Who's Got the Power? The Moderating Role of Need for Power in Environmental Identity and Energy Communities

Bachelor Thesis – Psychology of Conflict, Risk and Safety Department of Psychology, University of Twente Faculty of Behavioural and Social Sciences Nienke-Martine Terpsma (s3003469) Dr.ir. Peter de Vries (1. supervisor) Dr. Mariëlle Stel (2. supervisor) Date: 20.06.2025 Word count: 6159

Abstract

As climate change is recognised as a global crisis nowadays, initiatives like energy communities are becoming more important as they use renewable energy. A factor which influences people's behaviour regarding the environment is environmental identity. Environmental identity is the degree to which someone sees themselves as environmentally friendly. This study investigated whether people with a strong environmental identity are more likely to join an energy community and whether the need for power moderates this relationship. A survey was used to assess the relationship between environmental identity, joining an energy community and the need for power. The ease of retrieval task was used to manipulate environmental identity. The results showed that environmental identity influences the willingness to join energy communities. However, the ease of retrieval did not manipulate environmental identity, which resulted in the hypothesis not being effectively tested. The need for power did not moderate the relationship between the two variables. However, the influence of environmental identity in joining energy communities is shown by this research.

Who's Got the Power? The Moderating Role of Need for Power in Environmental Identity and Energy Communities

One of the biggest crises the world is facing right now is climate change. As the world is getting warmer, our natural resources are decreasing. The sea level is rising, the weather is getting more severe, and temperatures are climbing yearly (United Nations, n.d.). Efforts are being made to combat climate change by having laws and regulations in place to work against it, as can be seen in the Paris Agreement of 2015. Climate change and the ability of individuals to counteract it are increasingly becoming the focus of everyday discussion. A lot of importance is placed on renewable energy and extending the efforts regarding renewable energy (Radtke et al., 2022). One of these efforts is facilitating the establishment of energy communities.

Energy communities are "formal or informal citizen-led initiatives which propose collaborative solutions on a local basis to facilitate the development of sustainable energy technologies" (Bauwens et al., 2016). An energy community could be a group of locals from a small town that form a cooperative to install and share energy from solar panels placed on rooftops and a community building. Germany emphasises the use of energy communities to achieve an effective energy transition, which is also promoted by the EU (Radtke & Bohn, 2023). Therefore, energy communities are gaining increasing support as they are seen as an effective way to use renewable energy.

Energy communities are used to transition from non-sustainable energy to renewable energy. Individuals play an important role in energy communities as they are vital to forming and engaging with them. However, the decision to engage and join energy communities depends on different factors. There are financial, bureaucratic, technical and social barriers that influence joining these communities (Dioba et al., 2024). As people with similar values and behaviour work well together, they would want to join a group that has similar values and behaviours (Bouman et al., 2021). Because environmental identity is influenced by past behaviours and values of an individual, it may give more insight into the motivation for joining an energy community.

It is important to highlight how environmental identity influences people's behaviour regarding the environment. Environmental identity is the degree to which individuals see themselves as environmentally friendly (Sloot et al., 2018; Wang et al., 2021). Therefore, people with a high environmental identity would engage in more environmentally friendly behaviour. However, substantial research does not seem to exist on the connection between environmental identity and joining energy communities. Hence, this paper will focus on the connection between these variables.

RQ: How does environmental identity influence the willingness to join energy communities?

Theoretical Framework

Willingness to join

In energy communities, people in general behave in an environmentally friendly way (Jans, 2021; Sloot et al., 2018). An energy community is a group of people, individuals, businesses or organisations that collaboratively produce, distribute and manage renewable energy sources such as solar or wind power (Jans, 2021). Being part of these communities shows that people are more conscious about how they behave regarding the environment (Jans, 2021). As the goal is to reduce energy costs, increase sustainability and help to become more energy independent, they are actively behaving environmentally so they do not take away from the environment (Radtke et al., 2022). People who have a high environmental identity may be more interested when it comes to energy communities as they facilitate people to behave more environmentally friendly. Therefore, people who behave in an

environmentally friendly way, and hence have a high environmental identity, would be more willing to join an energy community.

Environmental Identity

As stated above, environmental identity influences people's environmental behaviour. Environmental identity refers to how strongly individuals perceive themselves as being environmentally conscious or friendly (Sloot et al., 2018; van der Werff et al., 2013; Wang et al., 2021). Additionally, values and past behaviours influence environmental identity (van der Werff et al., 2013). Some examples of past behaviours are recycling or taking public transportation. It is more likely that they behave in a way which aligns with their values and behaviour when it comes to environmentally friendly behaviour (van der Werff et al., 2013). Therefore, people who behaved in an environmentally friendly way in the past are more likely to have a high environmental identity. People with a strong environmental identity tend to do more for the environment and behave more environmentally friendly (Jans, 2021). This means that people are more cautious about the environment and actively try to behave in a way that benefits it. Therefore, when people behave in an environmentally friendly way, their environmental identity is expected to be high as well.

Because of the influence of past behaviours on identity, the ease of retrieval technique works well with manipulating identity. It may seem difficult to influence environmental identity, as values are stable and past behaviours cannot be changed. However, it does seem possible to change the perception of one's past behaviours. Schwarz et al. (1991) tested the ease of retrieval as a technique for influencing assertiveness. They asked participants to recall six or 12 instances of assertive behaviours. The findings showed that recalling more behaviours was difficult for participants. This perceived difficulty then led participants to consider themselves as less assertive, as they could not easily recall examples of assertive behaviours (Schwarz et al., 1991). The same should be possible for environmental identity.

By asking one group for a few examples of their environmentally friendly behaviour, they will have the feeling that they are more environmentally friendly, as they could easily recall the asked behaviours. The same principle applies to the other group. By asking them for many examples of their environmentally friendly behaviours, they will find themselves less environmentally friendly because they struggle to recall their past behaviours.

Need for Power

When looking at the factors that could influence the willingness to join a group, the feeling of power comes to mind. The feeling of power helps with the motivation of how involved someone is in a group. In energy communities, people can generate energy themselves or share it. This gives people a feeling of power as they can decide how to use it. As people with a high environmental identity behave more environmentally friendly, they control their actions and behaviour more (Jans, 2021). It can be assumed that these people tend to want more control over their and others' behaviour to influence them to do something good and achieve it together. Therefore, some people want to have more control over their environment and the people around them (Królewiak, 2017). This means that the feeling of power aids their environmental identity as well as their willingness to join.

Therefore, the need for power might be a factor which influences people when it comes to joining an energy community. The need for power refers to a concern about influencing the behaviour or emotions of another person or the environment in general (Dutton & Strachan, 1987; Królewiak, 2017; McClelland, 1982). As people with a higher need for power want to influence others and the environment, they might feel more inclined to achieve this in an energy community. In these communities, people work together to use and collect renewable energy. People with a high environmental identity might be more motivated to join because it allows them to influence others towards environmentally friendly behaviour. Therefore, it can be expected to see a stronger relationship between environmental identity and joining an energy community when the need for power is stronger than when it is weaker. Thus, having a high environmental identity and a high need for power influences the willingness to join an energy community.

The current study

The study compared two groups of participants, the few examples group and the many examples group. The design compared the intention to join an energy community by manipulating an individual's level of environmental identity using the ease of retrieval technique. The values of environmental identity, the need for power and the willingness to join were measured. One hypothesis was formulated to assess the relationship of the abovementioned values:

H1: Individuals with a strong environmental identity are more likely to join energy communities compared to individuals with a weak environmental identity, and this relationship is strengthened by the need for power.

Figure 1

Example of a Simple Conceptual Model with a Moderator



Methods¹

Participants and Design

The study used an experimental, between-participants design. Environmental identity was manipulated with an ease of retrieval procedure, in which a few examples of environmentally friendly past behaviours were expected to create a strong environmental identity, whereas many examples were expected to create a weak environmental identity. As the moderating factor, the need for power was measured with a questionnaire. The need for affiliation and the need for achievement were included in the questionnaire; however, the current study only focuses on the measurement need for power.

A convenience sample was obtained by recruiting participants via the Sona system of the University of Twente. For participation in the study, participants received 0.5 Sona credits. Outside the University of Twente context, snowball sampling was used during the process of data collection by sharing the questionnaire via social media applications (such as Instagram and WhatsApp). Participants were asked to share the questionnaire with others to obtain data.

Initially, 138 participants were recruited, out of which 108 have fully completed the study. One participant was omitted as they failed to complete the three attention checks within the survey successfully (i.e., respond to at least one out of three attention questions correctly). Thus, an overall sample of 107 people was obtained. Within the sample, 76 participants were female, and 31 participants were male. The age ranged from 17 to 64, with a mean age of 24. Participants were from Germany (n=56), other countries (n=39), or the Netherlands (n=12). 66 participants have a high school diploma, 27 have a bachelor's degree, four have a master's degree, five have a PhD, and three have another education as their highest degree

¹ The following section was written in collaboration with two other Bachelor students. Therefore, the Method section is virtually the same with the exception of the moderator as we closely collaborated on our experiments. This was done on the recommendation and with express permission of the first supervisor.

completed. 54 participants were subjected to the few examples condition of the study, and 53 participants to the many examples condition.

Materials

A Qualtrics questionnaire was used for data collection. The questionnaire included three scales as well as the ease of retrieval task and the manipulation check. First, the questionnaire measured the three motivational needs, then the ease of retrieval task and the manipulation check, afterwards the environmental identity, and lastly the intention to join an energy community.

Motivational Needs

The first scale measured the motivational needs of participants, using the Motivational Needs Questionnaire, adapted from Neill (2009). The original questionnaire included 11 statement questions, with three answer options each. Each answer option corresponds to one of the three needs based on the model of McClelland (1985). For the current study, the answer options were adapted as statement questions measuring the level of agreement. This was done to get a better idea of the level of each need per individual and to gain an idea of the high and low scorers. Each statement had to be ranked on a 7-point Likert scale, with 1 indicating the least agreement ("Strongly Disagree"), 4 indicating a neutral response ("Neither Agree nor Disagree"), and 7 indicating the highest level of agreement ("Strongly Agree"). The following statements show two examples of items measuring the need for power: "I prefer to work alone and be my own boss" or "I enjoy a good argument". The full list of questions can be found in Appendix C. The reliability of the scale was high, indications could be found in Cronbach's alpha coefficient ($\alpha = 0.79$). Barlett's test of sphericity supports the finding that the items of the scale are significantly correlated, $\chi^2(428) = 115.27$, p < .001.

Ease of retrieval

In the current study, the ease of retrieval technique was used by asking participants to recall either two or 12 instances of pro-environmental behaviour. Participants who recalled two behaviours belong to the few examples group, while those recalling 12 behaviours belong to the many examples group. It can be expected that participants in the few example group would think that they have a higher environmental identity due to the ease with which they recalled instances of pro-environmental behaviour (Schwarz et al., 1991). On the other hand, participants in the many examples group should find the recall of examples more difficult and, therefore, should have a lower environmental identity.

Manipulation check

After the ease of retrieval task, participants were subjected to a manipulation check question. The manipulation check was used to subsequently measure whether the ease of retrieval successfully worked in manipulating the environmental identity of participants. The check was done using one item, "I found it hard to recall the times when I engaged in environmentally friendly behaviour in the last two weeks." to be ranked on a 7-point Likert scale; 1 indicating "Strongly Disagree", 4 indicating "Neither Agree nor Disagree" and 7 indicating "Strongly Agree".

Environmental identity

Upon completing the manipulation check, participants had to complete 12 questions measuring their environmental identity. The scale was adapted from the Revised Environmental Identity Scale of Clayton (2003) and van der Werff et al. (2014). The responses were based on a 7-point Likert scale, with 1 indicating the least agreement ("Strongly Disagree"), 4 indicating a neutral response ("Neither Agree nor Disagree") and 7 indicating the highest level of agreement ("Strongly Agree"). Examples of the items are: "Behaving responsibly toward nature -living a sustainable lifestyle- is important to who I am" and "I use energy-efficient light bulbs". The full list of questions can be found in Appendix D. The reliability of the scale was high, indications could be found in Cronbach's alpha coefficient ($\alpha = .83$). Barlett's test of sphericity supports the finding that the items of the scale significantly correlated, χ^2 (78) = 478.07, p < .001.

Intention to join an Energy Community

Lastly, the scale measuring the intention to join an energy community was adapted from the study of Sloot et al. (2019). The study by Sloot et al. (2019) measured specifically the intention to join the Buurkracht initiative in a sample of Dutch households. For the current study, questions were adapted to fit the overall intention to join any energy community. The scale included statements to be ranked by a 7-point Likert scale, with 1 indicating total disagreement ("Strongly Disagree"), 4 indicating a neutral response ("Neither Agree nor Disagree") and 7 indicating total agreement ("Strongly Agree"). Statements included "I would like to know more about the energy community initiatives in my neighbourhood" and "I am considering joining the new energy community in my neighbourhood". The full list of questions can be found in Appendix E.

Procedure

Before the data collection, ethical approval was obtained by the Ethics Committee of the Behavioural, Management, and Social Sciences Faculty at the University of Twente. Participants were informed about the purpose and duration of the study, their right to anonymity and their right to withdraw before starting the study. Once informed consent was obtained, the participants could start with the study. First, demographic data of the participants were obtained. The information collected included age, gender, nationality, and education level.

Participants then had to complete the motivational needs questionnaire. Upon completion, participants were randomly allocated to one of two conditions to complete the ease of retrieval task. After completion, they were asked to complete the manipulation check, indicating the perceived difficulty of retrieval.

This section was followed by the questionnaire about environmental identity. Upon completion, the participants received an explanation of what energy communities are. It was explained that it is a group of people, businesses or organisations that together produce, share and manage renewable energy. Additionally, the goals of an energy community were stated. The explanation was followed by the last set of questions measuring the intention to join an energy community. After completing the last set of questions, participants were debriefed on the full purpose of the study, to assess the relationship between environmental identity and intentions to join an energy community. They were informed that the ease of retrieval task was used to manipulate their environmental identity. Therefore, the debrief was necessary as their identity was manipulated. Afterwards, participants were asked if they still consented to the use of their data and thanked for their participation in the study.

Data Analysis

The data was converted into a CSV. file from Qualtrics, after which it was transferred to RStudio. The full R script can be found in Appendix F.

Before the data analysis, the file was screened for missing values, non-consent, and unsuccessful completion of the attention checks. Participants who did not give their consent before and after completing the survey were excluded. Additionally, people who failed to complete the three attention checks were removed.

The data was first converted to numeric scores, after which the average scores per participant for the need for power, environmental identity, and intention to join an energy community were calculated. Furthermore, the average score for the manipulation check was calculated. Upon that, the demographic variables were calculated to find the average age, nationality and education level of the sample. A correlation matrix was created to visualise the correlation between the need for power, environmental identity, and intention to join an energy community with age, education level and nationality. The correlation matrix can be found in Table 1.

Parametric assumptions of linearity, normality, homoscedasticity and independence were tested before the analyses. Linearity was tested using a plot of residuals against fitted values of the model used for further analyses. The assumption of normality was assessed using the Shapiro-Wilk test. The Breusch-Pagan test was conducted for homoscedasticity. Lastly, the Durbin-Watson test was conducted for the assumption of independence of residuals.

A Welch Two Sample t-test was conducted to compare the means between two groups, namely the participants having to recall two examples of past environmental behaviours (few examples condition) versus participants having to recall 12 examples of past environmental behaviours (many examples condition). Another t-test was done to compare the environmental identity scores of the two groups. This was done to see if there was an influence of the ease of retrieval on the environmental identity scores.

A hierarchical regression model was calculated to test the effect of the ease of the retrieval task and its interaction with the need for power on the intention to join an energy community. The model was calculated using a linear model of the effects of the environmental identity on the intention to join an energy community. Additionally, another model was calculated with the interaction among the ease of retrieval, the need for power, and their interaction on intention to join an energy community. The two models were then compared using an ANOVA model, analysing the difference in explained variance between the two models when accounting for all independent variables.

If the ease of retrieval was found to be ineffective in manipulating the environmental identity, a hierarchical regression model with environmental identity instead of ease of

retrieval was calculated. The two linear models were to be calculated, with environmental identity instead of the ease of retrieval. An ANOVA model was used to analyse the difference in explained variance between the two models when accounting for all predictor variables.

Results

Correlations

After the descriptive analysis, the correlations between the variables – need for power, environmental identity and joining – and the descriptives – gender, age, nationality, and education – were done. This can be seen in Table 1. It shows an overview of how the variables are related to the descriptives and in what direction.

Table 1

Correlations between the Variables and their Descriptives^a

Variables	М	SD	1	2	3	4	5	6
1. Gender	1.71	0.46						
2. Age	24.3	7.71	25*					
3. Nationality	0.11	0.32	1	007				
4. Education	2.56	0.99	01	.55***	05			
5. Need for Power	4.71	0.67	003	1	01	.01		
6. Environmental identity	4.4	0.96	.24*	.19	03	.13	.03	
7. Joining	4.26	1.22	.23*	.27**	11	.26**	.11	.58***

 a N = 107; Scale categories: 1-7; Gender: 1 = Male, 2 = Female; Nationality: 0 = Non-Dutch, 1 = Dutch; Education: 1 = No Schooling completed, 2 = High School Diploma, 3 = Bachelors, 4 = Masters, 5 = PhD, 6 = Other

p = p < .05, p = p < .01, p = p < .001

Parametric Assumptions

First, the parametric assumptions of the hierarchical regression model were tested. The Shapiro-Wilk test was conducted. The results indicated a difference from normality, W = 0.97, p = .025, which suggests that the assumption of normality is violated. Next, to test the linearity, a plot of the residuals and the fitted values was calculated. It shows a linear line,

which suggests that the model is not violating the assumption of linearity. Furthermore, the Studentised Breusch-Pagan test was conducted. The results suggest no significant heteroscedasticity, BP = 1.74, df = 2, p = .42, which means that the assumption of equal variance is met. Lastly, the Durbin-Watson test was conducted. The results indicate no significant positive autocorrelation, DW = 1.78, p = .13, which means that the assumption of independence of residuals is met. Therefore, the model is fit for ANOVA testing as the majority of parametric assumptions are met.

Manipulation Checks

Afterwards, the ease of retrieval was analysed with a t-test to determine if it shows a difference in difficulty between the two groups to influence the independent variable. It showed a statistically significant difference in means between the groups, t(104.97) = -4.71, p < .001, 95% CI [-2.28, -0.93]. In the few examples condition (M = 3.06), the participants reported a significantly lower difficulty than those in the many examples condition (M = 4.66). This indicates that the participants in the many examples condition had more difficulty with the task than the few examples condition. Therefore, the ease of retrieval was effective as there was a difference in difficulty between the two groups.

Next, another t-test was conducted to compare environmental identity scores between the two groups. It shows no significant difference between the groups, t(104.98) = -0.99, p =.33, 95% CI [-0.55, 0.18]. The few examples condition had a mean environmental identity score of 4.30, while the many examples condition had a slightly higher mean of 4.49. However, the 95 % confidence interval indicates that the observed difference is due to chance. Therefore, the two groups do not show a significant difference in environmental identity scores, which indicates that the manipulation of the ease of retrieval did not work as intended.

The Effect of Ease of Retrieval and Need for Power on Intention to Join

Hierarchical regression was conducted to examine whether the need for power moderates the relationship between ease of retrieval and the intention to join an energy community. The overall model was not significant, F(3, 103) = 2.14, p = .10, although the predictors accounted for a small portion of the variance in joining, $R^2 = .06$. The ease of retrieval was a non-significant negative predictor of joining, B = -0.10, t(103) = -1.67, p = .1, 95% CI [-0.22, 0.02]. This means that the ease of retrieval did not correspond to joining an energy community. Additionally, the need for power was not a significant predictor, B = 0.25, t(103) = 1.40, p = .17, 95% CI [-0.10, 0.59]. This shows that the need for power was not associated with joining. Furthermore, the interaction between ease of retrieval and need for power was also not significant, B = 0.13, t(103) = 1.46, p = .15, 95% CI [-0.05, 0.31]. This means that the ease of retrieval had a similar influence on the intention to join regardless of the need for power. Table 2 shows an overview of the results.

Table 2

Hierarchical Regression of the Effect of Ease of Retrieval and the Need for Power on Intention to Join

	В	SD	t	р	95% CI	
Ease of Retrieval	-0.10	0.06	-1.67	.1	-0.22	0.02
Need for Power	0.25	0.18	1.40	.17	-0.10	0.59
Interaction	0.13	0.09	1.46	.15	-0.05	0.31

 $N = 107; R^2 = .06$

By adding the interaction term in one model, it did not result in a statistically significant increase in explained variance compared to the other model, F(1, 103) = 2.13, p = .15. Therefore, the interaction between ease of retrieval and need for power did not contribute significantly to the prediction of joining.

The Effect of Environmental Identity and Need for Power on Intention to Join

As the t-test showed no significant influence of the ease of retrieval on environmental identity scores, environmental identity was used as a predictor instead of the ease of retrieval. A hierarchical regression was conducted to examine whether environmental identity, need for power, and their interaction predicted intention to join an energy community. The model was statistically significant, F(3, 103) = 18.23, p < .001, explaining 35% of the variance in joining intentions, $R^2 = .35$. Environmental identity significantly predicted joining intentions, B = 0.74, t(103) = 7.26, p < .001, 95% CI [0.54, 0.94]. This means that higher environmental identity corresponds with a stronger intention to join. However, the need for power was not a significant predictor, B = 0.17, t(103) = 1.16, p = .25, 95% CI [-0.12, 0.45]. This means that a higher need for power does not relate to a higher intention to join. Additionally, the interaction between environmental identity and need for power was not significant either, B = -0.15, t(103) = -0.97, p = .33, 95% CI [-0.45, 0.15]. This shows that environmental identity influenced joining similarly, regardless of a high or low need for power. An overview of the results can be found in Table 3.

Table 3

Hierarchical Regression of the Effect of Environmental Identity and the Need for Power on Intention to Join

	В	SD	t	р	95% CI	
Environmental Identity	0.74	0.10	7.26	<.001	0.54	0.94
Need for Power	0.17	0.14	1.16	.25	-0.12	0.45
Interaction	-0.15	0.15	-0.97	.33	-0.45	0.15

 $N = 107; R^2 = 0.35$

When including the interaction term, the model did not significantly improve the model fit compared to the model with only main effects, F(1, 103) = 0.94, p = .33. Hence, the interaction between environmental identity and the need for power did not significantly predict joining.

Discussion

Overview of Results

Summarising the findings of the study, the hypothesis is rejected as there was no effect shown of the ease of retrieval on joining an energy community, and the need for power did not strengthen the relationship. Even though the difficulty of the ease of retrieval was high, the influence on environmental identity was not enough to manipulate the scores of environmental identity. Therefore, environmental identity was not manipulated. Hence, the planned analyses showed that the hypothesis should be rejected.

Additional analysis showed, however, that environmental identity did influence the willingness to join an energy community. However, a higher need for power did not influence the relationship between environmental identity and the intention to join. This means that environmental identity correlates with joining an energy community, but the need for power does not influence the relationship. Therefore, the research question of how environmental identity influences the willingness to join an energy community can be answered. Environmental identity positively influences the willingness to join an energy community.

As the ease of retrieval did not manipulate environmental identity, the question arises why that is. A factor which may have contributed to it is the question of the difficulty after the task to recall two or 12 behaviours. In the current study, the participants were asked about the difficulty of the ease of retrieval directly after recalling the behaviours. As participants were asked to rate the difficulty before answering the environmental identity measurement, they could have noticed that it should have been difficult enough to influence their further answers. This could have led to a weakening of the manipulation. Schwarz et al. (1991) indicated in one of their studies that when participants knew about the difficulty, the manipulation would not work as well as when they did not know. Additionally, another reason could be that the participants may have found it too difficult, which resulted in misattributing the difficulty of the task to their poor memory (Schwarz et al., 1991; Winkielman et al., 1998). Therefore, the ease of retrieval task did not influence the participants' environmental identity. This factor could have contributed to the effect of the ease of retrieval.

The environmental identity, however, did correlate with the willingness to join an energy community. This means that participants with environmental identity are more likely to join energy communities. It can be assumed that the strength of environmental identity impacts the willingness to join. This is because the current study showed an influence of environmental identity on the intention to join an energy community. Therefore, the stronger the identity, the more willing a person is to join an energy community.

Additionally, the need for power and its relationship with environmental identity and willingness to join an energy community were not significant either. The need for power influences the control of the behaviour of the participants. Participants with a high need for power control their environment and behaviour more, which would then benefit them when joining an energy community. However, this relationship could not be found in the current study.

Limitations

The ease of retrieval did not work as intended by manipulating environmental identity. This means that the hypothesis was not successfully tested. Participants either did not take it seriously and did not answer a total of 12 behaviours, or they were not affected by it. Participants were omitted when they did not write anything constructive in the survey. It was not checked if participants wrote 12 behaviours, but it was looked at whether participants wrote answers that did not make sense. Additionally, it can be assumed that when participants did not write a total of 12 behaviours, it was too difficult for them to answer as many. Therefore, some participants could have only written three or four examples. This could be fixed by making the participants answer the number of behaviours that are required by having mandatory fields for each behaviour. However, this could result in a higher dropout rate as participants could feel demotivated to continue. The usage of another manipulation task could be considered as well.

Another limitation is the concept of the need for power. The need for power did not show an influence on the relationship between environmental identity and joining an energy community. This indicates that the concept of the need for power concerning environmental identity does not fit as well as it was thought to. It was argued that a high need for power influences the behaviour of the person and others, as the person with a high need for power wants to influence them in a way that helps them achieve their goal (Królewiak, 2017). Therefore, when they have a high environmental identity, they control their environmental behaviour more to achieve their goal of doing more for the environment. However, there does not seem to be an influence of the need for power on environmental identity. An explanation for this is that the need for power does not influence the relationship between environmental identity and willingness to join an energy community. Devins and Federspiel (2010) highlighted that individuals with a high need for power may use joining a group as an outlet to become a leadership figure. This is because of their potential influence on the group. However, individuals may also find it better not to join a group, as they do not see the benefit of joining it because of the potential roles they could get instead of being a leader (Devins & Federspiel, 2010). They may also want to become a mediator instead of a leader (Devins & Federspiel, 2010). The need for power in a group setting seems to be about controlling others instead of their behaviour to achieve a common goal. People with a high need for power would want to achieve their own goals and not a collective goal by influencing the behaviour of others. It seems that influencing the behaviour of others is not as important as controlling someone else when in a group setting. Therefore, it may not be a concept or factor that plays a role in environmental identity and joining intentions of an energy community.

Future Research

First, future research should investigate whether the ease of retrieval task can manipulate environmental identity. Additional research should be done with the ease of retrieval by having the question about difficulty later on, or having a mandatory field for each behaviour. This could help assess if the ease of retrieval task manipulates environmental identity. Additionally, it could be investigated whether the ease of retrieval was too easy or too difficult. Furthermore, a different manipulation could be tried to manipulate environmental identity. An example of another manipulation is the identity manipulation from Hu et al. (2020).

The identity manipulation by Hu et al. (2020) could be used to manipulate identity. In this experiment, participants completed two tasks. The first involved rating three lecture pieces on style and clarity, under the pretence of evaluating teaching materials. Without their knowledge, the second piece was the subtle manipulating factor. The control group read a neutral text on energy efficiency, while the manipulated group read a version about excessive energy use in a dissociative group in their organisational working environment. This subtle priming aimed to influence identity-related perceptions, with the expectation that those in the treatment group would reduce energy consumption by psychologically distancing themselves from the negative group behaviour. After two weeks, they completed a follow-up survey assessing self-reported changes in energy-saving behaviours in both organisational and private domains. They rated this on a 5-point Likert scale. This can also be applied to the current study.

Using the identity manipulation by Hu et al. (2020), environmental identity could be manipulated similarly. Participants could evaluate reading materials for a study with three sections about different topics in the field of the environment. Two sections would be neutral, and one would be the manipulating section. After a few weeks, the participants fill out a

follow-up survey about their environmentally friendly behaviour on a 5-point Likert scale. However, this results in a longer study, which requires more effort, and this can affect participants' willingness to take the follow-up survey. With this setup, it can be tested whether environmental identity is manipulated.

Furthermore, future research could investigate if the needs of McClelland (1985) play a role in establishing and joining energy communities. As there is limited research regarding the environmental field and the needs, it could be an extensive and interesting research. This would indicate if there is a relationship between the needs of McClelland (1985) and environmentalism and energy communities. Additionally, it could be investigated if the needs play a role when group identity is measured instead of individual identity. As the need for power plays a bigger role in group settings (Devins & Federspiel, 2010; Królewiak, 2017), it would be interesting to see how it is influenced when a bigger emphasis is on the group and not the individual.

In this paper, it was investigated whether environmental identity predicts joining energy communities. Additionally, the need for power was included to see if it facilitates a stronger relationship between environmental identity and joining energy communities. In this study, the hypothesis can be partially accepted as environmental identity influences the willingness to join, but the need for power does not moderate this relationship. As the initiatives regarding the environment are increasing, the importance of understanding why people join these initiatives grows as well. This study indicates that environmental identity is one of the important factors which influence joining energy communities. Governments need to strive for policies following the individual's environmental identity to create long-lasting acceptance regarding sustainable initiatives. It shows the importance of further research into the field as society benefits from it.

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Appendices

Appendix A AI Statement

During the preparation of this work, the author, Nienke-Martine Terpsma, used ChatGPT in order to assist with RStudio codes. Additionally, Grammarly was used to check grammar and spelling mistakes. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

Appendix B Informed Consent

Dear Participant,

Thank you for your interest in this study. The purpose of this research in to investigate the willingness to join an energy community (EC). Energy communities are based on voluntary citizen participation, contributing to the transition to renewable energies (Elena & Andreas, 2020). They enable local stakeholders to produce, share, and manage energy collectively.

Your participation will help us to conclude possible motivating factors for joining.

This participation will take 20-30 minutes in total. Amongst others, we would like to uncover people's opinions of energy communities through this questionnaire.

While participating, we expect that you read the instructions carefully, answer honestly and not overthink your answers. This will help us to draw reliable information about the willingness to join an EC.

The BMS Ethics Committee/domain Humanities & Social Sciences has reviewed and approved this research project.

All information collected in this study will be kept confidential and will only be accessible to the research team. The data will be used solely for the purpose of this research and may be included in bachelor theses. At all times, your data will remain anonymous. The data will be securely stored and retained for ten years.

Participation in this study is entirely voluntary. You may withdraw at any time without providing a reason. If you withdraw before completing the questionnaire, your data will not be used. In the next section, we will ask you to provide some demographic information for data analysis purposes.

If you have further questions, feel free to contact: m.kremer-2@student.utwente.nl ethicscommittee-hss@utwente.nl (Ethics Committee)

By taking part in this study I agree that:

Taking part in the study	Yes	No
I have read and understood the study information:		
I consent voluntarily to be a participant in this study and understand that I can r	efuse to	
answer questions and I can withdraw from the study, without giving a reason:		
I understand that taking part in the study involved answering questions in an on	line surv	ey:

I understand that the information I provide will be used anonymously for data collection and analysis:

Appendix C

Motivational needs questionnaire

- 1. When doing a job, I need feedback
- 2. I prefer to work alone and be my own boss
- 3. I am uncomfortable when forced to work alone
- 4. I go out of my way to make friends with new people
- 5. I enjoy a good argument
- 6. After starting a task, I am uncomfortable until it is finished
- 7. Status symbols are important to me
- 8. I am always getting involved with group projects
- 9. I work better when there is a deadline
- 10. I work best when there is some challenge involved
- 11. I would rather give orders than take them
- 12. I am sensitive to others, especially when they are angry
- 13. I am eager to be my own boss
- 14. I accept responsibility eagerly
- 15. I get personally involved with my superiors
- 16. I include others in what I am doing
- 17. I prefer to be in charge of events
- 18. When given responsibility, I set measurable standards of high performance
- 19. I am concerned about my reputation or position
- 20. I desire to out-perform others
- 21. I am concerned about being liked and accepted
- 22. I enjoy and seek warm, friendly relationships
- 23. I get completely involved in a project
- 24. I want my ideas to be used
- 25. I desire unique accomplishments
- 26. I don't like being left out of things
- 27. I enjoy influencing the direction of things
- 28. I think about consoling and helping others
- 29. I am verbally fluent
- 30. I am restless and innovative
- 31. I think about my goals and how to attain them
- 32. I think about ways to change people
- 33. I think about my feelings and the feelings of others

Appendix D

Environmental Identity Scale and Past Behaviour Measures

- 1. Behaving responsibly toward nature -living a sustainable lifestyle- is important to who I am
- 2. I turn off electrical appliances (to save energy)
- 3. I often go to work or studies by bike instead of by car
- 4. I turn off the heater when I leave my room
- 5. I use energy-efficient light bulbs
- 6. I turn off the light when no one is in the room
- 7. I often buy organic products
- 8. I shower very shortly
- 9. I am a member of an environmental organisation

 \square

 \square

10. I always actively search for the most environmental-friendly products

11. I refuse plastic bags in clothing shops

12. I rarely eat meat

Appendix E

Intention to join an energy community scale

If you would take part in an energy community initiative, to what extent would the following reasons play a role for you? (1= absolutely not, 7= absolutely yes)

- 1. Save money
- 2. Contribute to a better environment
- 3. Be involved in my neighbourhood

Please indicate to what extent you agree with the following statements (1= not at all, 7 very much)

- 4. I would like to know more about the energy community initiatives in my neighbourhood.
- 5. I am considering joining the new energy community in my neighbourhood
- 6. I would like to know more about the energy community initiative in my neighbourhood
- 7. I plan to join the energy community initiative in my neighbourhood in the future
- 8. I am interested in the energy community initiatives

Appendix F

R codes

install.packages("tidyverse") library(tidyverse) library(broom) install.packages("psych") library(psych) install.packages("ggplot2") library(ggplot2) library(readxl) install.packages("fastDummies") library(fastDummies) install.packages("dplyr") library(dplyr) install.packages("tidyr") library(tidyr) install.packages("tidydr") library(tidydr) install.packages("Imtest") library(lmtest) install.packages("Hmisc") library(Hmisc) #import data Copy_of_Bachelor_Thesis_1_Mai_2025_06_11 <- read_excel("Copy of Bachelor Thesis_1. Mai 2025_06.11.xlsx") View(Copy_of_Bachelor_Thesis_1_Mai_2025_06_11) #delete rows/ people who did not consent in the end Copy_of_Bachelor_Thesis_1_Mai_2025_06_11 <-Copy_of_Bachelor_Thesis_1_Mai_2025_06_11 [-c(81, 82, 83, 84, 85, 87, 91, 92, 94, 98, 99, 100, 101, 103, 104, 105, 106, 107, 109, 113, 116, 119, 125, 126, 128, 134, 136),] Copy_of_Bachelor_Thesis_1_Mai_2025_06_11 <-Copy_of_Bachelor_Thesis_1_Mai_2025_06_11 [-c(91,92,93),] ##Attention ChecK: remove those who got 0 for all $attention checkcorrect <- \ Copy_of_Bachelor_Thesis_1_Mai_2025_06_11$ \gg mutate(Attention_1 = ifelse(Q6_16_Attention == "2", 1, 0), Attention_2 = ifelse(Q6_32_Attention == "4", 1, 0), Attention_3 = ifelse(Q8_7_Attention == "6", 1, 0)) attentionsum <- c("Attention_1", "Attention_2", "Attention_3") attentioncheckcorrect <- attentioncheckcorrect %>% mutate(sum_attention = rowSums(select(., all_of(attentionsum)))) fulldata<- attentioncheckcorrect[attentioncheckcorrect\$sum attention != 0, 1View(fulldata) ##averages #subset easy (2 behaviours) easy_condition <- select(fulldata, -Group2) easy_condition <- easy_condition %>% drop_na(Group1) #subset difficult (12 behaviours)

diff_condition <- select(fulldata, -Group1) diff_condition <- diff_condition %>% drop_na(Group2) easy_condition_achievement <- c("Q6_1_Ach", "Q6_6_Ach", "Q6_9_Ach", "Q6_10_Ach", "Q6_14_Ach", "Q6_19_Ach", "Q6_21_Ach", "Q6_24_Ach", "Q6_26_Ach", "Q6_33_Ach") easy_condition_average <- easy_condition %>% mutate(achievement_total = $rowMeans(select(.,all_of(easy_condition_achievement))))$ easy_condition_power<- c("Q6_2_Pow", "Q6_5_Pow", "Q6_7_Pow", "Q6_11_Pow", "Q6_13_Pow", "Q6_18_Pow", "Q6_20_Pow", "Q6_25_Pow", "Q6_28_Pow", "Q6_30_Pow", "Q6_34_Pow") easy_condition_average <- easy_condition_average %>% mutate(power_total = rowMeans(select(.,all_of(easy_condition_power)))) manucoporto_inter_formations/section_interms/sections_portoring_formations_portoring_formation_section_affiliation <- c("Q6_3_Aff", "Q6_4_Aff", "Q6_8_Aff", "Q6_12_Aff", "Q6_12_Aff", "Q6_12_Aff", "Q6_12_Aff", "Q6_22_Aff", "Q6_23_Aff", "Q6_27_Aff", "Q6_29_Aff", "Q6_31_Aff", "Q6_35_Aff") easy_condition_average <- easy_condition_average %>% mutate(affiliationr_total = rowMeans(select(..all of(easy condition affiliation)))) #wretage score environmental identity easy easy_identity <- c("Q8_1", "Q8_2", "Q8_3", "Q8_4", "Q8_5", "Q8_6", "Q8_8", "Q8_9", "Q8_10", "Q8_11", "Q8_12", "Q8_13", "Q8_14") easy_condition_average <- easy_condition_average%>% mutate(identity = rowMeans(select(.,all_of(easy_identity))))) #average score joining easy easy_ec <- c("Q10_1_DV", "Q10_2_DV", "Q10_3_DV", "Q10_4_DV", "Q10_5_DV") easy_condition_average <- easy_condition_average%>% mutate(joining_ec = rowMeans(select(.,all_of(easy_ec)))) #difficult diff_condition_achievement <- c("Q6_1_Ach", "Q6_6_Ach", "Q6_9_Ach", "Q6_10_Ach", "Q6_14_Ach", "Q6_19_Ach", "Q6_21_Ach", "Q6_24_Ach", "Q6_26_Ach", "Q6_33_Ach") diff_condition_average <- diff_condition %>% mutate(achievement total = rowMeans(select(.,all_of(diff_condition_achievement)))) diff_condition_power <- c("Q6_2_Pow", "Q6_5_Pow", "Q6_7_Pow", "Q6_11_Pow", "Q6_13_Pow", "Q6_18_Pow" "Q6_20_Pow", "Q6_25_Pow", "Q6_28_Pow", "Q6_30_Pow", "Q6_34_Pow") diff_condition_average <- diff_condition_average %>% mutate(power_total = rowMeans(select(.,all_of(diff_condition_power)))) diff_condition_affiliation <- c("Q6_3_Aff", "Q6_4_Aff", "Q6_8_Aff", "Q6_12_Aff", "Q6_15_Aff", "Q6_17_Aff", "Q6_22_Aff", "Q6_23_Aff", "Q6_27_Aff", "Q6_29_Aff", "Q6_31_Aff", "Q6_35_Aff") diff_condition_average <- diff_condition_average %>%

mutate(affiliationr_total = rowMeans(select(.,all_of(diff_condition_affiliation)))) #average score environmental identity diff_identity <- c("Q8_1", "Q8_2", "Q8_3", "Q8_4", "Q8_5", "Q8_6", "Q8_8", "Q8_9", "Q8_10", "Q8_11", "Q8_12", "Q8_13", "Q8_14") diff_condition_average <- diff_condition_average%>% mutate(identity = rowMeans(select(.,all_of(diff_identity)))) #average score joining difficult diff_ec <- c("Q10_1_DV", "Q10_2_DV", "Q10_3_DV", "Q10_4_DV", "Q10_5_DV") diff_condition_average <- diff_condition_average%>% mutate(joining_ec = rowMeans(select(.,all_of(diff_ec))))) ##manipulation check #dummy coding and combining data sets combined_data <- bind_rows(easy_condition_average, diff_condition_average) easy_condition_average\$Group1<- 1 diff_condition_average\$Group2<- 2 names(easy condition average) <- names(diff condition average) combined_data <- rbind(easy_condition_average, diff_condition_average) combined_data <- combined_data %>%rename(Groups = Group2) View(combined_data) #t-tests: difficulty & identity t.test(Q7_1_difficulty ~ Groups, data = combined_data) t.test(identity ~ Groups, data = combined_data) ##regression analysis # Create DV (Joining EC) composite score "Cloade DV (commp LC) composite core fulldataSEC <- rowMeans(fulldata[, c("Q10_1_DV", "Q10_2_DV", "Q10_3_DV", "Q10_4_DV", "Q11_5_DV")], na.rm = TRUE) # Create Need for power composite score "Cheat rectain power composite score" fulldata\$nPow <- rowMeans(fulldata[, c("Q6_2_Pow", "Q6_5_Pow", "Q6_7_Pow", "Q6_11_Pow", "Q6_13_Pow", "Q6_18_Pow", "Q6_20_Pow", "Q6_25_Pow", "Q6_28_Pow", "Q6_30_Pow", "Q6_34_Pow")], na.rm = TRUE) # Center predictor and moderator fulldata\$EoR_c <- scale(fulldata\$Q7_1_difficulty, center = TRUE, scale = FALSE) fulldata\$nPow_c <- scale(fulldata\$nPow, center = TRUE, scale = FALSE) # Create interaction term fulldata\$interaction <- fulldata\$EoR_c * fulldata\$nPow_c #main effects model1_hier <- lm(EC ~ EoR_c + nPow_c, data = fulldata) #add interaction $model2_hier <- lm(EC \sim EoR_c + nPow_c + interaction, data = fulldata)$ #review results summary(model1_hier) summary(model2_hier) confint(model2 hier) #compare models anova(model1_hier, model2_hier) ##Environmental identity #EI composite "RLI composite fulldataSEI <- rowMeans(fulldata[, c("Q8_1", "Q8_2", "Q8_3", "Q8_4", "Q8_5", "Q8_6", "Q8_8", "Q8_9", "Q8_10", "Q8_11", "Q8_12", "Q8_13", "Q8_14")], na.rm = TRUE) #Center EI and nPow fulldata\$EI c <- scale(fulldata\$EI, center = TRUE, scale = FALSE) fulldata\$nPow_c <- scale(fulldata\$nPow, center = TRUE, scale = FALSE) # Create interaction term fulldata\$interaction_EI <- fulldata\$EI_c * fulldata\$nPow_c #Block 1: $model1_EI <- lm(EC \sim EI_c + nPow_c, data = fulldata)$ #add interaction $model2_EI <- lm(EC ~ EI_c + nPow_c + interaction_EI, data = fulldata)$ # Summaries summary(model1_EI) summary(model2_EI) confint(model2_EI) # Model comparison anova(model1_EI, model2_EI) ##correlations & barlett & KMO #correlations identity value dataset identity_full <- fulldata %>% select(48:53,55:61) identity_full %>% cor() #nationality in dutch and non-dutch $full data \$Nationality_dummy <- if else(full data \$Q4_nationality == 1, 1, 0)$ #correlations needs needs_full <- fulldata %>% select(10:24.26:40.42:44)

needs full %>% cor() #correlations demographics fulldata\$Q3_age <- as.numeric(fulldata\$Q3_age) demo_full <- fulldata %>% select(5:6,9,75,80,76,83) demo_full %>% cor() correlation_matrix <- cor(demo_full) rcorr_result <- rcorr(as.matrix(demo_full)) rcorr_result\$r rcorr result\$P significant <- rcorr_result\$P < 0.05 significant #KMO identity_full %>% KMO() needs_full %>%KMO() #Bartlett identity_full%>% cortest.bartlett() needs_full %>% cortest.bartlett() ##parametric assumptions #Shapiro-Wilk test - normality shapiro.test(residuals(model1_hier)) #linearity plot(fitted(model1_hier), residuals(model1_hier), main = "Residuals vs Fitted", xlab = "Fitted values", ylab = "Residuals") abline(h = 0, col = "red") #homoscedasticity bptest(model1_hier) #independence dwtest(model1_hier) ##demographic data #age fulldata\$Q3_age <- as.numeric(fulldata\$Q3_age) fulldata %>% summarise(n = nmean_age = mean(Q3_age, na.rm = TRUE), $sd_age = sd(Q3_age, na.rm = TRUE),$ min_age = min(Q3_age, na.rm = TRUE), max_age = max(Q3_age, na.rm = TRUE)) #gender: 1=male 2=female table(fulldata\$Q2_gender) fulldata %>% summarise(n = n(),mean_gender = mean(Q2_gender, na.rm = TRUE), sd_gender = sd(Q2_gender, na.rm = TRUE)) #education: 1=no schooling 2=High school diploma etc 3=Bachelor 4=Master 5=PhD 6=Other table(fulldata\$Q5_education) fulldata %>% summarise(n = n(),mean_edu = mean(Q5_education, na.rm = TRUE), sd_edu = sd(Q5_education, na.rm = TRUE)) #nationality: 1=Netherlands 2=Germany 3=Others table(fulldata\$Q4_nationality) table(fulldata\$Q4 nationality other) fulldata %>% summarise(n = n(),mean_nat = mean(Nationality_dummy, na.rm = TRUE), sd_edu = sd(Nationality_dummy, na.rm = TRUE)) #need for power fulldata %>% summarise(n = n(),mean_pow = mean(nPow, na.rm = TRUE), $sd_pow = sd(nPow, na.rm = TRUE))$ #identity fulldata %>% summarise(n = nO. mean id = mean(EI, na.rm = TRUE), $sd_id = sd(EI, na.rm = TRUE))$ #joining combined_data %>%summarise(n = n(),mean_jo = mean(joining_ec, na.rm = TRUE), sd_jo = sd(joining_ec, na.rm = TRUE))