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# The Impact of Socio-Economic Status and Energy-Transition Policies on Energy Citizenship Through Materialised Participation in Groningen



## COLOPHON

**Title:** The Impact of Socio-Economic Status and Energy-Transition Policies on Energy Citizenship Through Materialized Participation in Groningen

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## ABSTRACT

Energy citizenship becomes increasingly important as it emphasises the critical role of individuals and communities in influencing the future of energy systems towards a more sustainable and inclusive society. This study investigates the relationship between materialised participation, energy citizenship, economic status, and energy transition policies in the spatial context of the city of Groningen. The primary objective was to study how socioeconomic position and energy-transition policies influence energy citizenship through materialised participation. A single in-depth case study was done, with data collected through semi-structured interviews with Groningen homeowners. The findings demonstrated that materialised participation had a beneficial influence on energy citizenship. Individuals with greater socioeconomic levels were more inclined to participate in materialised activities. Furthermore, energy transition policies were found to have a positive impact on materialised participation, with community-based projects and energy democracy programmes supporting higher engagement. The study gives useful insights for achieving an inclusive and accessible energy transition that prevents marginalised communities' marginalisation. These findings contribute to an increasing understanding of the significance of energy citizenship and materialised participation in the energy transition in the context of the Netherlands, and Groningen particularly.

## 1. INTRODUCTION

The energy transition is a complex process covering a wide range of fields, from technical to social and economic, that attempts to convert the energy sector and the whole economy/society away from fossil fuels and towards renewable energy sources (United Nations, 2021). This transition is essential for minimizing climate change and attaining global environmental goals (UNFCCC, 2018). However, the energy transition is not only a technological challenge but also a deeply rooted social endeavour. It necessitates the active participation of citizens to collectively create and shape a sustainable energy system. (United Nations, 2021).

As the emphasis on citizen engagement in the energy transition increases, the concept of energy citizenship has emerged as a key topic. Energy citizenship is the interaction of individuals and communities with energy issues such as energy production, use, and government. It relies on the idea that everyone has the right to access clean, affordable energy and to have a say in energy-related problems (Wahlund et al., 2022).

Materialised participation, or the tangible ways in which individuals engage in energy-related issues, is an important component of energy citizenship. This can include installing solar panels, participating in community energy projects, and implementing energy-saving

measures. For an inclusive and equitable sustainable energy transition, materialised participation is required (Ryghaug et al., 2018).

In actuality, numerous municipalities and stakeholders such as business owners, and governmental authorities appear to be struggling to engage residents in the energy transition and the usage of renewable energy in general, as well as through policies. Individuals who can afford to migrate to gas-free heating networks, solar panels, or electric vehicles can now participate in the energy transition, but others cannot (De Beun, 2022).

The Netherlands was chosen as a research context because of its ambitions for energy transition (European Commission, 2021), which would be interesting to examine as a case study. Furthermore, the Netherlands has a significant advantage over other countries in terms of lowering its footprint because it is a relatively small and densely populated country where new infrastructure investments may be made at a low cost due to high usage. Energy is vital to the Dutch economy and contributes a disproportionate amount to GDP when compared to other countries (Roelofse et al., 2016). In the Netherlands, people have steadily adopted low-carbon technologies such as solar and wind parks (Roelofsen et al., 2016).

Groningen, in particular, was chosen as a case study. Groningen's comprehensive and integrated approach to sustainable energy makes it a great case study for energy transition and energy citizenship. Energy has long been a prominent industry in Groningen, and the shift to sustainable energy sources is currently a top priority in the Groningen region (New Energy Coalition, 2021). Initiatives in the region, such as community energy projects, the Energy Transition Fund, and the Energy Academy Europe, illustrate the region's dedication to a sustainable future and its awareness of citizens' critical role in accomplishing this objective (Sahoo et al., 2022). Groningen was named a European "lighthouse city" for its leadership in the energy transition (Groningen.nl, n.d.). Groningen serves as a model for other regions attempting to transition to sustainable energy by including citizens in the transition process and investing in education and innovation (Sahoo et al., 2022).

Despite growing recognition of the importance of energy citizenship and materialized engagement in the energy transition, more research is needed in the energy citizenship area (Ryghaug et al., 2018). While prior research has concentrated on centralised energy systems and siting issues connected to renewable energy developments, this study will throw light on the often-overlooked problem of decentralised technologies located close to or within the household realm (Wahlund et al., 2022). With the increasing importance of technologies that can facilitate energy transition in future energy systems, it is critical to comprehend the types of involvement and engagement produced by human collectives and technology (Ryghaug et al., 2018). The proposed study will contribute to the subject of energy and sustainability transitions by providing a new case study of the city of Groningen and giving vital insights to policymakers, energy providers, and other stakeholders.

There is an urgent need to understand how materialized participation affects energy citizenship and what measures can be implemented to guarantee that the energy transition is inclusive and accessible to all, regardless of socioeconomic background or means. As a result, the research question “How do socioeconomic status and energy-transition policies impact energy citizenship through materialised participation in the city of Groningen?” was developed. Sub-questions were also created to delve deeper into the topic.

1. What are the current energy policies in the city of Groningen, and how do they impact materialised participation in the energy transition?
2. How does the socio-economic status of residents in the city of Groningen influence their ability to participate in materialised participation in energy transition?

This study project aims to conduct a single in-depth case study by looking into the relationship between expressed involvement and energy citizenship in the context of the Dutch city of Groningen. By examining the policies and programs implemented in the Groningen region, as well as the experiences of citizens who have participated in materialized activities, this research will provide insights into effective strategies for promoting inclusive and accessible energy transitions that avoid the potential risk of creating the exclusion of marginalized communities.

## **1.1. Structure**

The structure starts with a detailed background section that sets the tone for the study and addresses the research subject at hand. The theoretical framework includes several fundamental topics, such as energy citizenship, material involvement, socioeconomic status, policies, and, as well as a comparison of pertinent publications and the presentation of a conceptual model. The methodology section describes the strategy for data collecting and analysis, as well as data quality and ethical considerations. The findings are presented in the results section of socioeconomic status on material participation, the impact of energy transition policies on materialised participation, and the influence of materialised participation on energy citizenship. The conclusion section includes recommendations as well as any limits. Finally, the thesis includes a section for the researcher to share personal views and reflections on the subject.

## **2. THEORETICAL FRAMEWORK**

The theoretical framework is an essential component of this research study since it provides a solid foundation for understanding fundamental concepts, theories, and ideas. It focuses on

the importance of individuals and communities in designing sustainable energy transitions and promoting energy citizenship. The analysis of material participation, which investigates the role of tangible objects and technologies in encouraging public engagement and participation in environmental action, is central to the framework. Drawing from the works of Ryghaug et al. (2018) and Wahlund et al. (2022), the theoretical framework integrates their valuable contributions to the study. These articles go into the themes of energy democracy, energy citizenship, and energy poverty, all of which are crucial to fostering an inclusive energy transition. Ryghaug et al. (2018), in particular, emphasise the significance of materialised participation in developing energy citizenship, giving a model for comprehending the interconnectivity of material engagement, energy citizenship, and energy transition.

## 2.1. Energy Citizenship

According to Wahlund et al., (2022), energy citizenship is a critical component of energy democracy and participatory government. They define energy citizenship as individuals' and communities' ability to participate in energy-related decision-making processes. This includes both the right to participate in such processes and the ability to affect their outcomes. Energy democracy and energy citizenship are both solution-oriented notions, responding to requests for rapid decarbonization, accountability, and democratisation in the energy industry. While energy democracy evolved as a more politically oriented term with roots in social movements, energy citizenship is a narrower and more academic notion including individual acts of participatory energy use and production. Individual or communal forms of prosumers and sustainable consumption practices as tools for individuals to contribute to the energy transition through self-governance are more frequently referred to as energy citizenship (Wahlund et al., 2022).

Energy citizenship, according to the authors (Wahlund et al., 2022), can be developed through a variety of techniques, including community energy projects, citizen-led energy initiatives, and the creation of renewable energy cooperatives. They also underline the need for education and public awareness campaigns in empowering citizens to participate in energy decision-making.

In contrast, the study on developing energy citizenship through material participation by Ryghaug et al., (2018) focuses on the physical activities and practises that individuals engage in to support sustainable energy use and production. Ryghaug et al.'s notion of energy citizenship centres around individuals' hands-on involvement in changing energy systems and practical contributions to the energy transition.

Drawing on Wahlund et al., (2022) and Ryghaug et al., (2018), the current study understands energy citizenship as participatory decision-making and active engagement in sustainable energy practises. Individuals and communities are involved in energy-related decisions and



contribute to the energy transition. This encompasses both tangible actions, such as community initiatives and renewable cooperatives, and the ability to affect outcomes. Education and public awareness programmes are critical in empowering citizens to become active participants in the energy sector.

## **2.2. Material Participation**

Material participation, as defined by Ryghaug et al., (2018) is an 'object-oriented' or 'device-centered' perspective that emphasises the role of technologies and material items in (mundane) engagement in political concerns of concern. Individuals, rather than enterprises or government organisations, can actively take responsibility for their role in decreasing carbon emissions by adopting and interacting with smaller-scale renewable energy technology such as electric vehicles, smart meters, and rooftop PVs. Participant motivation can be defined as awareness of the need for active and socially reformative activity.

On the other hand, Wahlund et al., (2022) provide a broader and more comprehensive review that encompasses energy citizenship within the context of participatory energy transitions. While they recognise the importance of technology and individual activities, their attention goes beyond material participation. They emphasise that energy citizenship entails individuals' and communities' ability to engage in and influence energy-related decision-making processes.

## **2.3. Policies**

Furthermore, according to Ryghaug et al. (2018), a policy can also have a significant impact on the prospects for materialised participation. Policies that prioritise community-based energy projects and encourage energy democracy, for example, can help to increase participation from a wide range of persons and communities. Policies that support centralised energy systems and large-scale projects, on the other hand, may limit prospects for materialised engagement. The policy documents relating to the energy transition provided by the municipality of Groningen will be used for an in-depth study in the research. "Verduurzamingslening", " Groningen CO2-neutraal 2035" and "Zonne-energie" are three examples.

In contrast to the technical view on policies by Ryghaug et al. (2018), Wahlund et al., (2022) emphasise the importance of policy frameworks that acknowledge and prioritise citizen interaction, participation, and empowerment. Incentives for community energy projects, legislation encouraging citizen-led initiatives, and financial instruments to assist the formation of renewable energy cooperatives are examples of such policies.

## 2.4. Socio-economic Status

The next important aspect of understanding energy citizenship is socio-economic status. According to Wahlund et al., (2022) and Ryghaug et al. (2018), socioeconomic status can have a considerable impact on energy participation through materialised participation. Socioeconomic position can influence the ability of individuals to participate in energy initiatives in numerous ways. Those with a higher socioeconomic position, for instance, may have more access to financial resources, allowing residents to invest in renewable energy technologies. People may also have better access to information and networks that can assist them in navigating the often-complicated process of engaging in energy initiatives. In contrast, those with lower socioeconomic levels may face larger impediments to involvement, such as a lack of financial means or limited access to information and networks.

## 2.5. Conceptual Model

The following conceptual model was created (see Figure 1) to provide a framework for making an understanding of the complex interplay between materialised participation, energy citizenship, policy and governance, and socioeconomic status in the context of the energy transition, comprehensive.

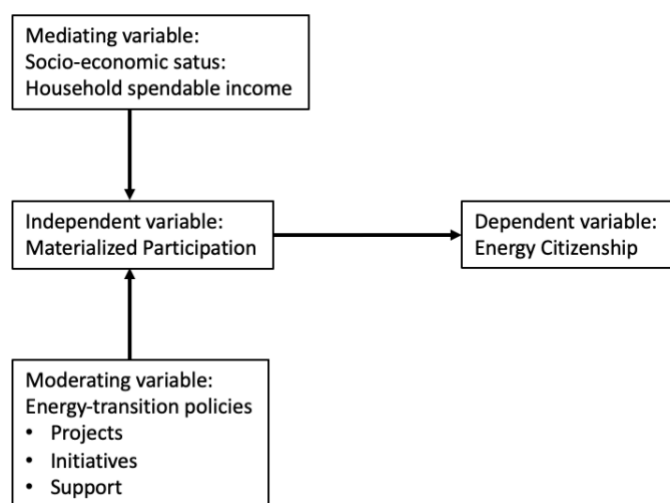


Figure 1. Conceptual model (Author, 2023)

## 3. METHODOLOGY

The research question"- How do socio-economic status and energy-transition policies impact energy citizenship through materialised participation in Groningen" as well as sub-questions "What are the current energy policies in Groningen, and how do they impact materialised participation in the energy transition?" and "How does the socio-economic status of residents in Groningen influence their ability to participate in materialised participation in the energy

transition?" will be investigated using a qualitative research approach in this study. The qualitative method will allow us to delve deeply into participants' experiences and views of materialized participation in energy citizenship (Punch, 2014).

### **3.1. Data Collection**

Results will be derived from primary and secondary sources. Secondary data will be gathered from secondary sources, including academic journals and policy reports from the municipality of Groningen. The policy documents will translate from Dutch to English to make the information comprehensible to the researcher as well as a larger audience. It is critical to understand that secondary data was created for a variety of causes (Clifford et al., 2016). Due to variances in research objectives and secondary source queries, only relevant data will be used.

To collect primary data, semi-structured interviews with Groningen homeowners were conducted (See Appendix 2,3). These interviews are semi-structured, informal, and include open-ended questions. The reason for the Semi-structured interviews use, because it allows for the collection of detailed and in-depth information from participants. Researchers might delve deeper into the comments of participants, seeking clarification and encouraging them to reflect on their thoughts and experiences. This method frequently yields rich and complex data, allowing for a more in-depth comprehension of the research issue (Clifford et al., 2016). Individuals were picked based on their socioeconomic background, specifically, household spendable income (see Appendix 1), to capture a diverse range of perspectives. Interviews took place in person in the city of Groningen as well as via online platforms such as Zoom, and Google Meet. Because of time constraints, the recruitment was done by contacting individuals from the researcher's network. With the participants' permission, the interviews were recorded and transcribed verbatim for analysis. The primary data was utilised for fact-checking and determining the viability of the policies offered. The policy documents were briefly analysed. It will be done as a preparation for specific questions during the interviews.

To enhance the validity and dependability of research findings, the triangulation approach was employed, which entails using multiple data collection/analysis methods, data sources, or perspectives (Clifford et al., 2016). This strategy is especially effective in social science research, where subjective data interpretation might introduce bias and distort outcomes. Researchers can acquire a fuller grasp of the study issue and boost their confidence in their findings by using triangulation (Mertens & Hesse-Biber, 2012).

### **3.2. Data Analysis**

A total of 6 homeowners in the city of Groningen were chosen for this study and interviewed applying a semi-structured interview method. One Interview took an average of 20 minutes to complete. At the beginning of each interview, respondents needed to mark with X the

applicable socio-economic group that they belong (see Appendix 4). In this way, any unethical uncomfortable questions were avoided. The summarized table was created (see Table 1.). It shows the diversity of the economic population present in this research.

Type of households:	Spendable income medians (x1000 euros):	Higher	Lower
Single person	23,6		1
Couple without children	47	2	1
Couple with children	68,1	1	
Single-parent family	36,4		1

*Table 1. Summary of the socio-economic status of the respondents (Author, 2023)*

After the data collection was fully complete. The interviews were then transcribed and analysed with textual analysis in the Atlas.ti programme. Thematic analysis was used to analyse the data, which entails detecting themes and patterns in the data. The coding tree was designed using the deductive technique and based on the theoretical framework (See Appendix 1). As an indicator, the key concepts depicted in the conceptual model (see Figure 1) were employed.

The operationalization (see Appendix 1) of the independent variable - Materialized Participation will be using the definition that is used in the article by Ryghaug et al., (2018). For the dependent variable: Energy Citizenship, the definition according to Wahlund et al., (2022) was used as an operationalization. Moderating variable - Energy-Transition Policies was operationalized by reviewing relevant policy documents and selecting the most relevant ones to be tested in interviews. And, mediating variable - Socio-economic status was operationalized with census data on the income status of citizens in Groningen.

The findings were summarised and analysed in light of the study topic and its sub-questions. In the following parts, the findings from the interviews will be described in greater depth, with a comparison of outcomes to better comprehend the research problem.

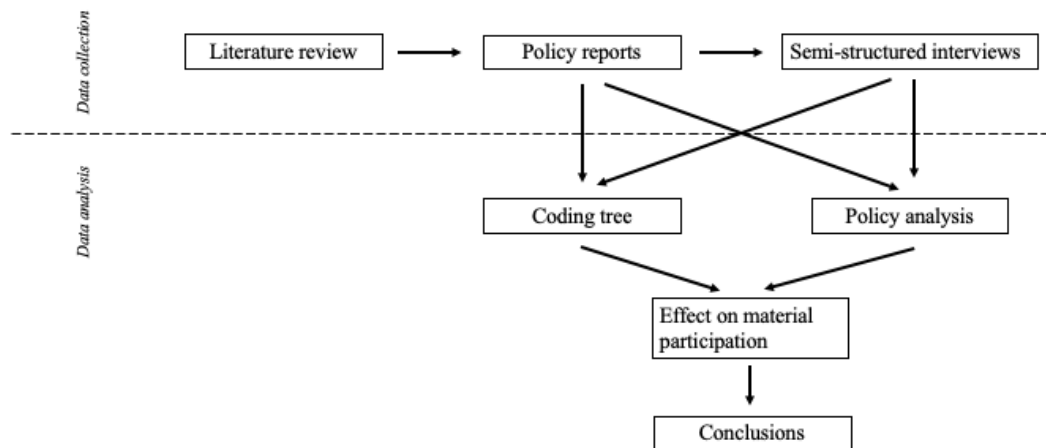


Figure 2. Overview of data collection and analysis (Author, 2023)

### 3.3. Data quality

Concerning data quality, the study relied mainly on self-reported data provided by participants. However, it is critical to recognise that self-reported data can be influenced by a variety of factors, including social desirability bias and potential reporting mistakes. This poses a significant barrier in effectively capturing and evaluating the true core of the variables under consideration.

### 3.4. Ethical Considerations

This study will follow the ethical standards and principles of the (The European Parliament and The Council of The European Union, 2016). The privacy of participants will be protected by ensuring that all data collected is secure and anonymous. All participants will provide informed consent before the study begins. Participants will be informed of the purpose of the study, their rights as volunteers, and their right to withdraw from the study at any time. The study will not harm the participants or their community, and it will be conducted in a way that respects the participants' dignity, rights, and well-being.

During the study process, the researcher's positionality will be taken into account. The researcher will be aware of their function and position in the study, as well as the effect this may have on participant replies. The researcher will take efforts to avoid imposition of their ideas and prejudices on the responses of the participants. The researcher will also be mindful of any power dynamics that may exist between the researcher and the participants and will make every effort during the interviews to establish a safe and non-judgmental atmosphere.

The research findings will be communicated accurately and without distortion to avoid reinforcing any social preconceptions. The research will also have a positive impact by increasing understanding of how materialised involvement influences energy citizenship and

by making recommendations to policymakers and stakeholders to support an inclusive and equitable sustainable energy transition.

## 4. RESULTS

### 4.1. The Observed Effect of Socioeconomic Status on Material Participation

The analysis focuses on examining how socioeconomic status affects material participation in the energy transition. It begins by exploring the mediating variable (see Figure 1) to identify the impact of respondents' socioeconomic status on their material participation.

By comparing the responses of high-income and low-income respondents, a correlation between socioeconomic status and the likelihood of considering renewable energy investments becomes evident. For instance, a high-income respondent stated, "The only reason I was able to buy my car or the solar panels is due to me being able to afford it." Similarly, another interviewee noted, "I can clearly say that my ability to engage in the energy transition has been influenced by my income." On the other hand, lower-income respondents expressed financial constraints as barriers to their participation. Responded mentioned, "I guess, because it is quite a big investment and I'd say that it is not one of the priorities right now". Similarly, another interviewee stated, "I can tell that it directly influenced on how I can participate, because as I mentioned above the equipment is quite pricy, and I am a single mother making it quite difficult to afford such things"

When addressing the question of support and education provided to enable participation in the energy transition, it becomes apparent that all respondent groups are aware of the existence of informational and educational campaigns. Responded highlighted, "I would say that there is quite a lot of information around. For example, in our neighbourhood centre. Also, kids had a couple of projects as well as lectures in schools related to the energy transition. I am very interested in this topic myself, and I read a lot of articles about it online." Another interviewee also mentioned the availability of workshops, informational sessions, and individualized expert consultations. However, few respondents were directly engaged in these campaigns, either due to a lack of information about events or time constraints. An interesting observation was made by one of the respondents, who stated, "I would say that marketing of EVs and solar panels plays a bigger role than education." This suggests that the decision to participate is often influenced by economic reasons rather than educational campaigns.

Examining the availability of financial support and answering the related interview question regarding the finance available for enabling participation in the energy transition, the responses reveal a pattern. Most respondents acknowledged the presence of financial

support from governmental entities. However, many expressed concerns about the distribution of these resources among lower-income groups. The interviewee stated, "I think that the financial support currently is strong. However, I would say that it should be distributed in another way. So, I believe that people in the most sensitive income groups, such as those earning less than average, should be subject to more financial benefits." Interviews indicated that individuals with existing savings were more inclined to consider renewable energy investments if loans or subsidies were available. Respondent explained, "I have enough money to participate. Having enough money to participate also means that I can make energy-efficient choices now so that I spend less money in the future." Conversely, the unstable or challenging income situations of lower-income groups resulted in lower priority levels for the energy transition. Participant emphasized, "When people have a million hardships in their lives, the question of involvement in the energy transition is not a priority."

Overall, the analysis supports and complements the insights from Wahlund et al., (2022) and Ryghaug et al., (2018), further highlighting the role of socioeconomic status in shaping material participation in the energy transition. These findings underscore the need for policies and initiatives that address socioeconomic disparities, promote energy democracy, and ensure equitable access to resources and opportunities for all segments of society.

#### 4.2. The Observed Effect of Energy Transition Policies on Materialized Participation

The analysis continues with an examination of the effect of energy-transition policies (moderating variable) on materialized participation, subsequently elaborating on the second sub-question.

Mentioned Policies	Times mentioned
Financial loans	3
Advertisement campaigns	2
Reduce Taxes	3
Educational programs	1
Subsidies	3
Warmtenet	1
Energy collectives	1
Social assistance benefits	1
Energy allowance	1
Financial compensation	2
Reduced pricing for energy-saving equipment	1
Lower interest rates	2
Grants	1

Table 2. Overview of mentioned policies by participants (Author, 2023)

Table 2 displays which policies are most popular among participants. Furthermore, it demonstrates how knowledgeable the respondents are about the policies that are available to them.

The analysis delves deeper into how energy-transition policies impact materialized participation, shedding light on the second sub-question. The municipality of Groningen has implemented numerous programs aimed at assisting residents in adopting energy-saving measures. The question at hand is how these policies truly influence citizens' decisions to invest in energy-saving measures and, if so, how exactly do they do so? The provision of financial assistance or loans emerges as the most frequently mentioned policy, as highlighted by one of the respondents, who stated, "Yes, we have received financial loans, such as sustainability loans for people who wanted to participate in the energy transition," and by another interviewee, who mentioned lower interest rates for solar panel loans. Interviews with the 3 individuals indicate that financial incentives hold significant sway over citizens' decisions to invest in energy-efficient measures such as solar panels and house insulation.

In the Interview, the participant revealed that they recently installed insulation in their home with the aid of a subsidy from the municipality. This subsidy covered a substantial portion of the costs, investing in energy-efficient measures more feasible for the participant. Additionally, the participant mentioned that the municipality provided technical assistance through an energy expert who guided them in determining the most effective steps for their property.

On the other hand, the next respondent seemed unaware of the municipality's efforts to support energy measures, stating, "Well, to be honest, I am not aware. But I heard that there were some campaigns and subsidies. But I think most of that stuff is not something that I usually involve myself with." While they acknowledged the existence of campaigns and subsidies, they had not actively participated in them. Similarly, another participant expressed unawareness of the municipality's initiatives to support energy conservation but expressed a belief that incentives would increase their willingness to make home improvements, such as installing solar panels. These responses suggest that there is room for improvement in how these policies are communicated to the public.

Moreover, as mentioned by 3 respondents, information campaigns were identified as a means for the municipality to support its citizens. These programs aim to educate and raise awareness about the importance of energy efficiency and renewable energy. One of the interviewees even suggested organizing more campaigns and lectures on these topics to inspire individuals to make a difference. Furthermore, another proposition was that the municipality offers additional assistance by reducing taxes for those using electric vehicles or installing solar panels, an idea also discussed by the interviewee.



When asked whether policies would influence their decision to invest in energy efficiency measures, the majority of interviewees highlighted financial incentives such as subsidies and lower interest rates on loans. Respondent identified reduced costs for energy-saving equipment as a helpful strategy. Also, Participant mentioned technical assistance from the municipality, including the availability of consultations in languages other than Dutch, to enable international residents to participate.

Regarding the influence of national or provincial policies on their decision to invest in energy-efficient measures, the majority of participants responded positively. The first respondent, for instance, noted that the country as a whole is striving to go green and utilize renewable energy sources, which influenced their choice to invest in solar panels. Another participant highlighted the importance of national policies that support the use of renewable energy sources and implement reduced taxation to motivate citizens to invest in energy-efficient measures.

The results both confirm and expand upon the findings of Ryghaug et al. (2018) regarding the significant impact of policies on engagement in the energy transition. While financial policies were the primary focus of the respondents, as opposed to community-based energy projects, the influence of income on the utilization of financial-assistance policies aligns with Ryghaug et al.'s observations. These findings emphasize the multifaceted nature of policies and highlight the need to consider specific contextual factors when examining their impact on materialized participation in the energy transition.

### 4.3. The Observed Effect of Materialized Participation on Energy Citizenship

<b>Material participation by:</b>	<b>How many respondents possess it</b>
PVs	2
Electric vehicle	4
House insulation	6
Smart meters	6
Less water consumption	1
Weather seals	1
Boiler	1
LED lights	2

*Table 3. Adapted energy-efficient solutions in the house by respondents (Author, 2023)*

There are various levels of involvement in local energy projects and activities, according to the interviewees. Answerer is involved in a local energy programme that includes solar panels and an electric vehicle charging station as part of their neighbourhood community. Currently, the other respondent is not active in any local energy projects. Furthermore, the next interviewee is not participating in any local energy projects or efforts due to a lack of interest

and spare time. Lastly, the other replier wants to start a local energy programme focused on charging electric vehicles, but he doesn't have much free time right now.

In terms of other people's involvement in energy initiatives, one of the respondents attended meetings relating to the solar panels' project in their neighbourhood, whereas another participant attended an online symposium or lecture on energy and sustainability. In addition, the next replier also attended interesting neighbourhood workshops on lowering energy expenditures in households.

Regarding the behavioural shift towards energy citizenship. To minimise overconsumption, the interviewee stated being more conscious and started to consume energy more efficiently. They also mentioned having some technology that taught them how to live differently, as well as the fact that energy prices are very high, so they are aiming to cut back on expenditure.

Interviewees provided a wide range of examples of how materialized participation influenced energy citizenship. For example, one of the interviewees highlights that they have been more aware of their energy bills and how much energy they consume, which has caused them to be more cautious. They also stated that students and those on modest incomes may prefer smaller energy options. Furthermore, the next respondent stated that he has enough money to make energy-efficient judgements and spend less money in the future. They also mentioned that having a smart metre motivated them to save energy by turning down appliances and heaters.

According to the other interviewee, real-time tracking made a minor impact on their family's lives. They began by shutting off electrical equipment that was not frequently utilised and by breaking the habit of leaving lights on. Even their children have learned to switch out the lights behind them. They feel that changing their behaviour will have an effect in the long run. In addition, one of the respondents remarked using significantly less electricity and saving money, particularly during the heating season. To conserve money, they often try to perform energy-intensive procedures when electricity prices are lower. As mentioned by the respondent smart metres, as well as the installation of PVs and insulation, made them more aware of their energy consumption. They were able to save money on their energy bills while also minimising their carbon impact as a result of this.

The research highlights the positive relationship between materialized participation and energy citizenship. Individuals become more invested in the energy system and are more likely to take an active role in influencing energy policy and decision-making when they engage in energy-related practical acts, which corresponds to the theoretical framework proposed by Wahlund et al., 2022. This includes attending public meetings or lobbying efforts and joining local energy-related organisations. Furthermore, materialised participation can lead to better awareness and understanding of energy-related issues, empowering individuals

to participate in energy citizenship activities. Individuals, for example, who put solar panels on their homes may become more aware of renewable energy technologies and the benefits of clean energy.

#### 4.4. Summary of The Results

To sum up, high socioeconomic status provides more financial resources for investing in renewable energy, while low socioeconomic status can create difficulties in accessing these resources. The outcomes of this study suggest that Income plays a significant role in the decision to invest in renewable energy. Respondents are aware of informational and educational campaigns, but not many are engaged directly. Financial support is available, but distribution among lower-income groups is a concern. Savings positively influence investment decisions, while an unstable income situation may result in lower priority for the energy transition.

It appears that the municipality of Groningen is taking steps to assist its inhabitants in implementing energy-saving measures, mostly through financial assistance and loans, information campaigns, and technical assistance. These policies have had various degrees of influence on residents' decisions to invest in energy-saving solutions, and there is still potential for improvement in conveying these policies to the public. The current study shows that subsidies and lower interest rates on loans tend to be the most successful approaches for encouraging citizens to invest in energy-saving measures. Furthermore, technical assistance, such as that provided.

Overall, the 'how' of materialized participation's impact on energy citizenship lies in the transformation from passive observers to active participants. By engaging in practical energy-related activities, individuals acquire knowledge, build connections, and develop a sense of agency. This heightened engagement equips them to contribute meaningfully to energy citizenship activities, effectively influencing energy policy and decision-making processes.

## 5. CONCLUSION

The study explored the impact of socio-economic status and energy transition policies on energy citizenship through materialised participation in Groningen. The research questions were specifically addressed through two sub-questions, and the study's findings demonstrated how the impact of materialised involvement on energy citizenship lies in the change from passive observers to active participants, favourably affecting energy citizenship. This outcome is consistent with the study's theoretical framework by Ryghaug et al. (2018), which emphasised the significance of material engagement in shaping energy citizenship.

The study also discovered that socioeconomic position had a significant impact on the level of materialised engagement in the energy transition. This is consistent with Ryghaug et al.

(2018)'s theoretical framework, which emphasised the role of socioeconomic position in affecting individuals' abilities to participate in energy projects. Citizens with better socioeconomic levels were more likely to participate in materialised activities, such as solar panel installation, due to their access to financial resources, and networks. At the same time, it is worth noting that information was almost equally accessible for all socio-economic groups.

The study also showed how policies promoting energy transition had a significant impact on materialised involvement. Policies that prioritised community-based energy projects and gave financial assistance to anyone who wanted to engage encouraged participation from a diverse group of people and communities. This aligns with the theoretical framework by Ryghaug et al. (2018), which emphasised the importance of energy transition policies in promoting an inclusive and accessible energy transition.

Overall, the findings of the study developed an understanding of how materialised involvement positively promoted energy citizenship, and that this link is mediated by socioeconomic position and moderated by policy. The findings are consistent with the study's theoretical approach, which emphasised the relevance of material involvement, socioeconomic position, and energy transition policies in shaping energy citizenship and ensuring an inclusive and accessible energy transition.

### **5.1. Recommendations**

Based on the research, here are several recommendations for policymakers on how citizen participation in energy transition could be impeded. First, the results show the importance of energy transition awareness initiatives and lectures. Therefore, policymakers should consider organising targeted campaigns and instructive lectures to stimulate public participation and foster a sense of responsibility in reducing energy usage and conserving energy. Additionally, the study points to the significance of providing smaller-scale options for citizen participation in the energy transition. Policymakers can engage students and low-income individuals who may feel excluded from large-scale initiatives by providing accessible options that demand smaller inputs.

Continuing, encouraging neighbourhoods to form energy collectives to make their communities more sustainable. Consider offering financial incentives or support, as well as collaborating with local officials, to aid in the formation of these collectives. Furthermore, the importance of going beyond distributing leaflets and instead providing genuine assistance to people. Many individuals overlook or dismiss leaflets as spam. Policymakers should explore granting financial assistance to fully engage individuals, particularly those with restricted options. Recognise that for those experiencing multiple obstacles in their lives, energy transition may not be a priority. Furthermore, involving children in school through minor

gestures such as turning off lights during breaks can have a good influence on their parent's behaviour and enhance future impact.

Importantly, additional financial incentives and support should be provided to groups at the bottom of the economic distribution. Focus on the financial rewards of using energy-saving measures, and ensure that they realise the need for energy transition for everybody. Good to mention that encouraging citizen participation can benefit the environment by making energy-saving devices more accessible and affordable. Furthermore, success in involving various groups of people could be achieved by giving information and technical assistance in languages other than Dutch. Collaboration with community organisations and leaders can play an important role in establishing trust and ensuring that their needs and concerns are met.

## 5.2. Limitations

One limitation of this study could be the possibility of sample bias. The generalizability of findings is also an important part of the study. However, the results that were derived might not be applied in other populations or settings, because the research was carried out in the city of Groningen, the Netherlands, and it may not be indicative of other places with differing socioeconomic and political settings. Furthermore, the study relied on participants' self-reported data, which could be influenced by social desirability bias or incorrect reporting. Finally, the study did not investigate the long-term effects of materialised engagement on energy citizenship, leaving room for future research in this area.

## 6. REFLECTION

The process of completing the case study for the city of Utrecht provided unexpected challenges, notably in terms of recruiting interview participants. Despite efforts to attract residents through community centres, the response rate was less than expected. Reflecting on this experience, it became clear that physically engaging oneself in the local environment and engaging with residents to establish connections would have been a more effective method. This was difficult due to financial and time constraints. As a result, it was decided to relocate the case study to Groningen, where existing contacts were useful in recruiting respondents for interviews. The interviews themselves, while structured in nature due to a lack of experience in conducting them, allowed for quick and efficient data collection given the respondents' limited time availability. Nonetheless, it is agreed that a more open-ended approach could have provided extra information beyond the primary questions posed. The shift in a case study hasn't impacted the quality of the finding, only the setting in which the data was gathered. While there were several limitations throughout the research procedure,

the data gathered in Groningen gave useful insights into the relationship between materialised participation, energy citizenship, socioeconomic position, and energy transition strategies.

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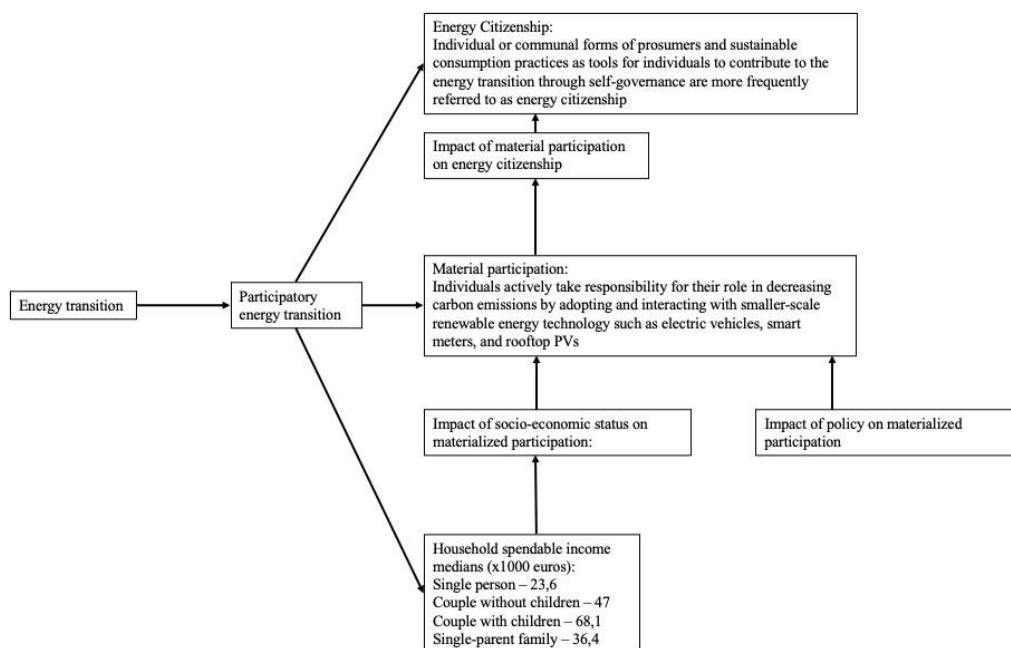
## 8. Appendix

### Appendix 1. Table of codes for collecting qualitative data

Topics	Parent codes	
Energy transition	Energy Citizenship	the current study understands energy citizenship as participatory decision-making and active engagement in sustainable energy practises. Individuals and communities are involved in energy-related decisions and contribute to the energy transition. This encompasses both tangible actions, such as community initiatives and renewable cooperatives, and the ability to affect outcomes. Education and public awareness programmes are critical in empowering citizens to become active participants in the energy sector.
Participatory energy transition		
	Material participation	Individuals actively take responsibility for their role in decreasing carbon emissions by adopting and interacting with smaller-scale renewable energy technology such as electric vehicles, smart meters, and rooftop PVs
	Social-economic status	Household spendable income medians (x1000 euros): Single person – 23,6 Couple without children – 47 Couple with children – 68,1 Single-parent family – 36,4 (CBS, 2021)

	Impact of material participation on energy citizenship	
	Impact of policy on materialized participation	

## Appendix 2. Coding Tree



## Appendix 3. Consent form for participants for semi-structured interviews

Dear participant,

Below you find the consent form for my bachelor's thesis at the University of Groningen. This thesis aims to fill research gaps by looking into the relationship between expressed involvement and energy citizenship in the context of the Dutch city of Groningen. By examining the policies and programs implemented in these regions, as well as the experiences of citizens who have participated in materialized activities, this research will provide insights into effective strategies for promoting inclusive and accessible energy transitions that avoid the potential risk of creating the exclusion of marginalized communities.

Participation is entirely voluntary. Withdrawal from the study is always possible, and no justification is required. The information will be treated anonymously and used only for university-related purposes.

If you have any more questions, please contact me at [a.korzjukov@student.rug.nl](mailto:a.korzjukov@student.rug.nl).

What is your name? (This is exclusively for the consent form and is unrelated to your interview.)

*[form to fill in name]*

I read the material regarding the research project (above). I was able to ask questions, and my questions were appropriately answered. I give permission for the interview data to be used for the following purposes: a written thesis.

The interviews will be recorded. The recording will then be transcribed for further examination. The recordings are only for data-collecting purposes. Any statements in the text that could lead to identity will be erased. Anonymous quotes will be included in the thesis. I agree to have the phone call/in-person interview recorded. *[option to select yes or no]*

Thanks in advance for your participation.

Aleksander Korzjukov

## Appendix 4. Interview guide

Introduction:

Thank you for agreeing to participate in this interview. This study aims to investigate the impact of socio-economic status and energy-transition policies on energy citizenship through materialized participation in Groningen. This interview will provide us with information on your experiences and perspectives about materialized engagement in energy citizenship.

The interviews will be recorded. The recording will then be transcribed for further examination. The recordings are only for data-collecting purposes. Any statements in the text that could lead to identity will be erased. Anonymous quotes will be included in the thesis. I agree to have the phone call/in-person interview recorded.

Please, before the interview could you mark with an "X" which *Type of household and its average spendable income* you belong to, indicating if it is lower or higher for you. This information will help to categorize different interviewees.

Type of households:	Spendable income medians (x1000 euros):	Higher	Lower
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Single person	23,6		
Couple without children	47		
Couple with children	68,1		
Single-parent family	36,4		

Warm-up questions:

- How are you doing today?

Introduction:

- How do you see the role of citizens and/or municipalities in the energy transition?

Main body:

- Can you tell us a little bit about your background and how you became interested in the energy transition and sustainable energy?
- Material Participation:
  - Are PVs installed on your roof?
  - Do you possess an electric vehicle?
  - Do you have house insulation?
  - Do you use any smart meters to track energy consumption?
  - Have you adapted other energy-sustainable solutions in your house?
- Policies:
  - Does Groningen support its citizens in taking energy measures? If so, how? (e.g., financial support/ loans, information campaigns, technical support, etc.)
  - How did the policies of the municipality influence your decision to invest in PVs, house insulation, electric vehicle, and smart meters?
    - Which policies would influence your decision to invest in measures to improve energy efficiency? Why/ why not.
    - Was your decision influenced by national or provincial policies? If so, why?
- Socio-economic status:
  - How has your spendable income influenced your ability to participate in the energy transition and can you describe any personal experiences you have had with it?
  - How much support and education is provided to enable participation in the energy transition?
  - Is there enough finance available to enable participation in the energy transition?
- Energy Citizenship:
  - Are you engaged in a local energy project? Why? Why not?
  - Are you engaged in a local energy initiative? Why? Why not?

- Have you been included in the participation stage of energy projects by others? Why? Why not?
  - Have you ever attended presentations or informative meetings on taking energy measures? Why? Why not?
  - Have you noticed any changes in your behaviour in the energy transition since you have adopted PVs, house insulation, electric vehicle, and smart meters?
    - Would this be different if you had PVs, house insulation, electric vehicle, and smart meters?
- In your opinion, what steps could be taken to increase the involvement of citizens in the energy transition in Groningen, particularly among underrepresented or disadvantaged communities?
  - Do you have any additional comments or suggestions for this study?

**Conclusion:**

Thank you for taking the time to participate in this interview. Your views and experiences are vital to our research at Groningen on materialized involvement, energy citizenship, and the energy transition. If you would like to get insight into the main conclusions drawn from the research, you can contact me for additional information.

## Appendix 5: Timetable

### Bachelors' Project SPD

Aleksander Korzjukov

