedrijf terreinen)
  - In the area of the park UH
  - None

- *... the following is the most important to consider: (one option)*
  - Near grid to reduce cost (and taxes)
  - Preserve Nature area and not disturb wildlife
  - Preserve the comfort of the residents, i.e. no overlast
  - Preserve the view (horizon vervuiling)
  - Protect local economic activity, e.g. farmers, tourists whatever
  - Nothing
  - Other ____

- *… I would want to participate financially: (tick the box)*
  - By receiving compensation (Tegemoetkoming, fondsen en vergoeding)
  - By having a share of stocks (aandelen en obligaties)
  - By local (co-)ownership
  - Not
  - Other ____

- *… I would want to participate in the process: (tick the box)*
  - In the decision-making and negotiations
  - In raising education
  - Not
  - Other ____

- *… I would be against because*
  - It will give me discomfort (overlast)
  - It will diminish the natural beauty
  - It will deter wildlife
  - It will interfere with my beliefs
  - I would not be against
  - Other ____

- *...I am willing to invest money in renewable energy if the guaranteed payback is:*
  - Within a year
  - Under 3 years

- Under 6 years
- Under 10 year
- Not willing

*If there were to be a **project initiated to improve the sustainability of houses** within my municipality …*
Think about solar panels on roofs, better isolation.

... the following is the most important to consider: (one option)
- The lowest cost for residents
- The aesthetics of my neighborhood
- Minimal invasive installation (temporal, physically)
- Personal ownership of the energy produced
- Nothing
- Other ____

… I would want to participate financially: (tick the box)
- Not participate financially, I will only participate when it's free
- By getting subsidies to reduce installation costs, and pay the rest myself
- By paying for the improvements
- Other ____

… I would want to participate in the process: (tick the box)
- In the decision making and negotiations
- In raising education
- Not
- Other ____

… I would be against because
- It will give me discomfort (overlast)
- It will diminish the natural beauty
- It will deter wildlife
- It will interfere with my beliefs

...I am willing to invest money in renewable energy for my house if the guaranteed payback is:
- Within a year
- Under 3 years
- Under 6 years
- Under 10 year
- Not willing

Conclusion (6/6)

Thank you for taking the time to fill out this survey!

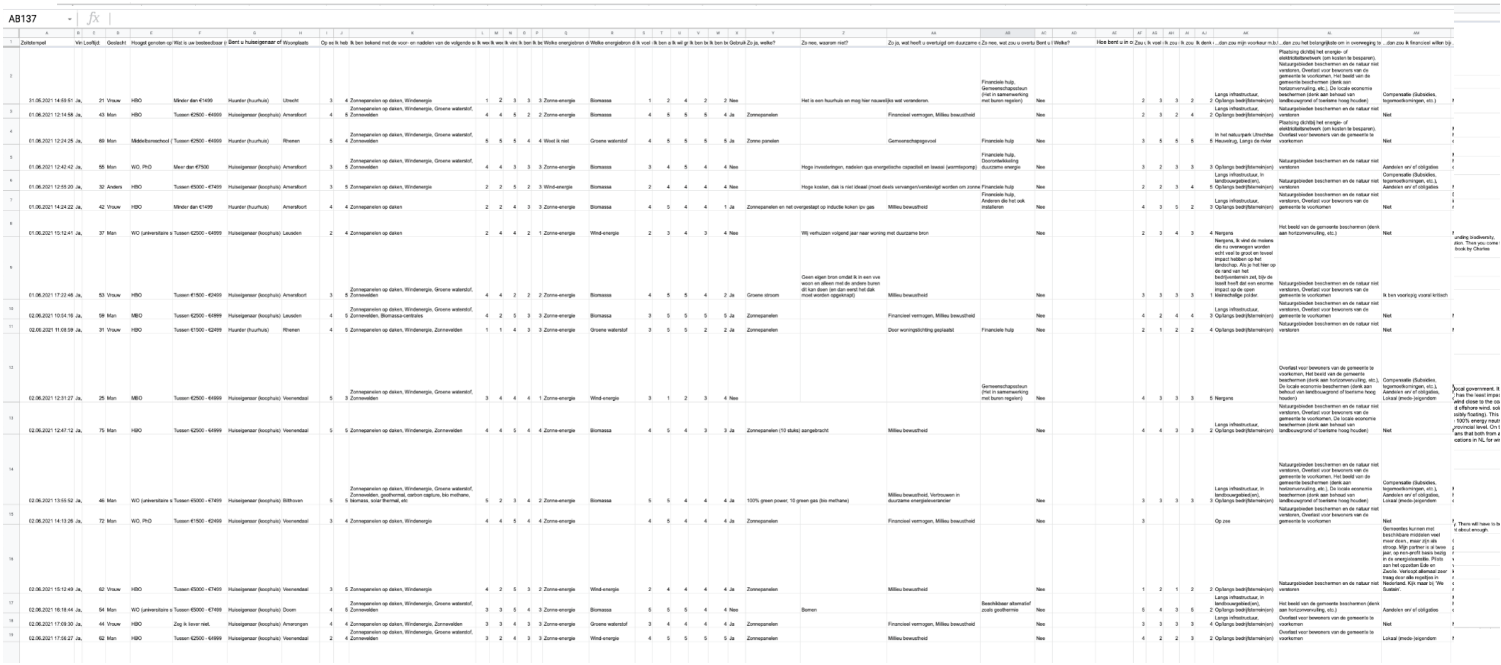
Do you wish to be kept informed about our research or do you have any questions? If so, you can contact us at m.c.a.perazadidion@students.uu.nl

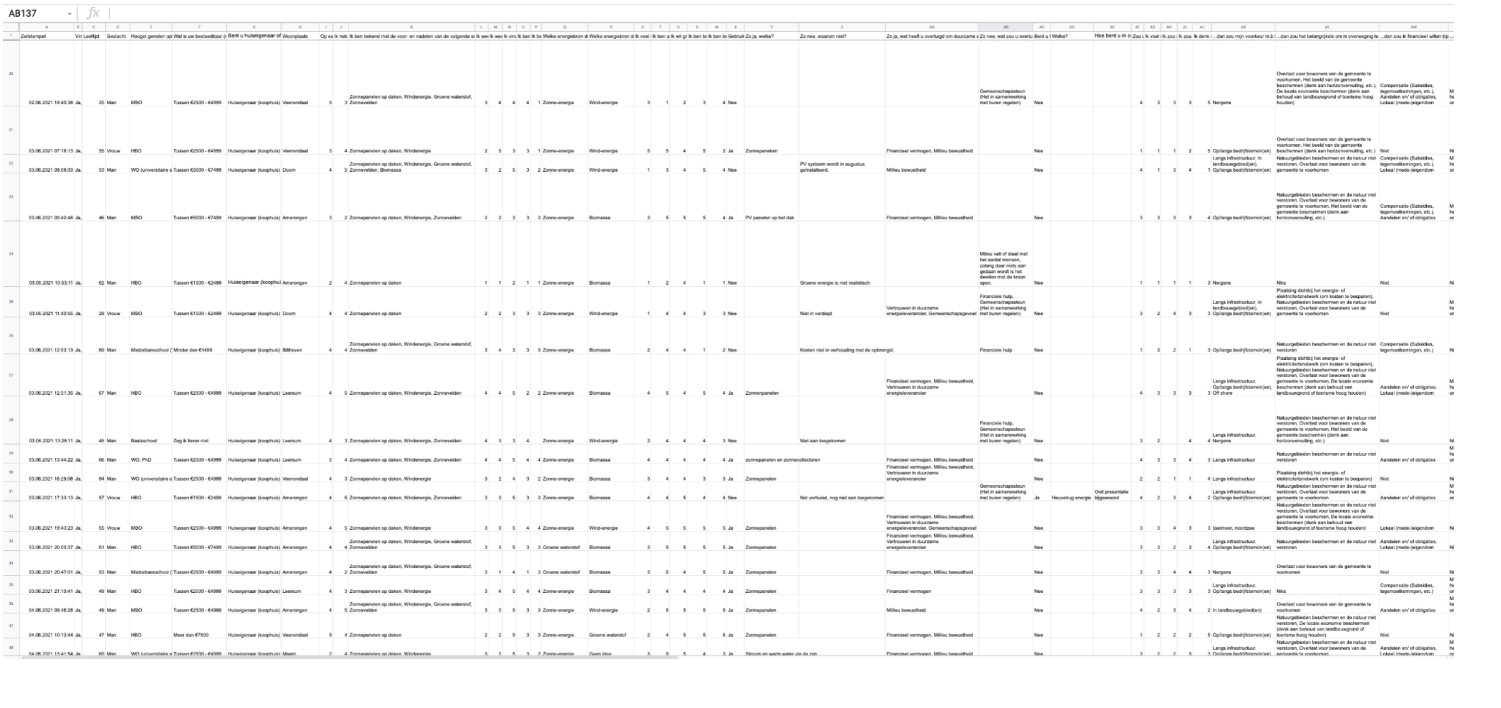
Would you like to help us by forwarding this survey to your acquaintances? You only need to copy this link: bit.ly/watdenkjij2021

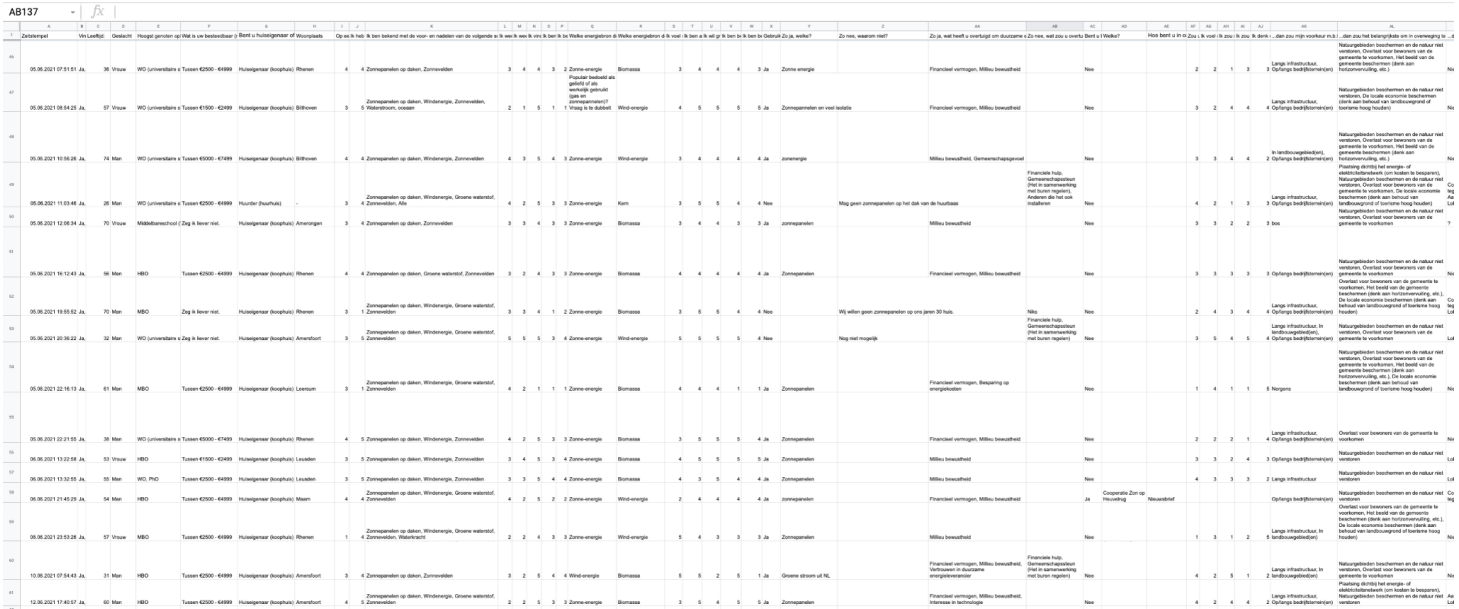
What did you think of this survey, or have you got any last comments? Let us know here: __

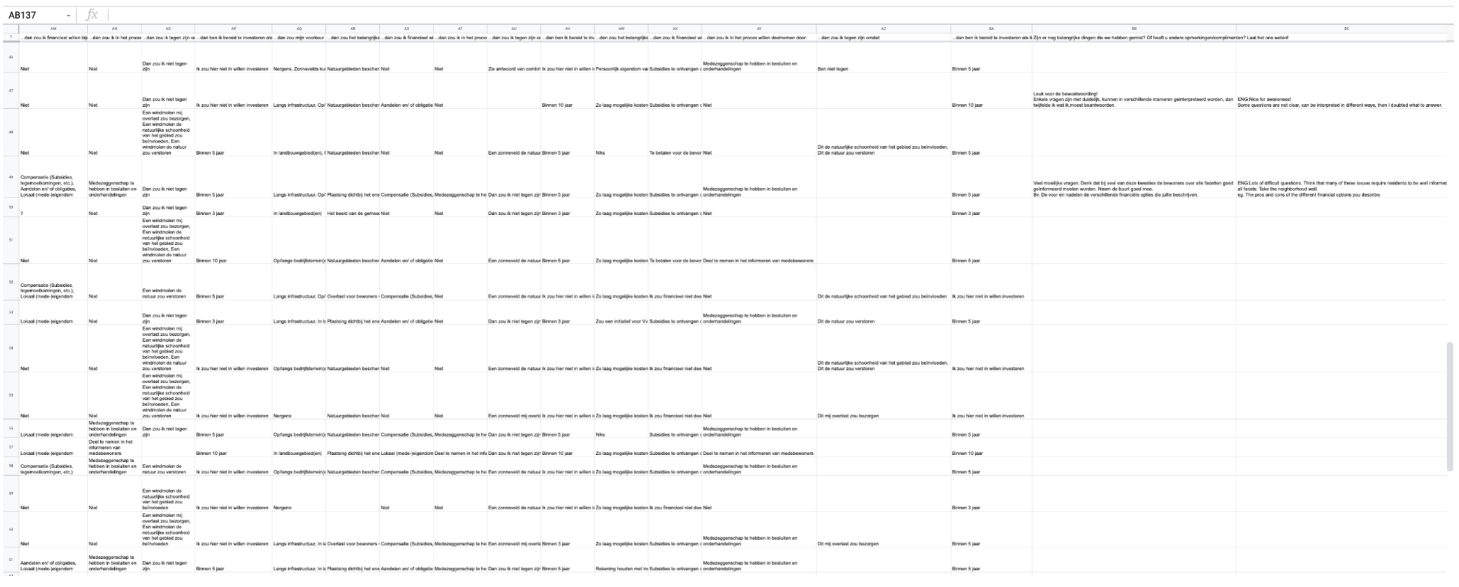
13. Appendix 5: *Survey Responses*

What follows are the 59 responses to the survey. The full excel sheet is also available online.









14. Appendix 6: Flyer

During the data collection fieldwork going from Tuesday June 1st until Friday June 4th 2021, this was the flyer the residents of selected cities received (more information on this process can be found in Appendix 7: Stratified Sampling). Whenever available, the flyer was handed out to residents in their households after a brief discussion; if absent, it was left in their mailboxes.

Pictures: would be nice to distribute within the report if u agree.

1)

	WINDTURBINE	SOLARFIELD
Along Industry	63,33%	68,33%
Along Infrastructure	56,67%	41,67%
Agricultural Land	20,00%	30,00%
In Nature	3,33%	1,67%
Nowhere	15,00%	13,33%
Alternative*	5,00%	8,33%

2)

3)

	WINDTURBINE	SOLARFIELD	SUSTAINABILITY HOUSING PROJECT
Not against	47,17%	47,27%	35,48%
Nature	35,85%	32,73%	22,58%
Aesthetic	43,40%	38,18%	22,58%
Hinderance	24,53%	5,45%	22,58%
Beliefs	5,66%	1,82%	3,23%

4) participation

Process participation	WINDTURBINE	SOLARFIELD	SUSTAINABLE HOUSING PROJECT
I would	43,10%	40,00%	56,67%
I would not	56,90%	60,00%	43,33%

	SUSTAINABLE HOUSING PROJECT
I would not	13,33%
Subsidies	76,67%
Pay for Improvements	23,33%

	WINDTURBINE	SOLARFIELD
I would not	44,07%	43,33%
Compensation	25,42%	21,67%
Shareholding	27,12%	35,00%
Local ownership	28,81%	13,33%

15. Appendix 7: Stratified Sampling and Data Collection Organization

During the fieldwork week, the partner research group was provided with general information about the data collection for this project.

Guidance

- Approach houses alone and keep distance.
- Bring water, food, OV and sunscreen.
- First meeting point is Utrecht Centraal at 10:00.

- Use fourth street only as a backup, in case the third one does not have sufficient number of houses, there is construction going on, etc.
- Please download google maps beforehand.
- Avoid using public transport during peak hours.
- For OV bikes, check https://www.ns.nl/deur-tot-deur/ov-fiets/huurlocaties/map before you leave home. This might be the best to coordinate the day before because the station of the destination will depend on the availability of bikes.
- Also, if you're gonna rent an OV bike make sure at least one person has a personal OV chipkaart!

Flyer Organisation

- Flyers: 750 (Respondent aim: 384)
- Fieldwork pairs: 5
- Flyers to hand out per pair, over the whole fieldwork week: 150
- Flyers to hand out per municipality: 75
- Flyers to hand out per street: 25

Final Street Selection (These were general starting points, not a confining selection)

Maarn
- Briedélaan
- Bakkersweg
- Schoollaan
- (Driespronglaan)
- Route: https://goo.gl/maps/orPCom7QJ4f1DPdQ9

Doorn
- Amersfoortseweg
- Kampdwarsweg
- Eikenlaan
- (Jan Ligthartlaan)
- Route: https://goo.gl/maps/YWwEVVhH6EAAStYN7

Amerongen
- Gasthuisstraat
- Imkerlaan
- Korenland
- (Kerkeland)
- Route: https://goo.gl/maps/ZyoMZR5XT8RjoNPf8

Leersum
- Bentincklaan
- Burgemeester s'Jacoblaan
- Wildbaan

- (Prinses-Marijkelaan)
- Route: https://goo.gl/maps/Td6Ns8wNU3dKDPWx7

Bilthoven
- Gregoriuslaan
- Ruysdaellaan
- Magnolialaan
- (Berkenlaan)
- Route: https://goo.gl/maps/3bU9ZxXY8rhEWpZy7

Rhenen
- Eikenlaan
- Sparrenlaan
- Bantuinweg
- (Weversstraat)
- Route: https://goo.gl/maps/VJ1WUmHGKJyeCNiV6

Veenendaal
- Boslaan
- Marsmanlaan
- Middellaan
- (Boegspriet)
- Route: https://goo.gl/maps/x5vmUaq1Yg8zbH5C8

Leusden
- Kees van Burgstedenstraat
- Schutterhoeflaan
- Kon. Beatrixlaan
- (Petri Markensteinstraat)
- Route: https://goo.gl/maps/j3ZTm2C6SRrT5qf3A

Baarn
- Beaufortlaan
- Nassaulaan
- Luitenant generaal van Heutzlaan → changed to Vondellaan
- (Gerrit van Veenlaan)
- Route: https://goo.gl/maps/xiWwxxqiu2XajWu79

Amersfoort
- Puntenburgerlaan
- Treublaan
- Violenstraat
- (Prinses Marielaan)
- Route: https://goo.gl/maps/ymDxBCwZ1MqfzC9w8

Division

Consequently, this was the final partner division and designated cities.

1 Veenendaal & Amerongen (Kristiana & Laurens)
- traveling time:
  - 3h40 (bike)
  - 2h10 (OV + bike between towns)
- OV bikes are available at Veenendaal de Klomp or Veenendaal West, but in limited numbers!
- traveling time between towns:
  - 32 min (bike)
  - 30 min (OV, bus 50)

2 Rhenen & Leersum (Vanessa & Thom)
- traveling time from uni and back:
  - 4h (bike)

        - 2h30 (OV + bike between towns)
    - (OV bikes are available at Rhenen station, but in limited numbers!)
    - traveling time between towns:
        - 40 min (bike),
        - 36 min (OV, bus 50)

3 Leusden & Maarn (Federico & Maya)

- traveling time:
    - 3h15 (bike)
    - 1h30 (OV + bike between towns)
- Can either rent bike at Amersfoort Centraal or ‘Keobike verhuur carrousel’ at bus stop “Groenhouten” from bus 17 or 80 or 82 from Amersfoort Centraal
- traveling time between towns:
    - 32 min (bike)
    - 20 min (OV, bus 82)

4 Doorn & De Bilt (Agnese & Thijs)

- traveling time from uni and back:
    - 2h20 (bike)
    - 1h30 (OV + bike between towns)
- OV bikes are available at Bilthoven station)
- traveling time between towns:
    - 53 min (bike),
    - 36 min (OV, bus 50 & 58)

5 Baarn & Amersfoort (Renske & Barbora)

- traveling time:
    - 1h30 (train + bike between towns)
    - 2h (train + bike)