



Energy Citizenship and Energy Communities
for a Clean-Energy Transition

D4.1

Report on experimental studies on energy communities

Effects of energy community set-ups on support for and
willingness to join energy communities



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Abstract

In this deliverable, the results of 10 experimental lab studies on energy communities are presented. In these 10 experiments, participants were presented with the descriptions of different energy communities. In the descriptions, several key economic and legal set-ups of energy communities (as identified in WP2 and WP3) were varied. We tested whether and how different set-ups of energy communities affect self-reported perceptions of and willingness to join an energy community. More specifically, we assessed whether people's support for and willingness to join an energy community depends on the involvement of citizens and the municipality in the energy community, the motives of members and their connection to the wider local community, and the diversity and representation of members in terms of their gender. We additionally examined energy citizenship at different collective levels and how this affects involvement intentions in energy communities. Impactful experiments were replicated in several EU countries to provide evidence for generalizability.

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List of Abbreviations

CEI	Community Energy Initiative
EC	Energy Citizenship
EU	European Union
IMED	Directive on Common Rules for the Internal Market for Electricity 2019/944/EU
OSF	Open Science Framework
RED	Renewable Energy Directive 2018/2001/EU
RQ	Research Question
WP	Work package

1 Introduction and Summary of Key findings

The sustainable energy transition is a pressing global challenge. For a solution, we not only need technological advancement, but also societal change (Sovacool, 2014; Perlaviciute et al., 2021). The sustainable energy transition is embedded in a broader transition from a neoliberal, consumer-oriented regime towards an alternative citizen-focused regime, from a centralised model of the energy market to a decentralised one. It relies on a transformation of passive energy consumers into energy citizens. This comes with the (implicit) assumption that citizens will more actively participate in shaping the energy transition; yet little is known about whether and when people want to participate in shaping the energy transition (Perlaviciute, 2022). Without careful consideration of what motivates different people to participate and when, there is a risk that the sustainable energy transition further increases inequalities in society (e.g., because only elites participate), jeopardising the justice element.

The EC² project focuses on energy communities as one of the collective contexts in which people make their decisions. Therefore, energy communities are a potential way of involving citizens in the sustainable energy transition and increasing citizen participation (e.g., Hamann et al., 2023). There has been an increased interest in the potential of local communities to be involved in, initiate, and run their own energy saving and production programs as a means to promote a sustainable energy transition (Middlemiss & Parrish, 2010; Sloot et al., 2018). Also in recent EU directives, the transformation of consumers from passive to active customers is emphasised as the right to participate in energy communities (Directive (EU) 2019/944; Directive (EU) 2018/2001). Depending on the definition, currently there are over 10.000 energy communities in Europe alone (Wierling et al., 2023).

There is a persistent ambiguity of what community energy means (Walker, 2011; Walker & Devine-Wright, 2008) and a wide range of definitions exist in the literature (Bauwens et al., 2022). These encompass both energy communities as formally defined by the European Commission as being Citizen Energy Communities (CEC) and Renewable Energy Communities (REC) (Directive (EU) 2019/944), and a range of types of (informal) energy communities that may not adhere to these definitions. Due to this variety and room for interpretation, energy communities can be set up in various ways (see also Hamann et al., 2022), for example regarding their governance structure, technology use (Boon & Dieperink, 2014), their economic and legal forms (see also Bertel., 2022), their locality, the actors, level of autonomy, geographic limitation, and purpose, varying from country to country (Hannoset, Peeters, & Tuerk, 2019). Yet, recent research suggests that only a small number of people are actually involved in such community energy initiatives (CEIs hereafter) (Schwanitz et al., 2023). This raises the key question of how this variety in set-ups of CEIs affects how people perceive and react to different CEIs, including whether they want to join a CEI.

We propose that (legal, social, and economic) set-up features of CEIs can have different effects on how people perceive CEIs, how accepting people are of these initiatives, and their willingness to join them. Research indicates that individuals' pro-environmental action crucially depends on whether they consider their behaviour as part of a collective (Fritsche et al., 2018; Jans et al., 2019). The extent to which people support and want to join CEIs depends on both collective and contextual set-up features of CEIs (e.g., the composition of CEIs, the influence citizens have within CEIs) and individual factors (e.g., differences in motivations and socio-demographics).

The objective of deliverable 4.1 of WP4 is to examine whether and how the set-up of CEIs fosters or hinders people’s involvement in CEIs. More specifically, deliverable 4.1 will provide insight into the causal effects of key CEI set-ups on support for and willingness to join a CEI, on the basis of experimental studies. Therefore, it provides a necessary contribution to understanding people’s motivation in the energy transition, especially when considered together with deliverable 4.2, that investigates the psychological predictors of energy citizenship. The energy community set-ups considered in this deliverable, were partly based on the key legal and economic set-ups identified in deliverable D3.3 by WP3 (Bertel et al., 2022), and derived from D2.1 by WP2 (Hamann et al., 2022), as being relevant from a social and environmental psychological viewpoint.

In 10 experiments, we examined whether and how several set-ups of CEIs such as the involvement of citizens and the municipality in CEIs, the motives of already involved members, energy communities’ connection to the wider local community, and the diversity of members in terms of their gender, affected people’s perceptions and behavioural intentions to join. Experiments were replicated in several European countries in order to assess the generalizability of the results. Studies were conducted in the Netherlands, Germany, Italy, Poland, and Austria. These five countries differ concerning their implementation of the legal framework and the market situation for energy communities, making them an interesting socio-political context for replication (Bertel et al., 2022). In the following, we will present the different set-ups examined, the relevant research questions per topic, and provide a summary of the main results. First, we assessed whether people’s willingness to join a CEI depends on the level of municipality and community members’ involvement in the initiative (1.1). Second, we investigated how people’s support for and the willingness to join a CEI are affected by the extent to which i) the goals of the members of a CEI are morally and pro-environmentally framed, and ii) the extent to which the initiative is connected with the wider local community (1.2). Third, we examined various aspects of diversity and representation in energy communities, with a specific focus on gender (1.3). In the fourth and final series of experiments, we examined energy citizenship at different collective levels and how this affects involvement in CEIs (1.4).

1.1 Citizens’ and municipality involvement in energy communities

The first set-up of CEIs examined the question of how people’s support for and their willingness to join a CEI are affected by who is involved in setting up the energy community. Energy initiatives can be set up and organised top-down by the government, municipality or business enterprises, bottom-up by inhabitants of the local community, or both.

Although bottom-up formation is one of the key features of CEIs, they are often initiated in cooperation with external institutions such as the local government (Bertel et al., 2022, Hamann et al., 2022). From an economic or legal perspective such municipality involvement can be seen as potentially enhancing the likely success of a CEI, as reflected in the EU directives allowing municipalities to participate in CEIs (Bertel et al., 2022). The rationale behind this is that municipalities often have easier access to knowledge and funding compared to citizens (Bertel et al., 2022). Yet, these perspectives do not consider how municipality involvement affects citizens’ perceptions of CEIs, as well as their willingness to join such initiatives.

Following the reasoning that municipalities can help CEIs to reach their sustainable goals, municipality involvement might enhance the perceived collective efficacy of CEIs, a key factor for becoming engaged in collective environmental actions (Fritsche et al., 2018). Yet, willingness

to join a CEI might not only depend on the extent to which the initiative is able to achieve their sustainable energy ambitions. Previous psychological research (Sloot et al, 2019, see also Goedkoop et al., 2022) suggests that people want to become involved in CEIs because of their environmental motives (wanting to protect the environment) as well as their communal motives (wanting to be involved in their community). Furthermore, CEIs seem to increase identification, pro-environmental norm perceptions and behaviours more when they are perceived as formed by members of the community themselves (Jans, 2021). As such, willingness to join a CEI might also depend on whether the initiative is perceived as representing us as community (identity leadership). Such perceptions of identity leadership (Haslam et al., 2020; Steffens et al., 2014), might be enhanced when community members are involved in the initiative, but hampered by municipality involvement.

In three experiments, two in the Netherlands and one in Poland, we assessed whether people's acceptability of and willingness to join an energy initiative depends on the level of municipality and community members' involvement in the initiative. We propose that while involvement of a municipality might help to enhance the perceived collective efficacy of CEIs, defined here as CEI's ability to further a sustainable energy transition (Bandura, 1997; Hamann et al., 2023), municipality involvement might at the same time hamper perceptions of identity leadership, defined here as the initiative representing us as a community (Steffens et al, 2014), and this might have opposing effects on acceptability of and willingness to join a CEI. Specifically, we test the model as displayed in Figure 1.

Additionally, these effects might depend on people's pro-environmental motivations (De Groot & Steg, 2007), their energy citizenship (WP2), their identification with their community (Postmes et al., 2013), and their trust in the municipality (Liu et al., 2019), as these may all affect people's willingness to become involved in an energy initiative set up by community members and/or the municipality. We therefore explore how these variables affect perceptions of the CEI as well as acceptability and willingness to join.

Our findings show that community involvement is more relevant than municipality involvement for acceptability and willingness to join a CEI in both the Netherlands and in Poland, two countries which differ in trust in the government, and number of existing CEIs. When the local community was involved (vs. not involved) in the energy community, this increases the perception that the energy initiative is able to advance a sustainable energy transition (collective efficacy), and that the initiative represents the community (identity leadership), and partly as a result, increases acceptability and willingness to join the energy community. Unexpectedly, energy initiatives in which the municipality is involved, besides community members, did not increase collective efficacy nor affect any of the other outcomes (except for an increase in approval in Study 1).

Environmental values, energy citizenship, community identification and trust in the municipality, are all positively related to acceptability of and willingness to join an energy initiative, as well as the perceived collective efficacy and identity leadership of the initiative, but generally do not moderate the relationship between initiative formation and outcomes. In Poland, community involvement increases acceptability of a CEI for people who strongly or moderately identify with their community, but not for people who weakly identify with their community.

1.2 Environmental motivations and connection with the local community

The second set-up experiments investigated how people's support for and their willingness to join a CEI are affected by the extent to which i) the goals of the members of a CEI are morally or pro-environmentally framed, and ii) the extent to which the initiative is self-focused or focussed on the wider local community (in terms of either members' identity or the beneficiaries).

Pro-environmental behaviour, such as setting up a CEI (Stern, 2000) is often perceived as morally motivated (e.g., Fritsche et al., 2018; Steg & Nordlund, 2019). Indeed, research suggests that stressing the environmental benefits, as compared to the financial benefits, can foster the adoption of environmental behaviours, which suggests that CEIs would need to emphasise their environmental motivations in order to motivate others to join their community (see for a similar reasoning Sloot et al., 2021).

However, there might be a risk to this approach. By emphasising their environmental motivations, the minority involved in CEIs may implicitly question the moral integrity of those not involved (Minson & Monin, 2012). As a result, those not yet involved may respond defensively, by derogating those involved in a CEI, and distinguishing those not involved from those involved. By alienating those not involved, there is a risk that CEIs hamper the sustainability transition they ambition (Kurz et al., 2020; see Bolderdijk & Jans, 2021 for a review). This suggests that CEIs might need to be careful with how pro-environmental they present themselves, if they wish to attract new members.

A too pro-environmental framing of the energy community might thus create an exclusive social identity, which separates those involved from those not involved, whereas social identity is pivotal for motivating environmental behaviour (Barth et al., 2021). As such, placing emphasis on the overarching identity of the community might be a way to avoid this alienation (Gaertner & Dovidio, 2014). By emphasising the energy community's investment in the shared group membership of the local community, the perception of two different groups changes from an "us. vs. them" to a "we". When others are seen as part of one's ingroup, their interests are also seen as one's own and can therefore be described as shared interests, which are then more likely to be pursued (Batalha & Reynolds, 2012).

We examine this idea in two different ways. First, we examine whether a highly moral environmental motivation of an ecovillage vs. a moderately moral environmental motivation and a pro-environmental motivation of an energy cooperative vs. mixed motivations of an energy cooperative (including both pro-environmental motives as well as financial motives to be involved) affect people's willingness to join (in activities of) the energy community, their acceptability of the energy community, their feelings of warmth towards its members, their identification with the energy community, and their perceived shared identity between the energy community and the local region. Second, we investigate whether highlighting the shared identification of the energy community with the local community, rather than merely with the energy community itself, can help to counter any potential negative effects of a pro-environmental framing. Furthermore, we examine whether such shared community identity can also be signalled by the energy community providing benefits for the local community. For example, profits can be shared among members only in the form of return on investment or saved energy costs, or be re-distributed among the entire community by investing in local facilities or energy saving programs that are open to all. Again, the latter may help in

transforming an “us. vs. them” to a “we” hereby increasing participation even when a strong pro-environmental message is displayed.

Our findings from experiment 4 showed that perceiving members of an ecovillage as highly morally motivated for the environment, compared to moderately morally motivated, lowered people's willingness to join the ecovillage, the perceived warmth of ecovillage members, the acceptability of the ecovillage, and the perceived shared identity with the ecovillage. When the members of the ecovillage identified strongly with the local community, rather than just their own ecovillage, this increased the perceived shared identity with the ecovillage, and countered the negative effect of a high moral motivation on willingness to join. That is, when the ecovillage was identified with the local community, people were equally willing to join, independent of how morally the ecovillage presented itself.

In Study 5, we found that presenting a CEI initiative as being environmentally motivated, compared to having mixed motivations (both environmental and financially motivated), increased perceived warmth of members, acceptability of, and identification with the energy community initiative, only when benefits were shared within the local community, rather than just among members of the initiative.

Together, these findings suggest that perceptions of the environmental motivations of the energy community affect how people evaluate the energy community and that CEIs can present themselves as more pro-environmental, when being connected to the local community (either in terms of identification with, or in terms of benefits provided for the wider local community), when recruiting members. This seems to underline the importance of the community aspect of CEIs. Yet, results are not fully consistent on the different outcomes. Future research is needed to examine the most effective manner to showcase connection with the local community, when wanting to motivate members of the local community to become involved in the energy transition.

1.3 Diversity and representation in energy communities

The third set-up experiments examined the diversity and representation of members of the energy community. Fostering inclusivity of CEIs by increasing awareness of how socioeconomic, gender, sociocultural, and socio-political factors impact energy citizenship and involvement in CEIs is a key aspect of the EC2 project. The unequal treatment of citizens and the exclusion of groups of citizens from the energy transformation was also flagged as a key barrier to energy citizenship and active involvement in CEIs in WP3 (Bertel et al., 2022). As stated in deliverable D3.3, all citizens should have the guaranteed possibility to generate energy for their own needs (Bertel et al., 2022; p.50). We examine whether and how the diversity and representation of CEIs, with a specific focus on gender, impact the acceptance of and willingness to be involved in CEIs.

Energy access, climate protection, societal transformation and gender equality are inextricably linked and addressing them together can offer multiple development gains. The energy sector continues to be men-dominated and women are generally underrepresented in the labour force, on company boards, and among senior management positions within this field (EIGE, 2016; IEA, 2023). When it comes to CEIs more specifically, initial qualitative evidence shows that CEIs tend to be led by wealthy, well-educated and older white men (Aiken, 2012; DuPuis & Goodman, 2005; Fraune, 2015; Warbroek et al., 2019; Yildizet al., 2015). Yet, we know little

about differences in the willingness to be involved beyond the group of initiators and leaders and the processes underlying such potential differences. Initial evidence shows that especially women and low-income groups are less involved in CEIs because they feel less efficacious to join, have less social contact with members, and feel less represented by members (see deliverable D4.3, forthcoming). In this series of experimental studies, we examine whether the group composition of the board of a CEI, in terms of diversity and representation of women, can enhance women's willingness to join a CEI.

We find that in the Netherlands men were more willing to join the CEI compared to women, independent of how the energy community was presented in terms of diversity of the board members. This is in line with evidence showing that CEIs are often led by men. Importantly, as in D4.3, we find that overall women felt less efficacious to join the energy community. This seems to suggest that merely presenting scenarios in which more women are included may not be enough to counter such negative effects. Further research is needed to test whether these effects can be replicated in other socio-political contexts as, contrary to our expectations, in Italy we found that women were in fact more willing to join. This could partly be due to the fact that participants in Italy were presented with an all-women board, which was not included in the Netherlands, and because participants in this sample were on average younger than our sample in the Netherlands. Thus, we need to gain a better understanding of the complexity of the participation among different genders in different contexts, including potential intersectionalities, to design effective strategies for inclusive engagement.

1.4 Energy citizenship at the local, national, and EU level

In the fourth and final series of experiments, we examined energy citizenship at different collective levels and how this affects involvement in CEIs. Energy citizenship is defined here from a psychological perspective as “people's belief that they as individuals and as collectives have rights and responsibilities for a just and sustainable energy transition, and their motivation to act upon those rights and responsibilities” (Hamann et al., 2023, p. 47). It encompasses people's perceived rights as individuals and collectives, their felt responsibility, and their willingness to contribute to an energy transition that is both socially just and ecologically sustainable (Held et al., 2022). CEIs are one way in which energy citizenship may unfold. Since CEIs are predominantly organised at the local level, most studies on energy citizenship and CEIs have also mainly focused on local CEIs thus far (e.g., Lode et al., 2022; Dudka et al., 2023).

Yet, energy citizenship can develop at multiple levels. Is energy citizenship more likely to emerge locally or at national, or supranational levels? For what reasons? And how does the level of energy citizenship impact involvement in CEIs? Local collectives are often considered as more relevant for people than national or supranational social units, but the latter might be more strongly associated with effective environmental action because the effectiveness of national and supranational social units in environmental action is associated with the greater scale, resources, and ability to address global environmental challenges (e.g., Chokrai et al., 2022). Therefore, national or supranational social units could be of, at least, equal importance for people perceiving themselves as part of an agentic energy collective, fostering energy citizenship. In three studies conducted in Austria, the Netherlands, and Germany, we specifically study the consequences of group-based collective energy citizenship related to local, national, or European level on perceptions of and willingness to join CEIs. Hereby we will inquire about

the relevance of different levels of collectivity, such as the local community, the country, and the EU, for experiencing collective energy citizenship and the willingness to join CEIs.

Our results demonstrate that there is indeed a difference in collective energy citizenship, depending on the geographical level, however, as there are differences across the countries, there seems to be a degree of variability in how individuals from different regions perceive and engage with energy-related initiatives.

We observed that in the Austrian context, individuals reported higher levels of collective energy citizenship in larger groups such as the national and EU contexts. However, willingness to join CEIs did not significantly vary among these groups. In the Netherlands, we saw a parallel trend with higher collective energy citizenship at the national and EU levels, but notably, there was a difference in willingness to join, with participants in the local and national groups being more willing to participate in local or national CEIs respectively.

However, the German sample presented a deviance from the patterns observed in Austria and the Netherlands. In this case, no significant differences in collective energy citizenship were noted among the groups, yet we observed a difference between the groups in terms of their willingness to join a CEI, with those in the local group displaying a higher willingness to participate compared to those in the national and EU group.

The implications of these results highlight the importance of considering the multifaceted nature of energy citizenship, recognizing that high levels of energy citizenship do not necessarily translate into a heightened willingness to actively participate in or join a CEI. Therefore, energy policy and community engagement strategies should be adapted to the specific characteristics and needs of each region, acknowledging the unique interplay of factors that shape energy citizenship at different geographical levels. By doing so, we can foster more effective and tailored approaches for energy citizenship, taking into account the complexities of energy citizenship across diverse contexts.

2 Experimental studies

We conducted 10 experiments to answer the research questions posed in this deliverable regarding the key social, economic and legal set-ups of CEIs and how this affects acceptance and willingness to join a CEI. In these experiments the conditions of the CEIs were varied. We examined four energy community set-ups in a set of experiments; 1) the level of involvement of citizens and local government in the governance of CEIs (3 experiments), 2) the environmental framing and the community framing of the energy community (2 experiments), 3) the level of diversity of the energy community in terms of socio-demographics (2 experiments), and 4) different levels of energy citizenship and how this affects willingness to join CEIs (3 experiments). Below, the main features and results of these studies are summarised. We report the overall conclusion and discussion per topic. All studies conducted by the University of Groningen (i.e., studies 1-7) were reviewed and approved by the Heymans Institute Ethics Committee, of the University of Groningen. The studies conducted by University of Graz (i.e., studies 8-10) received ethical approval from the ethics committee of the University of Graz. All participants provided their informed (online) consent to participate in these studies and the use of their personal data as stated in the information sheets which accompanied every survey (see deliverable 8.1 for all ethics-related topics and certificates). When applicable, participants also received a debriefing about the experimental manipulations used and the aim of these

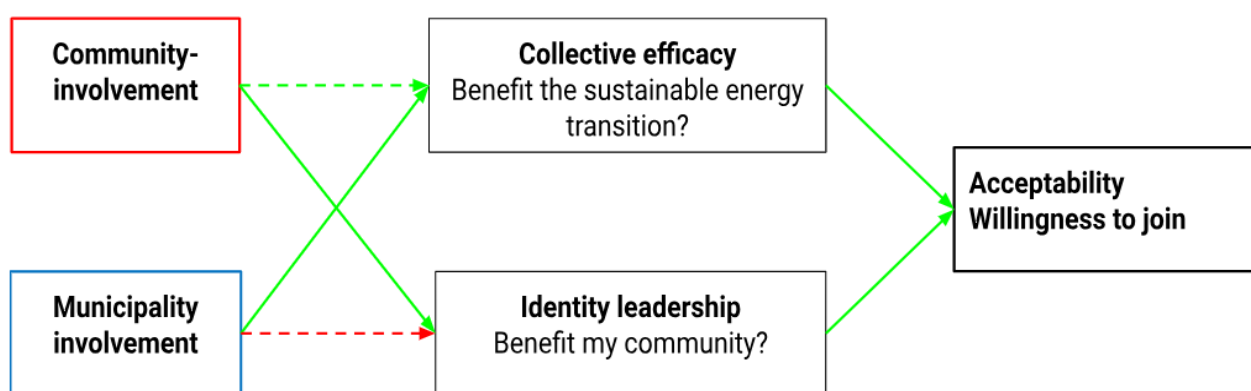
manipulations. Each of the studies were pre-registered on “AsPredicted” or open science framework (OSF; see links per study below)¹. All analyses were conducted in R or SPSS (data and scripts are available upon request).

2.1 Municipality and citizen involvement

In the first three studies we tested whether people’s acceptability of and willingness to join a CEI depends on the municipality and citizen involvement in the set-up of CEIs (see Figure 1). We aimed to address the following overarching research question:

RQ: "How does municipality and community members involvement in the set-up of a CEI affect perceived collective efficacy and identity leadership of the CEI, and acceptability of and willingness to join the CEI?"

Figure 1. Tested model of municipality and community members involvement.



Note. Solid lines represent the hypothesised relations, dashed lines are explorative.

In Study 1, we examined how municipality involvement affected perceptions of a community energy initiative (CEI), as well as acceptance and willingness to join a community-led energy initiative. Specifically, the participants were presented with community-led energy initiatives where the municipality was either involved in (supporting) the initiative, uninvolved, or opposed to the initiative. Participants were recruited using the mailing list of an energy provider in the Netherlands, named Vattenfall.

In Study 2, we added a municipality-led energy initiative, in which solely the municipality was involved in the set-up of the CEI, without involvement of community members. Comparisons were made between community-led, municipality-led, and jointly led energy initiatives. A representative sample of participants of the general Dutch population was recruited via Panel Inzicht.

In Study 3, we aimed to replicate the second study in Poland, a country with a different socio-political context. Participants were recruited via Prolific.

¹ Note that not all hypotheses as pre-registered were analysed as they went beyond the scope for this deliverable and we only report the main results that are of particular interest to EC².

Each of the studies, and hypotheses, were pre-registered on AsPredicted (Study 1: https://aspredicted.org/KXL_Y7P; Study 2: https://aspredicted.org/2ZR_FT6²; Study 3: <https://aspredicted.org/~diQfBHI6MX>).

2.1.1 Study 1 Netherlands, mailing list Vattenfall

2.1.1.1 Sample and Design

A survey link was sent out via a mailing list of Vattenfall, an energy provider in the Netherlands with more than two million clients (<https://www.vattenfall.nl/>). The mailing list consisted of Vattenfall clients in the Netherlands who had indicated earlier that they could be contacted for research purposes³. The data were collected using the online survey software Qualtrics (<https://www.qualtrics.com/>).

Using G*Power, a power analysis was conducted to determine the minimally required sample size for a one-way ANOVA with three levels of predictors (municipality uninvolved, municipality support, and municipality opposed), a medium effect size ($f = 0.25$) at a significance level of $\alpha = 0.05$, and a power of 0.8. This yielded a minimum sample size of 159.

Although a minimum of 159 participants was required, data collection continued after having reached this number. In total, 1384 people clicked on the link to the survey, of which 1247 (90%) consented to participate in the research. After consenting and filling in a short value inventory, participants had either stopped by themselves ($n = 215$), or were randomly and evenly allocated to our study ($n = 516$), or a different study ($n = 516$). Of those 516, 396 (76.7%) filled in all or most of the questions. For these participants, age ($M = 61.0$, $SD = 11.5$) ranged from 24 to 85, with 304 men and 80 women, while 1 participant indicated another gender, 2 preferred not to say, and 9 cases were missing. The median household income level was 30,000-45,000 euros gross per year (ranging from less than 15,000 euros gross per year to over 60,000 euros gross per year). Note that there were 6 missing cases and 47 participants preferred not to state their household income. In comparison to the Dutch population, the participants were on average older, wealthier, and more likely to be men. Of the 516 participants allocated to this study, 353 (68.4%) correctly answered the relevant manipulation checks at the end (see details below) and were included in the analysis; well above the required sample size of 159. For more information on the manipulation checks and exclusion on the basis thereof, see 2.1.1.3 and 2.1.1.4.

2.1.1.2 Procedure and experimental conditions

When allocated to our study, participants were randomly and evenly distributed to one of the three conditions of municipality involvement: uninvolved, supported, or opposed to the local energy initiative (each $n = 172$). To manipulate municipality involvement, participants were asked to imagine three scenarios about a bottom-up energy initiative set up by residents of their neighbourhood, called SMART. In all three conditions, they read that this SMART-initiative planned to use smart metres to promote more efficient and sustainable collective energy use in their neighbourhood. This was followed by a short description about how smart metres can help to reduce collective energy use. Yet, the scenarios differed in the description about the municipality's involvement in this initiative. In the involved-condition, participants read that the

² We report the hypotheses of Study 3, also in Study 2.

³ Vattenfall had no influence on the hypotheses, research design, execution, analyses, and write-up of this study.

initiative was set up by residents of their neighbourhood and the municipality, and that they had jointly decided on the energy saving measures they aimed to take. In the uninvolved-condition, participants read that the initiative was set up by residents of their neighbourhood without involvement of the municipality, and that these initiative takers had independently decided on the energy saving measures they aimed to take. The text in the opposed-condition was similar to the uninvolved condition, except that in this condition participants read that this initiative was set up despite opposition from the municipality (see full text in the Appendix 4.1).

Next, participants were asked to fill in questions about their willingness to join the initiative, the perceived acceptability of the initiative, the perceived identity leadership and collective efficacy of the initiative, participants' identification with their neighbourhood, and further measures that are not relevant to this deliverable⁴.

2.1.1.3 Measures

Questions were answered on a 7-point Likert-scale (1 = *completely disagree*; 7 = *completely agree*), unless otherwise specified. See Table 1 for descriptive statistics and correlations.

Approval of the energy initiative. Approval was measured using a single self-created item; "I approve of the SMART initiative".

Willingness to join. Willingness to join the SMART-initiative was assessed with two items, adapted from Sloot et al. (2018); e.g. "I want to be involved in the SMART-initiative."

Identity leadership. To assess the perceived identity leadership of the initiative, we adapted the short 4-item inventory of identity leadership from Steffens and colleagues (2014) to the context of community energy initiatives. These items included statements such as "The SMART-initiative is representative of residents of my neighbourhood."

Collective efficacy. Collective efficacy was assessed with three items, adapted from Hamann and Reese (2020) and Van Zomeren and colleagues (2013); e.g. "I think that the SMART-initiative ... can promote a just and sustainable energy transition."

Values. Values were assessed with a shortened version of the environmental portrait value questionnaire (Bouman et al., 2018, personal correspondence main author). Biospheric, altruistic, hedonic, and egoistic values were each assessed with two items. For each item, a fictional person was described, after which participants were asked to indicate to what extent this described person resembles the participant. Answers were given on a scale of 1 (*Looks not at all like me*) to 7 (*Looks very much like me*). The higher the score, the greater the perceived importance of the value. For the purposes of this study, only biospheric values were included in the analysis; an example of one of the items for biospheric values is "It is important for this person to feel connected to nature and respect this nature."

⁴ The survey also included measures about perceived integrity-based trust of the initiative and the energy supplier, as well as their willingness to share data with the energy supplier.

Community identification. Community identification was assessed with the single-item scale of social identification (i.e. “I identify with the residents of my neighbourhood”; Postmes et al., 2013).

Energy citizenship. This was assessed through nine items (Held et al., 2022), including statements such as “I consider affordable sustainable energy as an important right” and “I perceive it as my responsibility to help others participate in the sustainable energy transition (for example by sharing my knowledge).”

Manipulation checks. We included three items to assess whether the experimental manipulation worked as intended. We assessed whether the participants thought that the municipality was involved in and supportive of the SMART-initiative, opposed to the SMART-initiative, and whether the initiative was set up solely by residents of the neighbourhood (i.e. municipality not involved). Each item thus corresponded to one experimental condition, and was formulated as a statement (e.g. “the municipality is involved in and supports the SMART initiative”) to which the participants indicated their agreement on a 7-point scale.

Table 1. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	M	SD	1	2	3	4	5	6
1 Approval	-	5.30	1.36						
2 Willingness to Join	.91	4.85	1.58	.682**					
3 Identity Leadership	.88	4.51	1.15	.584**	.649**				
4 Collective Efficacy	.95	4.90	1.33	.612**	.681**	.738**			
5 Biospheric Values	.78	5.57	1.18	.222**	.259**	.227**	.282**		
6 Community Identification	-	4.35	1.42	.258**	.355**	.588**	.433**	.122*	
7 Energy Citizenship	.88	5.23	1.01	.305**	.483**	.447**	.483**	.396**	.360**

* $p < .05$, ** $p < .01$.

2.1.1.4 Results

Manipulation check. First, we checked whether the manipulation worked as expected. For this we conducted a repeated measures analysis, with the manipulation checks as within-subject factor, and experimental condition as between-subjects factor. Both type of manipulation check, $F(2, 784) = 20.28, p < .001, \eta_p^2 = .05$, and municipality involvement, $F(2, 392) = 12.00, p < .001, \eta_p^2 = .06$, had a significant main effect on manipulation check scores. Importantly, these main effects were marked by a significant interaction, $F(4, 784) = 51.33, p < .001, \eta_p^2 = .21$, in line with what was manipulated. Participants in the involved condition scored significantly higher on the involved check, and significantly lower on the uninvolved check, than participants in the uninvolved condition, and the opposed condition. Similarly, participants in the opposed condition scored significantly higher on the opposed check, than participants in the involved, and uninvolved conditions (see Table 2).

Although the manipulations generally worked as intended, there were 43 participants who

scored below the midpoint of the scale (< 4) on the check related to the condition they were in. Specifically, this was the case for 14 participants in the involved condition, 16 participants in the uninvolved condition, and 13 participants in the opposed condition. As pre-registered, these participants were excluded from further analyses, resulting in a remaining sample of 353 participants, well above the required sample size of 159 to detect a medium effect.

Table 2. Means and standard deviations per condition

Manipulation Check	Experimental Condition					
	Uninvolved		Involved		Opposed	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Uninvolved	4.80	1.62	3.62	1.50	4.76	1.65
Involved	3.63	1.79	4.73	1.43	2.99	1.68
Opposed	3.18	1.31	3.02	1.38	4.91	1.67

Effects of municipality involvement. Municipality involvement significantly affected approval of the CEI, but not willingness to join, nor identity leadership, and unexpectedly also not collective efficacy, (see Table 3). Specifically, approval was significantly higher when the municipality was involved compared to not involved (uninvolved and opposed), $M\Delta = 0.36$, $CI_{95}(0.06; 0.66)$, $p = .018$, while there was no significant difference in approval between an uninvolved or opposed municipality, $M\Delta = -0.29$, $CI_{95}(-0.64; 0.05)$, $p = .092$.

Table 3. Means, standard deviations, and univariate effects on acceptability, willingness to join, identity leadership, and collective efficacy

Variable	Statistics			Experimental Condition					
	<i>F</i> (2, 350)	<i>P</i>	η^2	Uninvolved		Involved		Opposed	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Approval	4.18	.016	.023	5.03	1.38	5.53	1.27	5.32	1.36
Willingness to Join	2.83	.060	.016	4.77	1.46	5.13	1.56	4.67	1.67
Identity Leadership	.309	.735	.002	4.51	1.16	4.57	1.06	4.45	1.15
Collective Efficacy	.522	.594	.003	4.81	1.33	4.99	1.26	4.90	1.41

The role of identity leadership and collective efficacy. Using process model 4 (Hayes, 2022), we assessed whether identity leadership and collective efficacy explained additional variance in approval and willingness to join. Municipality involvement explains 2% of variance in acceptance and in willingness to join. Such small effects are typical for hypothetical manipulations within psychology. Adding identity leadership and collective efficacy explains an additional 39% in acceptance, and an additional 50% in willingness to join (see Table 4). Thus, in line with our expectations, both identity leadership and collective efficacy seem relevant for acceptance and willingness to join, yet in contrast to what was expected this is not affected by municipality involvement.

Table 4. Multivariate regression analysis on approval and willingness to join

Variable	Approval					Willingness to join				
	<i>B</i>	<i>CI-95</i>	β	<i>t</i>	<i>p</i>	<i>B</i>	<i>CI-95</i>	β	<i>t</i>	<i>p</i>
C1 ^a	-0.28	-0.50; -0.05	-.21	-2.38	.018	-0.30	-0.54; -0.06	-.19	-2.43	.016
C2 ^b	0.28	0.02; 0.55	.21	2.10	.037	-0.13	-0.41; 0.15	-.08	-0.89	.155
Identity Leadership	0.35	0.21; 0.49	.30	4.97	<.001	0.43	0.28; 0.58	.32	5.76	<.001
Collective Efficacy	0.39	0.27; 0.51	.38	6.37	<.001	0.52	0.39; 0.65	.44	8.04	<.001

^aC1: Uninvolved = .333, Opposed = .333, Involved = -.667; ^bC2: Opposed = .5, Uninvolved = -.5.

Other relevant predictors. As displayed in Table 1, biospheric values, energy citizenship, and community identification are all positively related with acceptance, willingness to join, as well as with collective efficacy and identity leadership.

We explored whether these individual factors moderate the relation between municipality involvement and acceptance and willingness to join, using process model 1 (Hayes, 2022), with a Bonferroni correction of $\alpha/24$, $p < .002$). While all individual factors positively predicted acceptance, willingness to join, identity leadership, and collective efficacy, there were no significant moderation effects, when Bonferroni correction was considered, strongest $b = .24$ (0.06; 0.42), $p = .011$.

2.1.1.5 Conclusion

In Study 1, approval of the CEI is higher when a municipality is involved, compared to not-involved (uninvolved or even opposed) in a community-led initiative. Both identity leadership and collective efficacy positively predict acceptance and willingness to join, but unexpectedly do not explain why municipality involvement affects acceptance and willingness to join.

Biospheric values, energy citizenship, and community identification are all positively related to acceptance, willingness to join, identity leadership, and collective efficacy, but do not moderate the relationship between municipality involvement and any of these outcomes.

This study thus suggests that municipality involvement can increase the approval of CEIs, but the present sample is likely already quite interested in energy matters, as they indicated that they wanted to be contacted by their energy provider. This raises the question whether similar findings can be found when a more representative sample is approached. Additionally, effect sizes are small, and we do not find any effects on the assumed mediators of collective efficacy and identity leadership, while they do positively predict acceptance and willingness to join. The small effect sizes might be due to the hypothetical scenario. However, it might also be that identity leadership, acceptance, and willingness to join are more affected by community members' involvement than by municipality involvement.

2.1.2 Study 2 Representative sample Netherlands

Study 2 aimed to test whether municipality involvement, compared to uninvolvement, would also increase acceptance of and possibly the willingness to join an CEI, among a representative sample of the Dutch population (compared to the members of energy provider Vattenfall, in Study 1). Furthermore, we added a municipality-led condition, without involvement of community members in the energy initiative, to test whether community involvement might be more important than municipality involvement for identity leadership, collective efficacy, acceptability and willingness to join. We excluded the municipality opposed condition, as Study 1 suggested little difference in outcomes depending on whether the municipality was uninvolved or opposed. This study thus included three conditions: a community-led, a jointly led, and a municipality-led energy initiative. Finally, we added some extra measures, including trust in the municipality.

2.1.2.1 Sample and design

The online data collection took place between February 20th and March 29th 2023, using the online survey software Qualtrics. The study recruited participants through Panel Inzicht (<https://panelinzicht.nl>), a Dutch pre-recruited online participant panel of Dutch-speaking individuals aged 18 years or older. To ensure a representative sample, we set quotas based on demographics (age, gender, household income, and highest completed education). Participants were paid €2.50 for successful participation.

Study 1 suggested small effects of the experimental manipulation. To detect a small effect size ($f = .10$), with power of .80, and a $\alpha = .05$, for an experiment with three conditions, we required a sample of 969 participants. Given that in Study 1 some participants were excluded after the manipulation check, we aimed to recruit a slightly higher sample of 1100.

In total, 2199 people followed the link to the survey, of which 2083 (94.7%) consented to participate in the research. Participants could not participate if their demographics corresponded to a filled quota, nor when they still lived with their parents or guardian, as then they would likely not be in charge of energy-related decisions in their household. Data collection continued in this manner until all quotas were met and a total of at least 1100 participants was reached. In total, 1104 participants completed the study.

We removed 172 participants from the data; 3 due to having been exposed to the manipulation after having initiated the questionnaire more than one time, another 4 skipped many of the questions, an additional 93 had filled in nonsense text in the open-question comprehension check, 64 participants were removed because they had failed the attention check as well as one of the two comprehension checks. Finally, 8 participants were removed because of wrongly answering both comprehension checks. The final sample used for analysis was therefore $N = 932$ (84.4%). This resulted in the removal of a number of participants that was higher than expected, such that the final sample of 932 was somewhat lower than the intended 969. The division among conditions was as follows: community-led ($n = 307$), jointly-led ($n = 299$), and municipality-led ($n = 326$). Age ($M = 51.1$, $SD = 16.9$) ranged from 18 to 91, with 492 participants who indicated woman as gender, 436 indicated men, 3 indicated other, and 1 preferred not to say. The median household income level was 2000-2999 euros net per month (ranging from less than 500 euros net per month to 5000 euros or more per month).

2.1.2.2 Procedure and experimental conditions

Participants first completed demographic questions, followed by scales measuring personal values, energy citizenship, and community identification, and trust in the municipality. Subsequently, participants were randomly allocated to one of the three conditions. The general text about the SMART initiative was similar to Study 1, with small modifications (see Appendix 4.2 for the full text). The text was adapted such that the SMART initiative was initiated by either neighbourhood residents (community-led), the municipality (municipality-led), or by neighbourhood residents together with the municipality (jointly led). After having read the text, two open-ended comprehension checks were included, to gain insight into whether the participant had understood the content of the text (i.e., “Who has initiated the SMART initiative?” and “What is the aim of the SMART initiative?”), and to serve as an indication for the quality of the participants’ responses. Thereafter, participants were asked, among other things, about their perception of and attitudes towards the SMART initiative, including identity leadership, collective efficacy, acceptability, and willingness to join⁵.

2.1.2.3 Measures

Questions were answered on a Likert-scale (1 = *completely disagree*; 7 = *completely agree*), unless otherwise specified. All measures were similar to Study 1 except otherwise specified below (see Appendix 4.3 for an overview of each item per variable for Studies 1-3). See Table 5 for descriptive statistics and correlations.

Acceptability of the energy initiative. Acceptability was measured using three items from Liu et al. (2019). Participants indicated, on a 7-point scale from -3 to 3, the extent to which they agreed or disagreed with the following three statements: on a bipolar scale from -3 (recoded to 1) to 3 (recoded to 7): “In my opinion, the SMART-initiative is very... unacceptable/acceptable, bad/good or negative/positive”.

Willingness to join. Willingness to join was assessed as in Study 1.

Identity leadership. Identity leadership was assessed as in Study 1.

Collective efficacy. Collective efficacy was assessed as in Study 1, however this time we only referred to a sustainable energy transition, and not to a just and sustainable energy transition, e.g., “I think that the SMART-initiative can promote a sustainable energy transition”.

Values. Values were assessed using the environmental value questionnaire (De Groot & Steg, 2007). Biospheric and altruistic values were measured using 4 items each, whereas hedonic and egoistic values were measured using 3 and 5 items, respectively. Answers were given on a scale of 1 (*Unimportant*) to 7 (*Extremely important*), with an additional answer option of -1 to indicate that the described value goes against one’s principles. The higher the score, the greater the perceived importance of the value.

⁵ The survey also included measures for interpersonal contact with community members, inclusion-exclusion in the community, trust in community members, collective efficacy in terms of a just energy transition, participation intentions, integrity and competence-based trust of the initiative, and energy initiative membership.

Energy citizenship. Energy citizenship was measured as in Study 1.

Community identification. Community identification was assessed with four items, as recommended by Postmes and colleagues (2013), and included items such as “residents of my neighbourhood form an important part of how I see myself,” besides “I identify with the residents of my neighbourhood”.

Trust in the municipality. Participants were asked to indicate their (dis)agreement to the following statement: “I generally have trust in my municipality.”

Initiative formation checks. At the end of the questionnaire, participants were requested to answer eight initiative formation items (see Jans, 2021, adapted from Jans et al., 2011). Participants indicated their agreement to statements related to the top-down influence of the municipality ($\alpha = .90$) and the bottom-up influence by community members ($\alpha = .92$) in the SMART-initiative. Example statements are “The municipality can determine the direction of the SMART-initiative” and “The SMART-initiative is formed by neighbourhood residents themselves.”

Table 5. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	M	SD	1	2	3	4	5	6	7
1 Acceptability	.92	5.09	1.48							
2 Willingness to Join	.91	4.54	1.53	.557**						
3 Identity Leadership	.88	4.70	1.15	.556**	.710**					
4 Collective Efficacy	.94	5.02	1.23	.604**	.727**	.730**				
5 Biospheric Values	.88	4.62	1.46	.274**	.333**	.345**	.384**			
6 Community Identification	.89	4.46	1.25	.228**	.373**	.445**	.292**	.186**		
7 Energy Citizenship	.89	5.36	1.53	.319**	.524**	.471**	.472**	.551**	.377**	
8 Trust Municipality	-	4.53	1.38	.238**	.225**	.291**	.318**	.149**	.253**	.180**

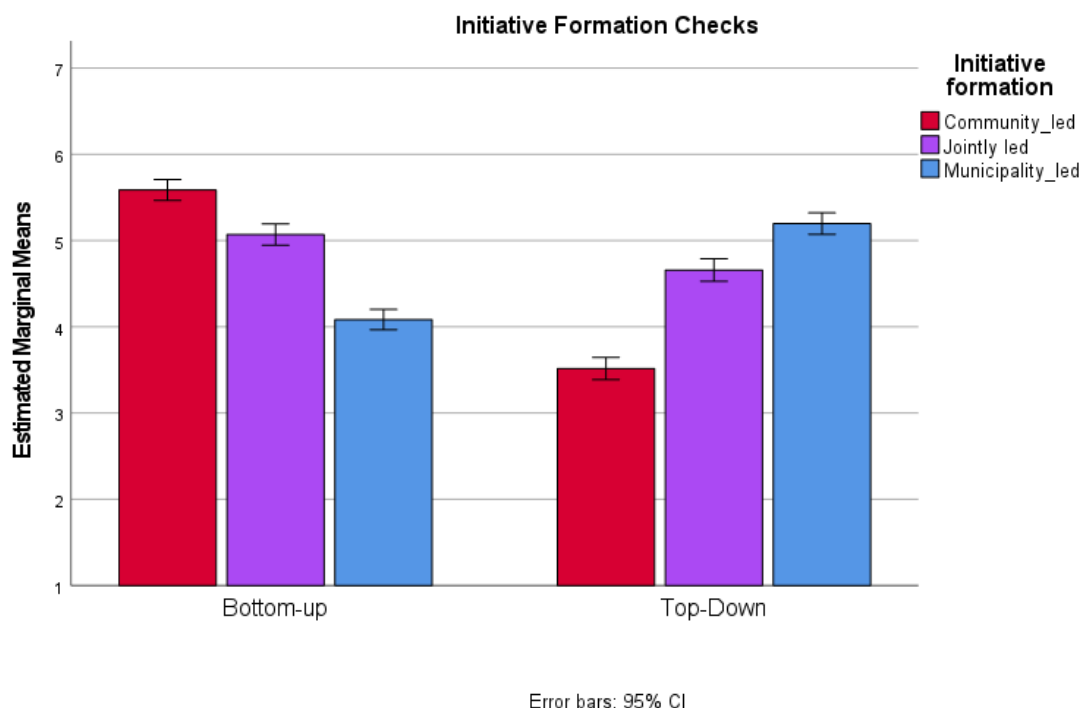
* $p < .05$, ** $p < .05$.

2.1.2.4 Results

Initiative formation check. First, we checked whether the participants perceived the formation of the energy initiatives as intended. For this we conducted a repeated measures analysis, with the initiative formation checks as within-subject factor, and condition as between-subject factor. Both type of formation check, $F(1, 928) = 72.80$, $p < .001$, $\eta_p^2 = .07$, and condition, $F(2, 928) = 13.45$, $p < .001$, $\eta_p^2 = .03$, had a significant main effect on formation check scores. Importantly, these main effects were marked by a significant interaction, $F(2, 928) = 301.33$, $p < .001$, $\eta_p^2 = .39$, in line with what was expected. Participants in the citizen-led condition scored significantly higher on the bottom-up check than participants in the other conditions. Similarly, participants in

the municipality-led condition scored significantly higher on the top-down check than participants in the other conditions. The jointly led condition differed significantly from the other two conditions, scoring in the middle of the other two conditions (see Figure 2).

Figure 2. Group mean comparisons initiative information checks by initiative formation



Effects of initiative formation. Initiative formation significantly affected acceptability of the initiative as well as the perceived collective efficacy and identity leadership of the energy initiative, but not willingness to join the initiative (see Table 6 & Figures 3-5).

Specifically, acceptability of the SMART-initiative, $M\Delta = -0.24$, $CI_{95}(-0.44; -0.04)$, $p = .017$, identity leadership, $M\Delta = -0.43$, $CI_{95}(-0.58; -0.28)$, $p < .001$, and collective efficacy, $M\Delta = -0.21$, $CI_{95}(-0.38; -0.05)$, $p = .012$, were significantly lower when the initiative was municipality-led, compared to when citizens are involved (community or jointly led). In contrast to Study 1, there were no differences between a community-led or jointly led initiative in terms of acceptance, $M\Delta = -0.14$, $CI_{95}(-0.38; 0.09)$, $p = .229$, identity leadership, $M\Delta = -0.03$, $CI_{95}(-0.21; 0.15)$, $p = .729$, and collective efficacy $M\Delta = 0.11$, $CI_{95}(-0.08; 0.31)$, $p = .258$.

Table 6. Means, standard deviations, and univariate effects on acceptability, willingness to join, identity leadership, and collective efficacy

Variable	Statistics			Experimental Condition					
				Community-led		Jointly led		Municipality-led	
	<i>F</i> (2, 927)	<i>P</i>	η^2	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Acceptability	3.592	.028	.008	5.25	1.43	5.10	1.56	4.93	1.43
Willingness to Join	1.532	.217	.003	4.62	1.48	4.58	1.58	4.42	1.51
Identity Leadership	15.231	<.001	.032	4.87	1.12	4.84	1.11	4.42	1.18
Collective Efficacy	3.767	.023	.008	5.04	1.16	5.15	1.26	4.88	1.25

Figure 3. Group mean comparisons acceptability by initiative formation

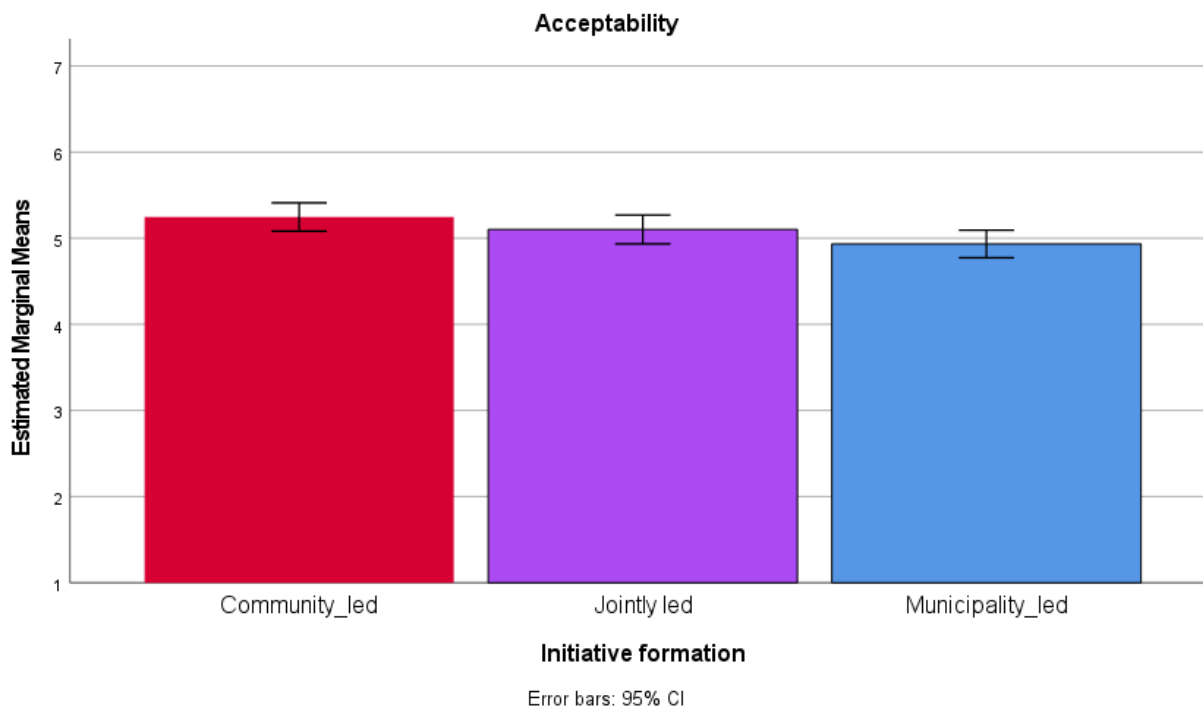


Figure 4. Group mean comparisons identity leadership by initiative formation

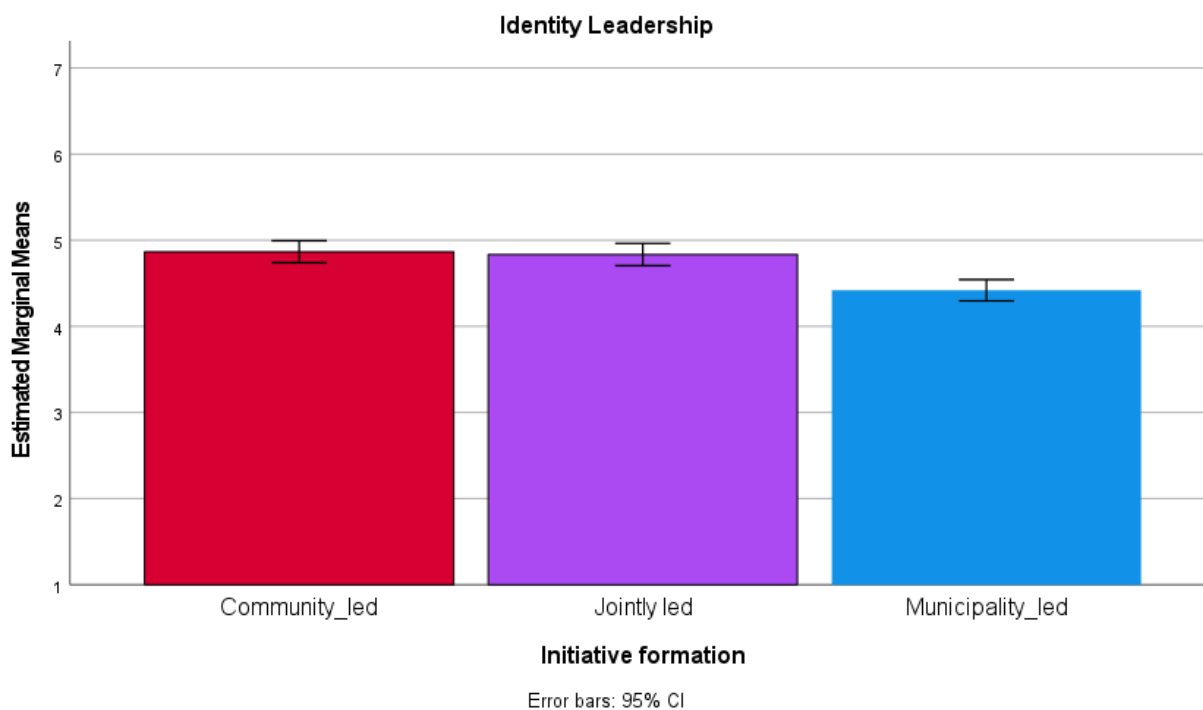
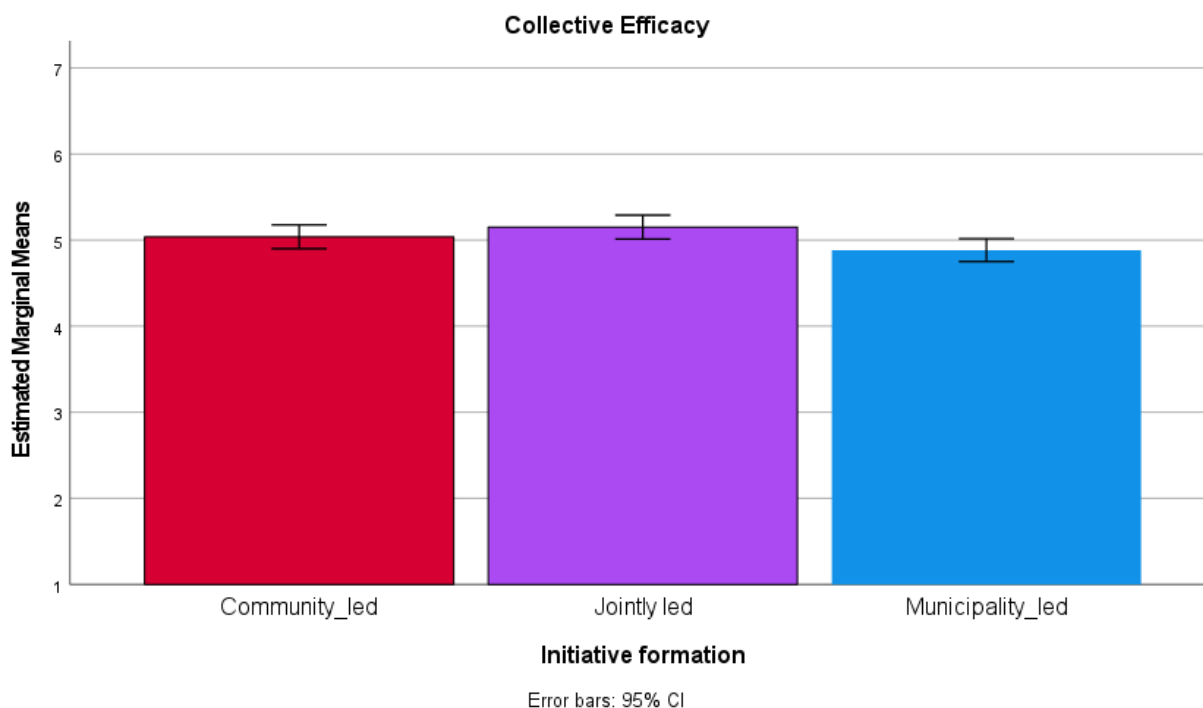
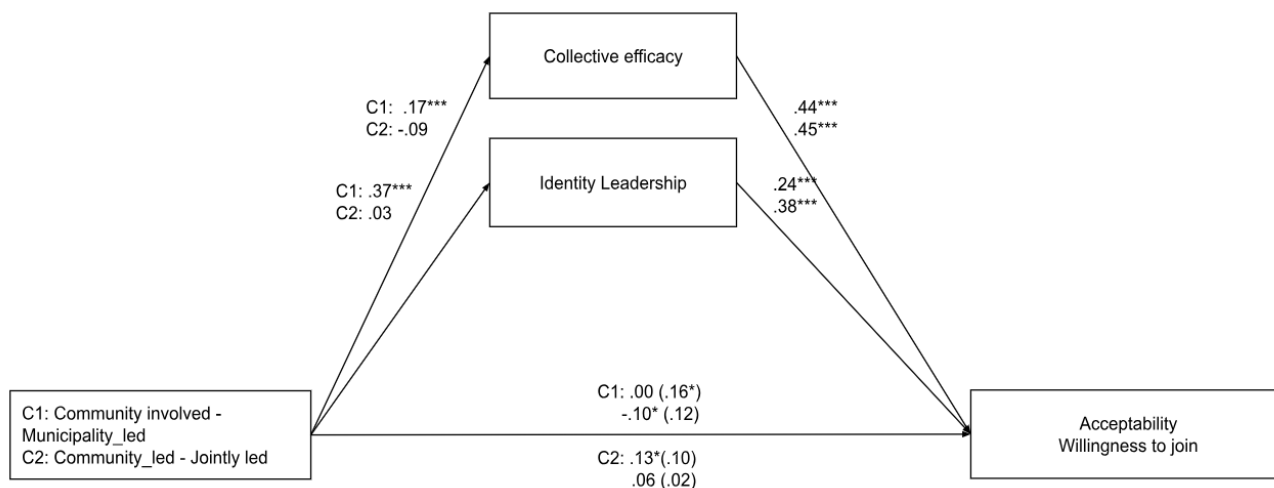


Figure 5. Group mean comparisons collective efficacy by initiative formation



The role of identity leadership and collective efficacy. We additionally examined the role of collective efficacy and identity leadership in explaining acceptability of and in a separate analysis, willingness to join a CEI. Initiative formation explains 1% of variance in acceptance and less than 1% of variance in willingness to join. Adding identity leadership and collective efficacy explains an additional 39% in acceptance and an additional 59% in willingness to join. Furthermore, identity leadership (indirect effects: beta = .09, 95% CI [.05; .14]; beta = .14, 95% CI [.09; .20]) and collective efficacy (indirect effects: beta = .08, 95% CI [.02; .14]; beta = .08, 95% CI [.02; .14]), fully mediated the relationship between whether community members were involved either by leading or jointly leading the initiative (vs. municipality-led) and acceptability, and arguably willingness to join (see Figure 6).

Figure 6. Mediation model with the relationship between initiative formation, collective efficacy, identity leadership on acceptability and willingness to join



Note. Effects are standardised coefficients, effects in brackets are total effects. C1: Community-led = .333; Jointly led = .333; Municipality-led = -.667. C2: Community-led = .5; Jointly led = -.5. *** $p < .001$ **, $p < .01$, * $p < .05$.

Other relevant predictors. Biospheric values, energy citizenship, community identification, and trust in the municipality positively predict acceptance, willingness to join, collective efficacy, and identity leadership (see correlation Table 5), but generally did not moderate any of the outcomes (considering a Bonferroni correction of $\alpha/32$, $p < .002$), strongest $b = -0.15$ (-0.27; -0.03), $p = .012$.

2.1.2.5 Conclusion

Overall, we found that acceptability of the SMART-initiative, identity leadership (i.e. the extent to which the CEI represents us) and perceived collective efficacy were higher when community members were involved in the energy initiative (namely leading it by themselves or together with the municipality), compared to when the energy initiative was led by the municipality alone, although effect sizes were small. Unexpectedly, we did not find an effect of municipality involvement (a jointly led initiative compared to a community-led energy initiative) on collective efficacy, or any of the other outcomes.

Furthermore, as expected, both identity leadership and collective efficacy were positively associated with acceptance and willingness to join, and explained why involvement of community members in an energy initiative is important for acceptability and willingness to join.

As in Study 1, biospheric values, energy citizenship, and community identification were all positively related to acceptance, willingness to join, identity leadership, and collective efficacy, which was irrespective of who led the energy initiative. Trust in the municipality was also significantly positively related to all outcomes, but did not moderate the effect of initiative formation on any of the outcomes.

A key question is whether these results are limited to the Netherlands or whether they are generalizable to another institutional context, where trust in the government is lower and CEIs are scarce.

2.1.3 Study 3 Replication Poland

Study 2 shows that particularly community involvement is relevant for acceptability and willingness to join, by increasing identity leadership and collective efficacy. The results related to municipality involvement are inconclusive, as in Study 1 jointly led initiatives have higher approval than initiatives in which the municipality is not involved, whereas we do not find any differences between a jointly led and a community-led initiative on any of the outcomes in Study 2. Therefore, Study 3 aimed to replicate findings from Study 2 (and 1), in another country with a different socio-political context: Poland. In Poland there is generally less trust in the government, compared to the Netherlands (OECD, 2023), and there are far less community energy initiatives (Schwanitz, et al., 2023). At the time of data collection, people were protesting against the government to show support for democracy in Poland. We expect to replicate the findings regarding the enhancing effects of community involvement, and examine whether municipality involvement matters for collective efficacy in this socio-political context. The main analysis is based on the same three experimental conditions as in Study 2: municipality-led, community-

led, and jointly led⁶.

2.1.3.1 Sample and design

Sample size was determined in the same manner as for Study 2 (i.e., 969 participants required and 1100 gathered). Participants were recruited using the Prolific panel (<https://www.prolific.com/>) ensuring a representative sample for gender. After obtaining informed consent, participants were assigned to one of three involvement conditions: community-led, jointly led, and municipality-led. Following completion of the questionnaire, participants were rewarded at the rate of £8.00/hr.

A total of 1106 respondents was randomly assigned to the three main conditions of this study (the remaining participants were assigned to the exploratory conditions). Thirty-two participants did not fill in the multiple-choice comprehension check correctly, and were therefore excluded from the analyses, resulting in a final sample of 1074 (359 in the community-led condition, 358 in the jointly led condition, and 357 in the municipality-led condition). The age of the participants ranged from 18 to 68 years old ($M = 27.0$, $SD = 7.9$). Furthermore, the sample consisted of 523 women and 523 men, while 22 participants indicated 'other' as a gender, and 6 preferred not to say. The median disposable household income per month was approximately €1323 to €1543 (ranging from less than 440 euros net per month to over 1543 euros per month)⁷. In contrast to studies 1 and 2, this sample did include participants that lived together with their parents or guardian ($n = 462$; not living with parents or guardian $n = 612$), as we were afraid that we would otherwise not reach the required sample size.

2.1.3.2 Procedure and experimental conditions

Participants first completed demographic questions, followed by scales measuring personal values, energy citizenship, community identification, and trust in the municipality. Next, they were randomly allocated to one of the three experimental conditions of initiative formation (community-led, jointly led, municipality-led). These manipulations were slightly adapted from Study 2, to make them fit the Polish context. After having read the text, a multiple-choice ((i.e., "Who has initiated the SMART initiative?") and an open-ended question "What is the aim of the SMART initiative?" assessed participants' comprehension of the text. Thereafter, participants were asked, among other things, about the acceptability of, and their willingness to join, the SMART initiative, the perceived identity leadership and collective efficacy of the initiative, and an initiative formation check⁸.

⁶ After data were collected for these three conditions, we collected data for two additional exploratory conditions: municipality support of a community-led initiative ($n = 120$) and municipality opposed ($n = 120$), to better understand results of Study 1. We leave these conditions out of the reporting, as they do not differ from the other community involved conditions on identity leadership, collective efficacy, and acceptability. The only remarkable difference we found was that when the municipality is opposed, willingness to join is lower, than when the municipality is involved, similar to Study 1.

⁷ Note that in the questionnaire, the answer options for disposable income per month were in Zloty, with the following categories: Less than 2000 Zloty (~ €440), 2000-2999 Zloty (~ €440-€661), 3000-3999 Zloty (~ €661-€882), 4000-4999 Zloty (~ €882-€1101), 5000-5999 Zloty (~ €1102-€1323), 6000-6999 Zloty (~ €1323-€1543), and >7000 Zloty (~ €1543).

⁸ The survey also included measures for political orientation, interpersonal contact with community members, inclusion-exclusion in the community, trust in community members and the government, members' influence, collective efficacy in terms of a just energy transition, participation intentions, EC² - 101022565

2.1.3.3 Measures

Acceptability, willingness to join, identity leadership, collective efficacy, trust in the municipality, values, and community identification were measured in the same manner as in Study 2 (see descriptive statistics and correlations, see Table 7).

Initiative formation checks. We also assessed top-down influence of the municipality ($\alpha = .94$), and bottom-up influence by community members ($\alpha = .87$) in the SMART-initiative, in the same manner as in Study 2.

Table 7. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1 Acceptability	.90	5.41	1.35							
2 Willingness to Join	.97	5.04	1.57	.669**						
3 Identity Leadership	.85	5.00	1.13	.559**	.646**					
4 Collective Efficacy	.92	5.58	1.09	.624**	.693**	.652**				
5 Biospheric Values	.91	4.60	1.09	.228**	.322**	.274**	.312**			
6 Energy Citizenship	.83	4.59	0.78	.245**	.381**	.324**	.321**	.497**		
7 Community Identification	.88	3.74	1.35	.065*	.177**	.245**	.119**	.167**	.285**	
8 Trust in the municipality	-	3.67	1.47	.148**	.167**	.224**	.191**	.052	.074*	.340**

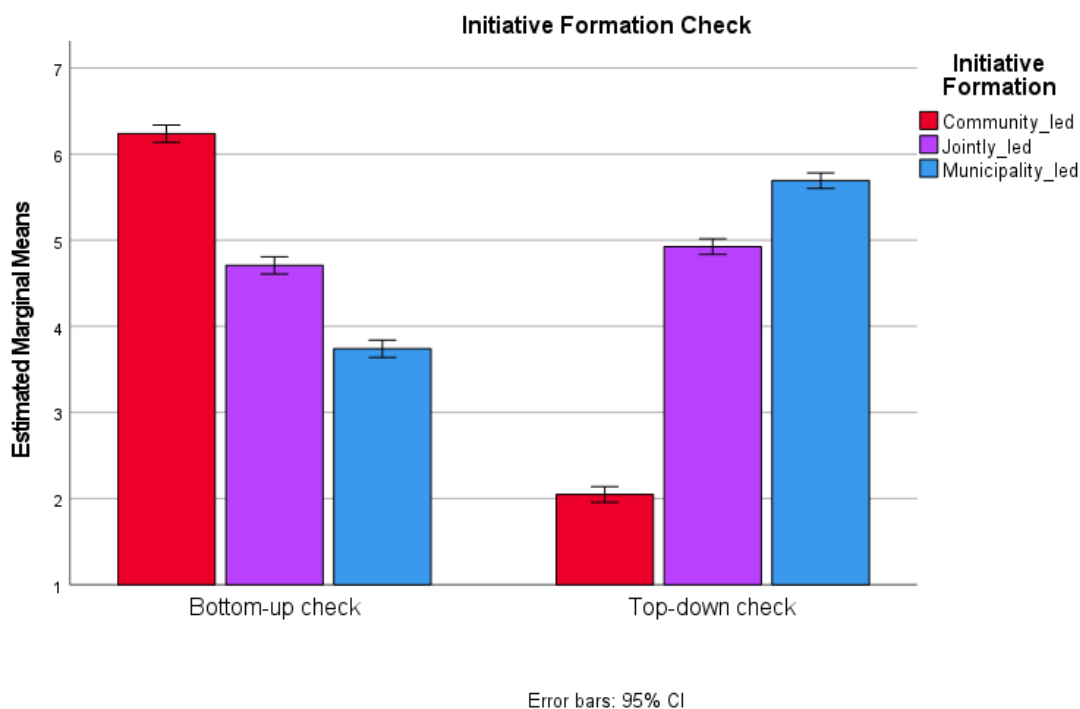
* $p < .05$, ** $p < .01$.

2.1.3.4 Results

Initiative formation check. First, we checked whether the main manipulations worked as expected. For this, we conducted a repeated measures analysis, with the initiative formation checks as within-subject factor, and condition as between-subjects factor. Both type of formation check, $F(1, 1071) = 250.47, p < .001, \eta_p^2 = .19$, and condition, $F(2, 1071) = 130.59, p < .001, \eta^2 = .20$, had a significant main effect on formation check scores. Importantly, these main effects were marked by a significant interaction, $F(2, 1071) = 1850.60, p < .001, \eta_p^2 = .78$, in line with what was manipulated. Participants in the citizen-led condition scored significantly higher on the bottom-up check than participants in the other conditions. Similarly, participants in the municipality-led condition scored significantly higher on the top-down check than participants in the other conditions. The jointly led condition differed significantly from the other two conditions, scoring in the middle of the other two conditions (see Figure 7).

integrity- and competence-based trust of the initiative, energy initiative membership, and general requisitions regarding sustainable energy in Poland.

Figure 7. Group mean comparisons initiative information checks by initiative formation



Effects of Initiative formation. Initiative formation significantly affected acceptability of the initiative, willingness to join the initiative, as well as people’s perceived collective efficacy and identity leadership of the energy initiative (Table 8 and Figures 8-11). Specifically, acceptability of the SMART initiative, $M\Delta = -0.37$, $CI_{95}(-0.54; -0.19)$, $p < .001$, willingness to join the initiative, $M\Delta = -0.30$, $CI_{95}(-0.50; -0.10)$, $p = .003$, identity leadership, $M\Delta = -0.74$, $CI_{95}(-0.88; -0.61)$, $p < .001$, and collective efficacy, $M\Delta = -0.25$, $CI_{95}(-0.38; -0.11)$, $p < .001$, were significantly lower when the initiative was municipality-led, compared to when citizens were involved. In contrast to Study 1, but similar to Study 2, there were no differences between a community-led or jointly led initiative in terms of acceptability, $M\Delta = 0.13$, $CI_{95}(-0.07; 0.32)$, $p = .201$, identity leadership, $M\Delta = -0.14$, $CI_{95}(-0.29; 0.02)$, $p = .086$, and collective efficacy $M\Delta = 0.09$, $CI_{95}(-0.07; 0.25)$, $p = .271$.

Table 8. Means, standard deviations, and univariate effects on acceptability, willingness to join, identity leadership, and collective efficacy

Variable	Statistics			Experimental Condition					
				Community-led		Jointly led		Municipality-led	
	<i>F</i> (2, 1071)	<i>P</i>	η^2	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Acceptability	9.646	<.001	.018	5.47	1.40	5.60	1.22	5.17	1.39
Willingness to join	5.644	.004	.010	5.04	1.55	5.23	1.42	4.84	1.70
Identity Leadership	59.045	<.001	.099	5.32	1.06	5.18	0.97	4.50	1.17
Collective Efficacy	6.767	.001	.012	5.61	1.04	5.70	0.95	5.41	1.24

Figure 8. Group mean comparisons acceptability by initiative formation

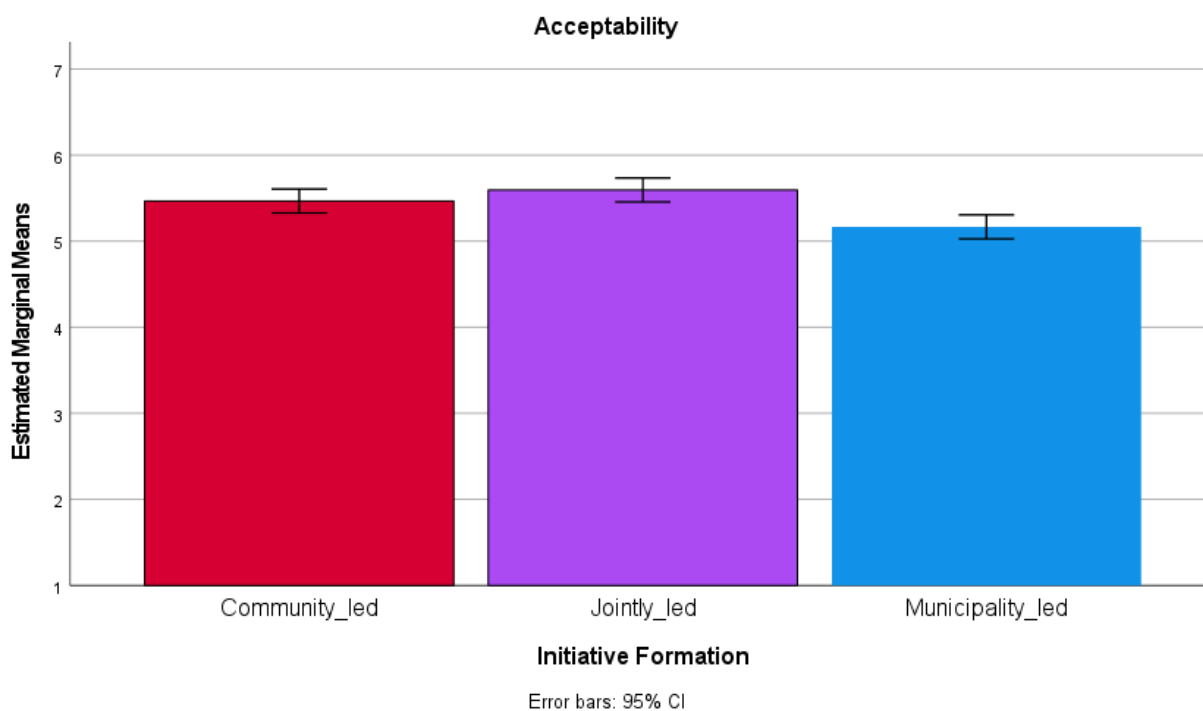


Figure 9. Group mean comparisons willingness to join by initiative formation

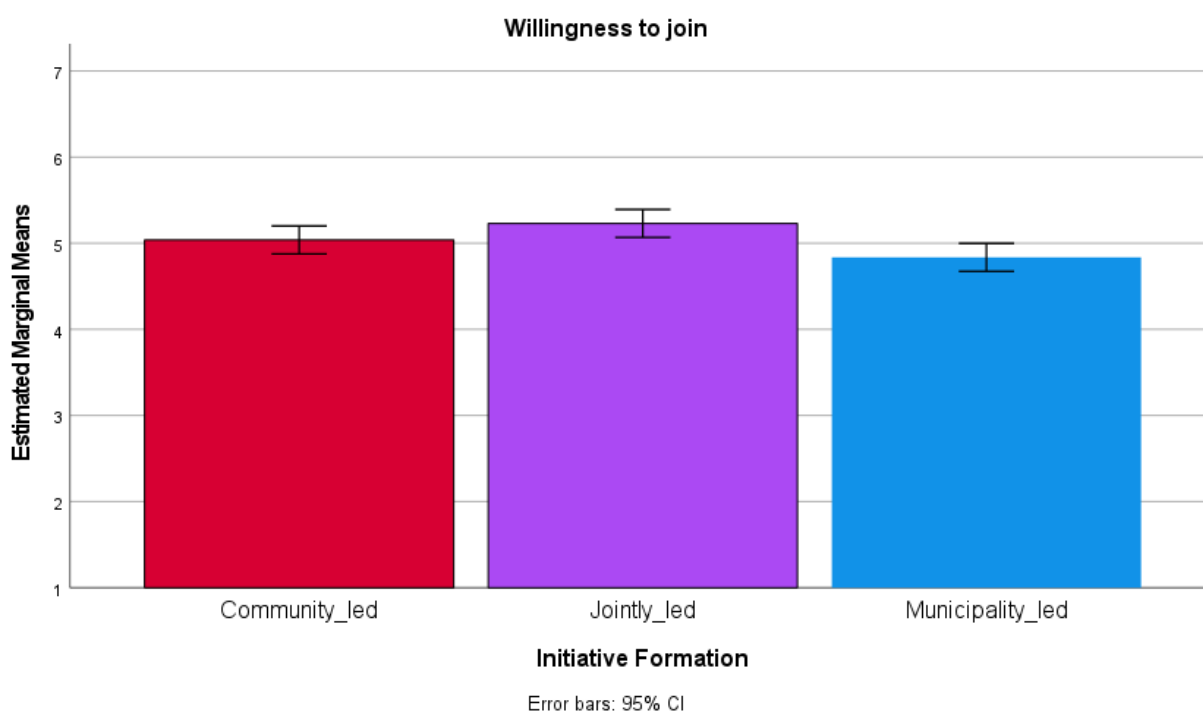


Figure 10. Group mean comparisons identity leadership by initiative formation

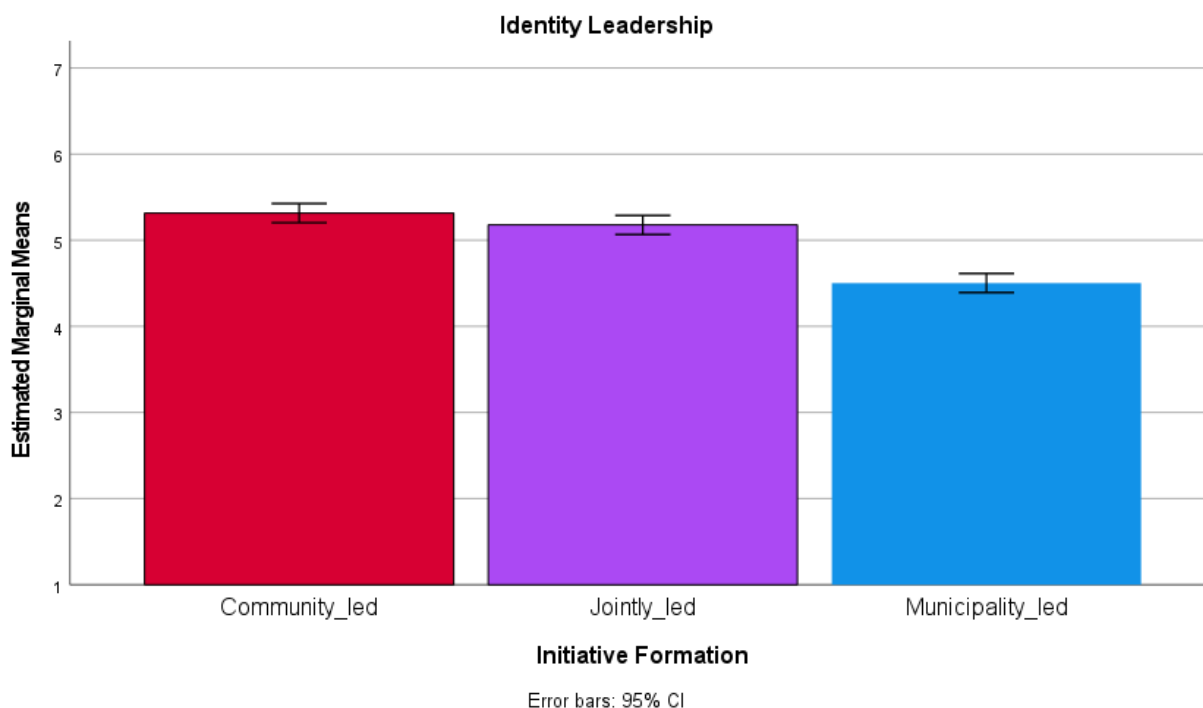
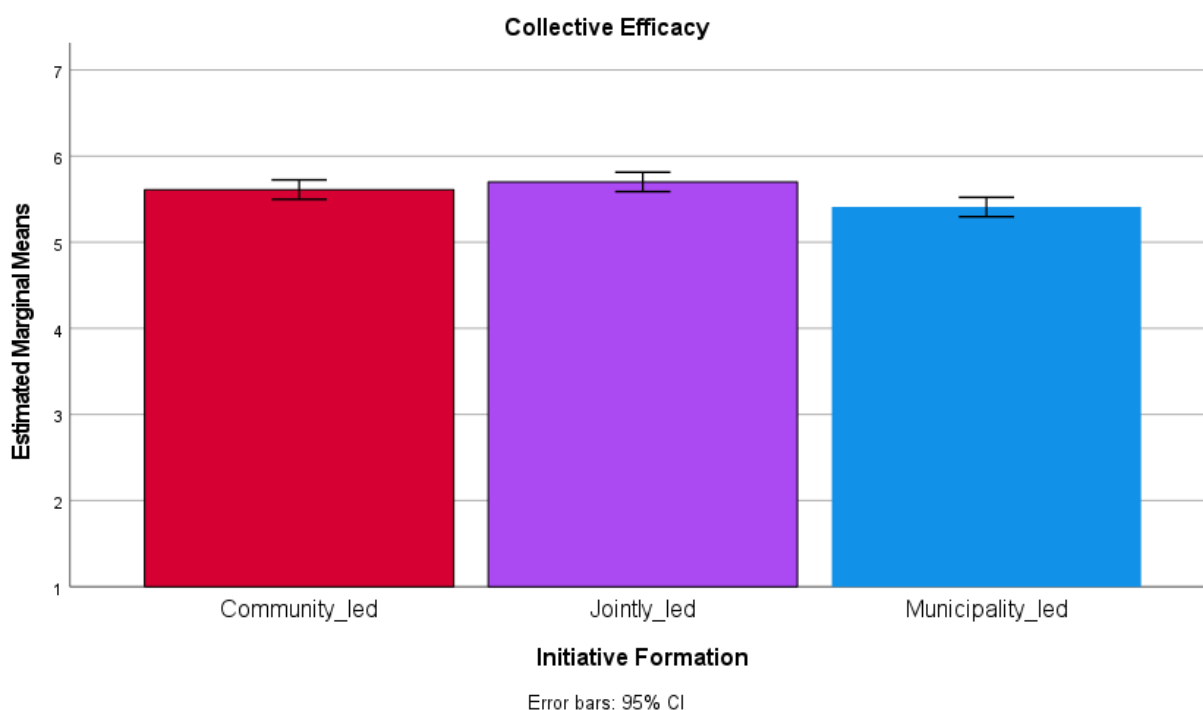


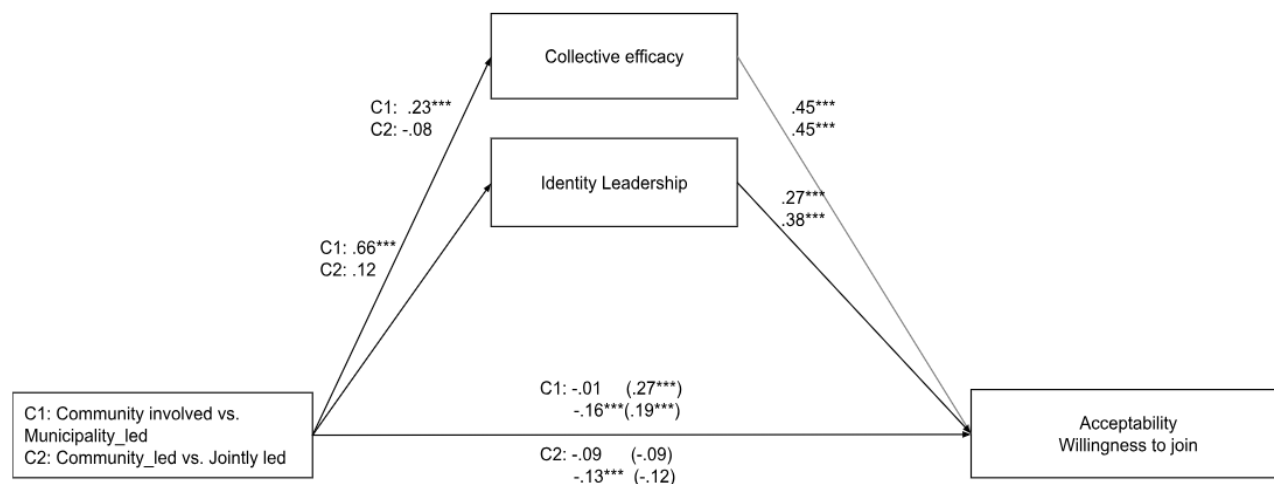
Figure 11. Group mean comparisons collective efficacy by initiative formation



We additionally examined the role of collective efficacy and identity leadership in explaining acceptability of and, in a separate analysis, willingness to join a CEI. Initiative formation explains 2% of variance in acceptability and 1% of variance in willingness to join. Adding identity leadership and collective efficacy, explains an additional 41% in acceptability, and an additional 54% in willingness to join. Furthermore, identity leadership (indirect effects: beta = .18, 95% CI [.13; .24]; beta = .25, 95% CI [.18; .32]) and collective efficacy (indirect effects: beta = .10, 95%

CI [.04; .16]; beta = .10, 95% CI [.04; .17]), fully mediated the relationship between whether community members were involved (vs. municipality-led) and acceptability, and willingness to join (see Figure 12).

Figure 12. Mediation models with the relationship between initiative formation, collective efficacy, and identity leadership on acceptability and willingness to join

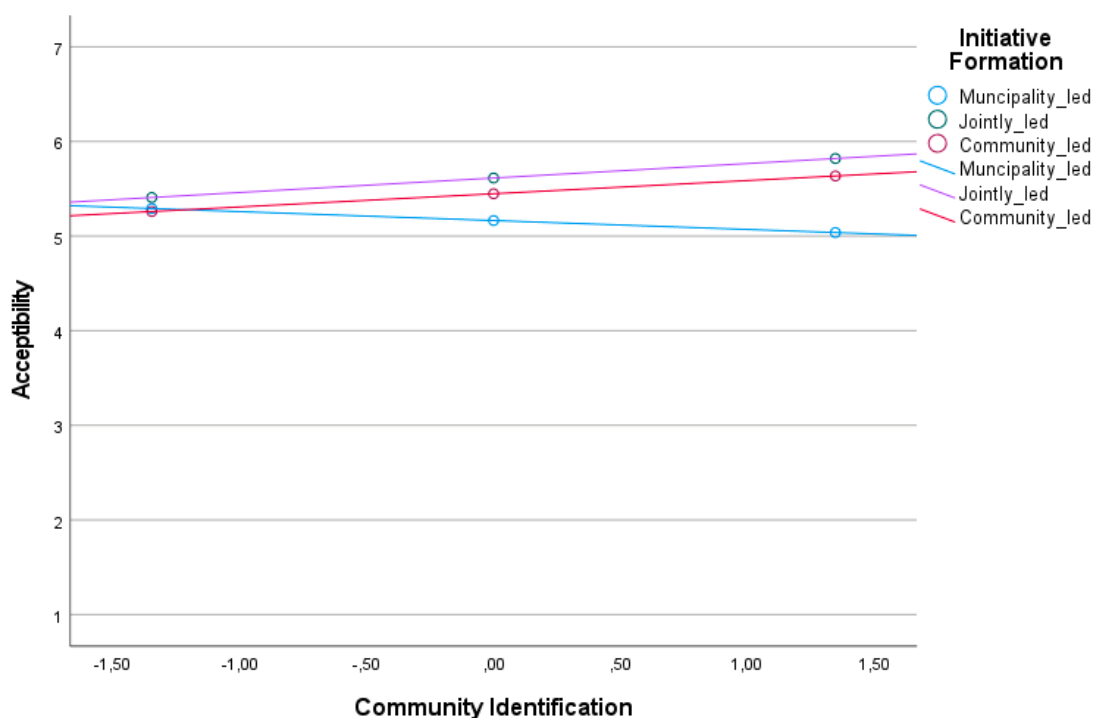


Note. Effects are standardised coefficients, effects in brackets are total effects. C1: Community-led = .333; Jointly led = .333; Municipality-led = -.667, C2: Community-led = .5; Jointly led = -.5. *** $p < .001$, ** $p < .01$, * $p < .05$.

Other relevant predictors. Biospheric values, energy citizenship, community identification, and trust in the municipality positively predict acceptance, willingness to join, collective efficacy, and identity leadership (see correlations Table 7), but generally did not moderate any of the outcomes (considering a Bonferroni correction of $\alpha/32$, $p < .002$), strongest $b = 0.17$ (0.03; 0.32), $p = .018$.

We did find that community identification moderates the effect of community involvement (vs. municipality-led) on acceptability, $b = -0.24$ (0.11; 0.37), $p < .001$ (see Figure 13). Specifically, community involvement (vs. municipality led) positively predicted acceptability for people with high (+1 SD), $b = 0.69$ (0.45; 0.94), $p < .001$, or average, $b = 0.37$ (0.20; 0.54), $p < .001$, community identification, but not for people with low (-1 SD) community identification, $b = 0.04$ (-0.20; 0.28), $p = .727$.

Figure 13. Interaction between community identification and initiative formation in explaining acceptability



2.1.3.5 Conclusion

Overall, we found that acceptability of the SMART initiative, willingness to join, identity leadership (i.e., the extent to which the CEI represents us) and perceived collective efficacy were higher when community members were involved in the energy initiative (namely leading it by themselves or together with the municipality), compared to when the energy initiative was led by the municipality alone, although effect sizes were small (except for a medium-sized effect on identity leadership). As in Study 2, but in contrast to what we expected, we did not find an effect of municipality involvement (a jointly led initiative compared to a community-led energy initiative) on collective efficacy, or any of the other outcomes.

Furthermore, both identity leadership and collective efficacy were positively associated with acceptance and willingness to join, and explained why involvement of community members in an energy initiative is important for acceptance.

As in Study 2, biospheric values, energy citizenship, community identification, and trust in the municipality were all positively related to acceptance, willingness to join, identity leadership, and collective efficacy, which was generally irrespective of who led the energy initiative. In Poland, community identification moderated the effect of community involvement (vs. municipality led) on acceptability, where community involvement is particularly predictive of acceptability of an energy initiative, when community identification is high or average, but not when community identification is low. The results in Poland thus largely mimic the results in the Netherlands, despite lower general trust in the government (and, according to the means in Study 2 and 3, also lower trust in one's municipality) and less existing energy communities in Poland, compared to the Netherlands.

2.2 Environmental motivations and connection with the local community

In the following two experiments (Studies 4 and 5) we examined how people's support for and the willingness to join a CEI are affected by the extent to which i) the goals of the members of the energy community are morally and/or pro-environmentally framed, and ii) the extent to which the members are solely focussed on the energy community itself or connected to the wider local community (in terms of either members' identity or the beneficiaries of the energy community). We aimed to address the following overarching research question:

RQ: "How does the perceived (moral) environmental motivation of members of a CEI and their connection with the local community affect people's perceptions of the energy community, and their willingness to join the energy community?"

In the first experiment we examine how both a CEI's strong moral motivation to protect the environment, as well as their identification with the wider local community, affect perceptions of the energy community and its members, the perceived shared identity between the energy community and the local community, and willingness to join (in activities of) the eco-village. Specifically, participants were presented with a text describing a fictional ecovillage, whose members were either strongly or moderately motivated to protect the environment, and either strongly identified with their eco-village or the wider local community.

We expected that perceiving members of the energy community as having strong moral motivations (compared to moderate), would lower acceptability of the energy community, perceived warmth of energy community members, shared identity with the energy community, and willingness to join in activities of the energy community. We expected that perceiving members of the energy community as being strongly identified with the local region (compared to only the ecovillage) would counter these negative effects, as it would increase people's positive perceptions of the energy community, and perceived shared identity. This experiment was conducted in Germany.

In the second experiment we conducted a conceptual replication of Study 4, in another country and socio-political context: Italy. In this study, the motivation of the energy community members was framed as either pro-environmental (leaving out the moral framing from Study 4) or mixed (including both pro-environmental motives as well as financial motives). The connection with the local community was framed here as sharing the benefits of the energy community with the local community vs. sharing the benefits with the energy community members only. Again, we examined how this framing affected people's willingness to join and their evaluation of the energy community. Furthermore, similar to Study 4, also here we examined the interplay between the motives of the members and benefit sharing framing.

Each of the studies and hypotheses were pre-registered (Study 4: https://aspredicted.org/blind.php?x=L1Q_F4Z; Study 5: https://aspredicted.org/blind.php?x=CH4_HB9).

2.2.1 Study 4 Moral motivation and identification with the local community (Germany)

2.2.1.1 Sample and design

An online study was conducted among a gender-balanced German-speaking sample using the Prolific panel. Following completion of the questionnaire, participants were paid an hourly rate of £8.07. We based our sample size on four conditions consisting of a 2x2 factorial design: high moral motivation vs. moderate moral motivation, and identification with the ecovillage vs. identification with the local community. A power analysis assuming a power of .80 and a small effect size ($f=.10$), resulted in a minimum required sample size of 786.

A total of 1116 participants took part in the study. We removed 29 participants who completed less than 80 percent of the relevant measures for this study, and 1 participant who failed both attention checks, which reduced the dataset used for analysis to 1086 respondents. In total, this resulted in 273 (25,1%) participants in the high moral motivation and identifying with the ecovillage group, 272 (25,0%) participants in the high moral motivation and identifying with overarching local community group, 270 (24,9%) in the moderate moral motivation and identifying with the ecovillage group, and 271 (25,0%) respondents in the moderate morality motivation and identifying with the local community group. In total, 44.7% of participants identified as women, 53.9% as men, and 1.5% as “other”, with their age ranging from 18 to 73 years old ($M = 31.38$, $SD = 10.13$). The median household income level was 1500-2000 euros net per month (ranging from having no income to 4000 euros net per month or more). The participants in this sample were younger and earned less than the average German population (Destatis, 2023).

2.2.1.2 Procedure and experimental conditions

After obtaining consent, participants answered questions about their pro-environmental self-identity and their identification with the local region. Following this, participants were randomly allocated to one of the four experimental conditions of our 2 (moral motivation: moderate vs. high) x 2 (identification: ecovillage vs. local region) design. Participants were provided with a text describing a fictional ecovillage named "Ecotopia" and prompted to envision this ecovillage within their local region. The wording of the text varied according to the assigned condition. For the moral motivation manipulation, members were either characterised as environmentally concerned (“as an ecovillage we try to live sustainably”) in the moderate morality condition or as being on a moral mission to safeguard the environment (“as an ecovillage it is our moral duty to live sustainably”) in the high morality condition. In terms of the identification manipulation, ecovillage members were described either as identifying profoundly with their ecovillage only (“the members feel deeply connected to the ecovillage and the people living there, and aim to contribute to this special community”), in the ecovillage identification condition, or with their municipality, in the local community identification condition (“the members feel deeply connected to our municipality and the people living there, and aim to contribute to our special community”; see Appendix 4.4 for detailed descriptions of the scenarios). The subsequent questionnaire sections encompassed attention checks, dependent variables, manipulation checks, and demographics⁹.

⁹ The survey also included measures for environmental group identity, environmental self-identity, identification with the local region, and identity leadership.

2.2.1.3 Measures

Items were answered on a 7-point-likert scale (1 = completely disagree; 7 = completely agree), if not specified differently (see Appendix 4.6 for an overview of all items and references; for descriptive statistics and correlations see Table 9).

Willingness to join was measured using six items, two of which similar to Study 1 to 3 and four additional self-created items, asking participants about different levels of their intention to become involved with the ecovillage, starting with the lowest and ending with the highest level of engagement: “I want to learn more about the ecovillage” through “I want to live at the ecovillage”.

Acceptability of the ecovillage. Acceptability was measured as in Studies 2 and 3 (replacing “the SMART-initiative” with “the ecovillage”).

Warmth of ecovillage members. One item was adapted from Parker and Janoff-Bulman's (2013) feeling thermometer, asking participants how cold or warm they would experience the inhabitants of “Ecotopia”. The measurement units were adapted to the bipolar scale described above for acceptability, instead of using the original scale from 0 to 100.

Shared Identity. To measure the shared identity between the eco villagers and the municipality, three items were used asking about perceived similarities and differences between the two groups. An example item is: “The ecovillage members and the municipality members belong to the same group”.

Manipulation checks. Morality perceptions of the members were measured with three items to check the effectiveness of perceived moral manipulation. The items were rated on a bipolar scale from -3 to 3 (recoded into a scale ranging from 1 to 7). Participants were asked: “How would you describe the eco villagers?” The ends of the scale were labelled judgmental/non-judgmental. In addition, two self-made items checked whether participants perceived the eco villagers as identifying highly with the ecovillage or with their local region: “The inhabitants of the ecovillage seem to identify strongly with their ecovillage” and “The inhabitants of the ecovillage seem to identify strongly with our community”.

Table 9. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	M	SD	1	2	3
1 Acceptability	.91	5.43	1.11			
2 Willingness to Join	.93	4.31	1.45	.597**		
3 Group warmth	-	5.02	1.18	.976**	.615**	
4 Perceived shared identity	.82	4.12	1.28	.145**	.065*	.147**

Note. $N = 1086$.

* $p < .05$, ** $p < .01$.

2.2.1.4 Results

Manipulation checks. First, we examined whether participants read and understood the descriptions of the energy initiatives. In the following, the manipulation checks for the two factors of perceived moral motivation (moderate vs. high) and framed identification (ecovillage vs. local

region) were assessed using a MANOVA in order to evaluate whether the experimental manipulation had the desired effects. The univariate results show that members of the ecovillage were rated as significantly more judgemental in the high morality condition, $F(1, 1082) = 164.127, p < .001, \eta_p^2 = .132$, compared to the moderate morality motivation (see Figure 14). Furthermore, eco villagers were perceived as a strongly identified group in both conditions, $F(1, 1082) = 2.074, p = .150, \eta_p^2 = .002$, but only in the local community identification condition, they were perceived as identifying significantly more with their municipality than participants in the ecovillage identification condition, $F(1, 1082) = 6.155, p = .013, \eta_p^2 = .006$ (see Figure 15).

Figure 14. Group mean comparisons motivation manipulation checks by morality motivation

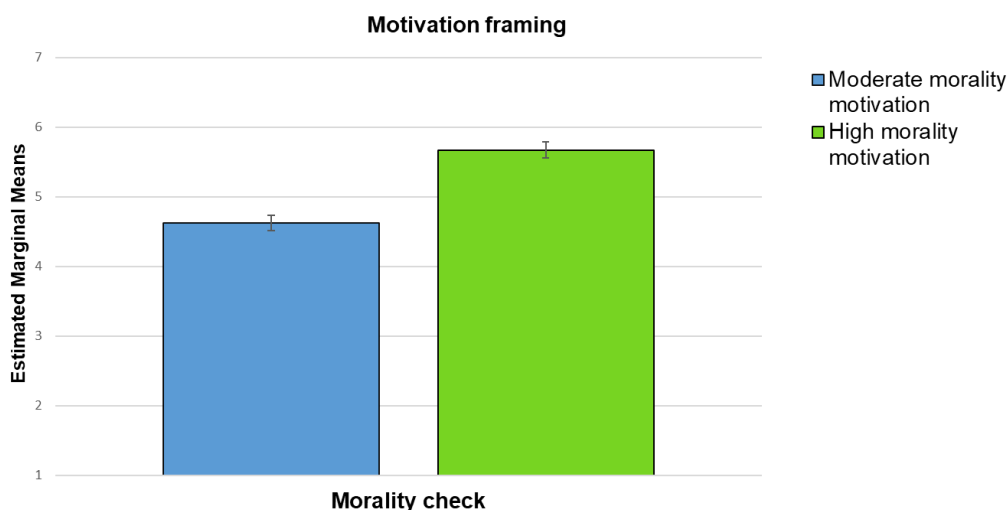
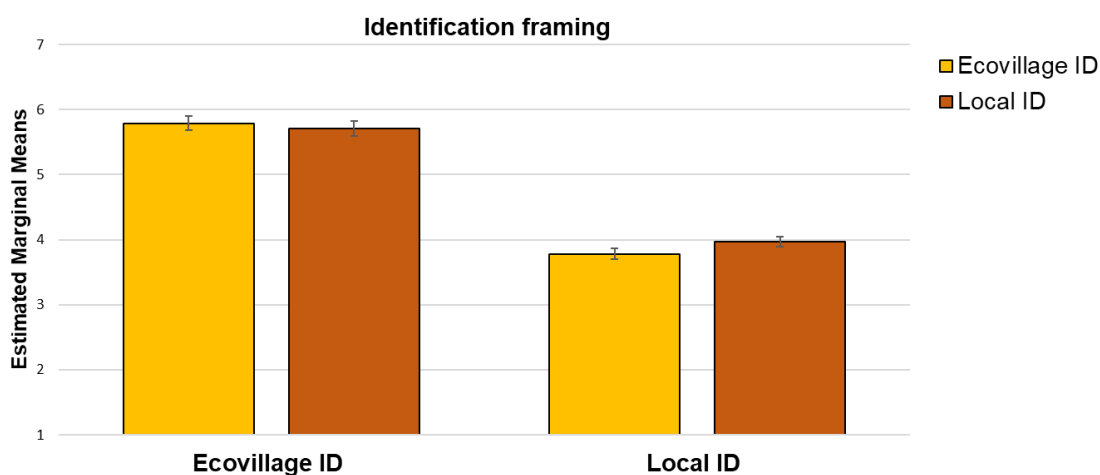


Figure 15. Group mean comparisons identification framing manipulation checks by identification framing



Effects of morality framing and identification with the local community. Univariate MANOVA results show that when the ecovillage was framed as highly moral, compared to the ecovillage being framed as moderately moral, participants were less willing to join activities of the ecovillage, $F(1, 1082) = 6.203, p = .013, \eta_p^2 = .006$, found the ecovillage less acceptable, $F(1, 1082) = 23.061, p < .001, \eta_p^2 = .021$, felt less warm towards the members of the ecovillage, $F(1, 1082) = 50.994, p < .001, \eta_p^2 = .045$, and perceived the members as having less shared identity with the overarching community, $F(1, 1082) = 7.401, p = .007, \eta_p^2 = .007$. However,

effect sizes were small (see Table 10 and Figure 16).

Next, contrary to our expectations, there was no effect of identification framing on willingness to join in activities of the ecovillage, $F(1, 1082) = 1.349, p = .246, \eta_p^2 = .001$, acceptability of the ecovillage, $F(1, 1082) = 1.046, p = .307, \eta_p^2 = .001$, and warmth towards the members of the ecovillage, $F(1, 1082) = 1.126, p = .289, \eta_p^2 = .001$. We did find a significant effect of identification framing on shared identity, $F(1, 1082) = 5.583, p = .018, \eta_p^2 = .005$. That is, when the ecovillage members were framed as identifying with the local community, participants perceived significantly more shared identity than when the members were framed as identifying only with their ecovillage, although the effect size is small.

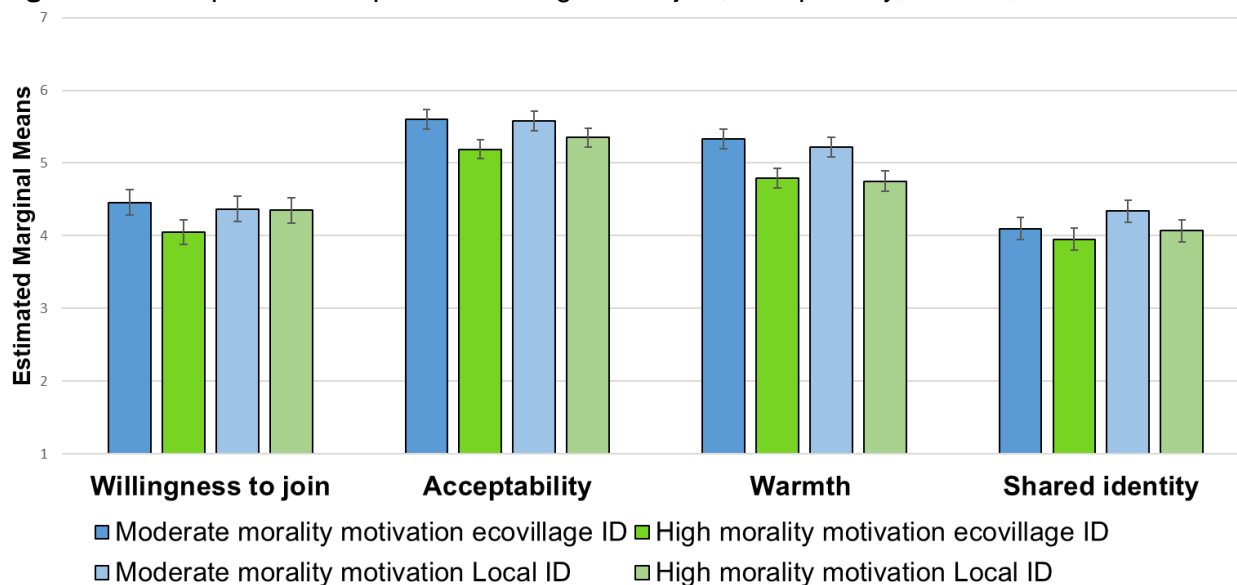
Besides these main effects, we found a significant interaction effect of moral and identification framing on willingness to join, $F(1, 1082) = 4.854, p = .028, \eta_p^2 = .004$, but not on acceptability, $F(1, 1082) = 1.945, p = .163, \eta_p^2 = .002$, warmth, $F(1, 1082) = .250, p = .617, \eta_p^2 = .000$, or shared identity, $F(1, 1082) = .675, p = .411, \eta_p^2 = .001$. Thus, seeing highly (vs. moderately) morally motivated members of an ecovillage reduces people's willingness to join the ecovillage only when the ecovillage members were seen as identifying only with their ecovillage, and this was no longer the case when the members identified with the local community.¹⁰

Table 10. Means and standard deviations per experimental condition

Variable	Experimental Condition							
	Moderate moral motivation & ecovillage ID		High moral motivation & ecovillage ID		Moderate moral motivation & local ID		High moral motivation & local ID	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Acceptability	5.60	0.99	5.19	1.14	5.58	1.18	5.35	1.08
Willingness to Join	4.46	1.42	4.05	1.49	4.37	1.50	4.35	1.35
Warmth	5.33	1.04	4.79	1.20	5.22	1.20	4.75	1.19
Shared Identity	4.10	1.32	3.95	1.31	4.34	1.23	4.07	1.24

¹⁰ Although the identification framing thus generally worked as intended, 230 participants within the local community identification condition scored below the midpoint of the local identification check. In an additional MANOVA analysis we excluded the 230 respondents scoring below the midpoint 4 of the local identity manipulation check scale in the local identity condition. In contrast to the original analysis, the effect of moral motivation framing on shared identity disappeared, $F(1, 852) = 3.123, p = .078, \eta_p^2 = .004$, but the effects of identification framing became significant for warmth of ecovillage members, $F(1, 852) = 5.824, p < .001, \eta_p^2 = .007$, acceptability of the ecovillage, $F(1, 852) = 14.222, p < .001, \eta_p^2 = .016$, and willingness to join $F(1, 852) = 18.616, p < .001, \eta_p^2 = .021$. We did not find any significant interaction effects here.

Figure 16. Group mean comparisons willingness to join, acceptability, warmth, and shared



2.2.1.5 Conclusion

In conclusion, we found that when an ecovillage was presented as having high moral standards (e.g., "it is our moral duty to protect the environment"), this resulted in people being less accepting of the ecovillage, feeling less warm towards its members, perceiving less shared identity between the ecovillage members and the wider local region (e.g., municipality), and being less willing to join in activities of the ecovillage, compared to when an ecovillage was presented as having moderate moral standards (e.g. "caring about environmental protection"), although the effect sizes were small.

In addition, we found that when members of the ecovillage were presented as identifying with the wider local community, this resulted in a higher perceived shared identity between the ecovillage members and the wider community, but not higher acceptance of the ecovillage or perceived warmth of ecovillage members.

Importantly, we found that perceiving the members to be highly (vs. moderately) morally motivated reduced people's willingness to join the ecovillage only when the ecovillage members were seen as identified with their own ecovillage, and not when they were seen as identified with the wider local region.

These results indicate that perceiving members as highly morally motivated can hinder people's willingness to join and influence people's perceptions of the energy community negatively. However, if members are seen as identified with the wider local community (rather than their own energy community only), this boosts perceptions of shared identity, and seems to counteract the negative effect of moral motivation on willingness to join. Yet, otherwise effects of local community identification were limited, possibly because people did not always perceive the members as identified with the wider local region, even when presented as such. Thus, future research is needed to examine whether the negative effects of CEIs that are strongly morally

¹¹ Note that shared identity was measured on a scale ranging from 1-10 instead of 1-7 and is thus generally low

motivated for the environment can be countered when the energy community is connected with the wider local community. Furthermore, it remains open whether perceiving a CEI as environmentally motivated reduces willingness to join and negatively influence people's perceptions of the energy community only when this motivation is seen as strongly moral or also when it is seen as moderately moral compared to a low environmental framing.

2.2.2 Study 5 Pro-environmental motivation and the distribution of benefits (Italy)

In the first study, Study 5, we aimed to conceptually replicate Study 4, in another country and socio-political context: Italy. Instead of high moral motivation vs. moderate moral motivation, we examined pro-environmental vs. more mixed (including both pro-environmental and financial motives) motivations of the members of a community energy initiative (CEI). Further, instead of identification with the local community, we examined whether the CEI's benefits were shared only among its members vs. the local community. We also adjusted some of the measures to better understand previously found results.

2.2.2.1 Sample and design

An online study was conducted among a gender-balanced Italian sample using the Prolific panel between August 29 and September 4, 2023. Data was collected online using the online survey software Qualtrics. Following completion of the questionnaire, participants were paid an hourly rate of £9.00.

Sample size was determined as in Study 4. A total of 1168 participants took part in the study. We removed 17 respondents who did not give informed consent, 43 respondents who filled in less than 80% of the relevant measures, and an additional 48 respondents who failed both comprehension checks after reading the text about the CEI (see measures for description of checks), which reduced the sample used for the analyses to a total of 1060 participants. This resulted in 266 (25.1%) participants in the pro-environmental motivation and benefits shared with members group, 272 (25.7%) participants in the pro-environmental motivation and benefits shared with the wider local region group, 245 (23.1%) in the diverse motives and benefits shared with members group, and 277 (26.1%) respondents in the diverse motives and benefits shared with the wider local region group. In total, 48.3% of participants identified as women, 49.6% as men, and 1.1% as "other", with their age ranging from 19 to 67 years old ($M = 31.26$, $SD = 9.24$). The median household income level was 1000-1999 euros net per month (ranging from less than 500 euros net per month to 5000 euros or more per month).

2.2.2.2 Procedure and experimental conditions

After consenting to participate, participants filled in questions about their individual pro-environmental self-identity, and their identification with the local region. Next, participants were randomly assigned to one of the four conditions in a 2 (pro-environmental vs. mixed motivation) x 2 (benefits shared among members only vs. community-wide) design. Participants were provided with a text describing a fictional CEI, prompting them to envision this CEI within their local region. The wording of the text varied according to the assigned condition. For the motivation manipulation, distinctions were made between pro-environmental and mixed motivation conditions, with the members of the CEI being characterised either as pro-environmentally motivated ("we all value the environment and want to do our best to protect it") or as having additional financial motivations ("some of us want to protect the environment,

others want to save money”). For the benefit-sharing manipulation, participants were shown a description of an energy cooperative in which it was stated that either only the members of the CEI (“join our pro-environmental energy cooperative and get exclusive member benefits”) or the entire local community could benefit from the activities of the cooperative (“join our energy cooperative and create benefits for our entire local community”) (see Appendix 4.5 for detailed descriptions of the scenarios). After reading the text, we checked whether people paid attention while reading, with two questions, and then participants filled in the rest of the survey with the subsequent dependent variables, process variables, and socio-demographic questions¹².

2.2.2.3 Measures

Measures were identical to those in Study 4, except otherwise stated below (see Appendix 4.6 for the full description of all included items in Studies 4 & 5). For items, descriptive statistics, and correlations, see Table 11.

Willingness to join. Willingness to join was assessed with four items instead of six, adapted from Sloot et al., (2018); “I am interested in getting involved with the energy cooperative” and “I would like to become a member of the energy cooperative.”

Acceptability of the community energy initiative. Acceptability was measured as in Studies 2 to 4.

Warmth. Warmth was measured as in Study 4.

Identification with the community energy initiative was measured using a single item from the social identification scale (Postmes et al., 2013): “I identify with the energy cooperative”.

Perceived shared identity. Inclusion-exclusion of the group from the self was measured with a single item, adapted from Becker and Tausch (2014). Participants were shown a figure with ten white circles (labelled 1 to 10) that were increasingly more distant from ten black circles, corresponding to an increase in the number from 1 to 10, with 1 overlapping completely with the black circle and 10 being most distant from the black circle. Participants were asked the following: “Below is shown an image. Imagine that the CEI represents the white circle, and the black circle represents the inhabitants of your local region.” Respondents then indicated the degree to which they felt the energy community was close to or distant from the inhabitants of their local region. This item was recoded for analysis such that a higher score indicates more overlap between the groups and thus a stronger perceived shared identity.

Comprehension checks. To check whether the participants read and understood the descriptions of the energy initiatives, two comprehension questions were asked. The perception of the motivation of members was measured with the question “why have local citizens decided to set up the energy cooperative?”. Participants could choose between 2 options, either “for one shared reason: to protect the environment” or “for various reasons”. The perception of who benefits from the energy community was measured with the question “who benefits from the energy cooperative?”. Again, participants could choose between 2 options, either “only

¹² The survey also included measures for environmental group identity, environmental self-identity, collective efficacy, and identity leadership.

members can enjoy exclusive benefits” or “everyone in the local community can benefit”¹³.

Table 11. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	<i>M</i>	<i>SD</i>	1	2	3	4
1 Acceptability	.88	6.09	1.06				
2 Willingness to Join	.92	5.16	1.29	.442**			
3 Group Warmth	-	5.31	1.15	.424**	.410**		
4 Perceived shared identity	-	5.07	2.04	.192**	.218**	.223**	
5 Identification with the CEI	-	4.11	1.50	.447**	.633**	.534**	.213**

Note. *N* = 1060.

* $p < .05$, ** $p < .01$.

2.2.2.4 Results

Effects of pro-environmental motivation framing and benefit sharing with the local community.

Main effects and moderation were tested using MANOVA. Motivation of CEI members significantly affected how warm participants the members perceived to be, $F(1, 1056) = 16.096, p < .001, \eta_p^2 = .015$. Perceived warmth of members was significantly lower in the mixed motives CEI compared to the pro-environmentally motivated CEI. We did not find an effect of motivation on acceptability of the energy initiative, $F(1, 1056) = .921, p = .337, \eta_p^2 = .001$ ¹⁴, willingness to join, $F(1, 1056) = .018, p = .894, \eta_p^2 = .000$, identification with the CEI, $F(1, 1056) = 1.222, p = .269, \eta_p^2 = .001$, or perceived shared identity with the CEI, $F(1, 1056) = 3.364, p = .067, \eta_p^2 = .003$. Thus, there were no differences found between the pro-environmental group or the diverse motives group in terms of these variables (see Table 12 and Figure 17).

Benefit-sharing did not significantly affect acceptability of the initiative, $F(1, 1056) = .019, p = .890, \eta_p^2 = .000$, perceptions of warmth of members, $F(1, 1056) = .019, p = .889, \eta_p^2 = .000$, willingness to join $F(1, 1056) = .182, p = .670, \eta_p^2 = .000$, identification with the community, $F(1, 1056) = .426, p = .514, \eta_p^2 = .000$, or perceived shared identity of the CEI, $F(1, 1056) = .637, p = .425, \eta_p^2 = .001$. Thus, there were no differences found between the members benefit group or the benefits shared community-wide group in terms of these variables.

We additionally tested whether the effects of the CEI’s motivation were moderated by the benefit sharing of the CEI. We found significant interaction effects for acceptability, $F(1, 1056) = 15.266, p < .001, \eta_p^2 = .014$, perceptions of warmth of members, $F(1, 1056) = 22.276, p < .001, \eta_p^2 = .021$, and identification with the energy initiative, $F(1, 1056) = 12.821, p < .001, \eta_p^2 = .012$. Yet, we did not find any interaction effects for willingness to join, $F(1, 1056) = .337, p = .562, \eta_p^2 = .000$, or shared community identity, $F(1, 1056) = 2.868, p = .091, \eta_p^2 = .003$. Thus, perceiving the members of the CEI to be pro-environmentally motivated (vs. mixed) increased feelings of warmth towards the members, acceptability of the CEI, and identification with the CEI only when

¹³ Later on in the questionnaire we also asked participants whether the local community can benefit from the initiative but then we found that the results were less clear; especially participants who were in the pro-environmental and benefits shared with the local community condition scored higher on this question, $F(1, 1056) = 30.968, p < .001, \eta_p^2 = .027$. When asking whether participants perceived the members of the energy initiative to exclusively benefit from the initiative (that is, opposite phrasing), the participants in the member benefit only group again score higher in the pro-environmental group, $F(1, 1056) = 259.288, p < .001, \eta_p^2 = .190$, compared to the mixed motivations group.

¹⁴ Note that the means of acceptability were high in both groups, which may have led to ceiling effects.

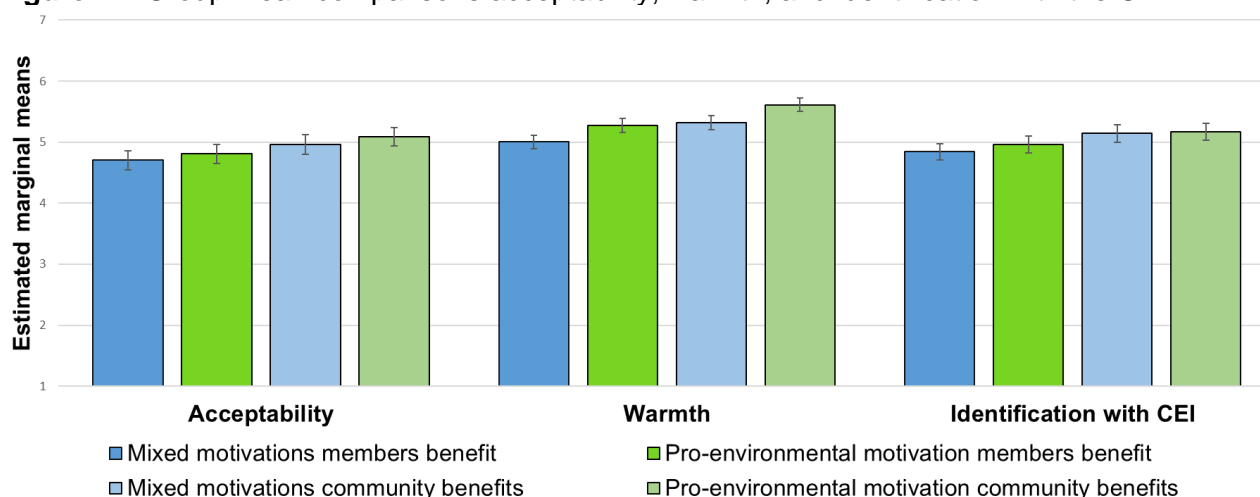
benefits were shared among the local region but not only among members.

Table 12. Means and standard deviations per experimental condition

Variable	Experimental Condition							
	Mixed motivations & Members benefit		Pro-env. Motivation & Members benefit		Mixed motivations & Community benefits		Pro-env. Motivation & Community benefits	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Acceptability	4.70	0.97	4.82	0.97	4.97	0.95	5.08	0.87
Willingness to Join	5.10	1.29	5.18	1.27	5.20	1.32	5.16	1.27
Warmth	5.02	1.10	5.29	1.22	5.33	1.15	5.59	1.06
Shared Identity	5.04	1.89	4.93	2.12	5.35	2.11	5.00	2.06
Identification with the CEI	4.85	1.11	4.99	1.24	5.15	1.18	5.15	1.15

Note. Pro-env. = Pro-environmental.

Figure 17. Group mean comparisons acceptability, warmth, and identification with the CEI



2.2.2.5 Conclusion

To conclude, the results show that when the members of the CEI were presented as being pro-environmentally motivated (vs. having mixed motivations), this increased the perceived warmth of members of the CEI, the acceptability of the CEI, and identification with the CEI, when CEI benefits were shared with the local community, but not when benefits were solely shared with CEI members (although effect sizes were again small). The positive effect of environmental framing may be partly explained by the way mixed motivations of members were framed, namely as members either being environmentally or financially motivated. Previous research indicates that CEI involvement is particularly driven by environmental protection and involvement in the community, but not by financial benefits (e.g., Goedkoop et al., 2022; Sloot et al., 2019), thus all framing including a financial motive may have affected people's perception of the CEI negatively. Furthermore, similar to Study 4, many people did not always perceive the CEI as sharing the benefits with the wider community and vice versa, even when presented as such.

Together, the results of Studies 4 and 5 suggest that energy communities can present

themselves as more pro-environmental and moral, when being connected to the local community (either in terms of identification with, or in terms of benefits provided for, the wider local community), when recruiting members. This seems to underline the importance of the community aspect of energy communities. Yet, results are not fully consistent on the different outcomes. Future research is needed to examine the most effective manner to showcase energy communities' connection with the local community, when wanting to motivate members of the local community to become involved in the energy transition.

2.3 Diversity and representation in energy communities

The purpose of the next two studies was to examine how the group composition of members in an energy initiative affects women's and men's perceptions of and their willingness to join in the energy initiative. We aimed to address the following overarching research questions:

RQ: “Do differences in acceptance of and willingness to join a community energy initiative between women and men depend on the group composition of the members of the initiative? How does the group composition of members of a community energy initiative affect perceptions of, and willingness to join an energy initiative?”

Based on previous research, we expected that the acceptability of and willingness to join an CEI would be higher among men compared to women, and that this effect would depend on the diversity and perceived representation of the members of the CEI. More specifically, we expected that women would have a higher acceptability of and would be more willing to join an CEI in which women are more represented. In addition, we tested whether people's differences in their perceived ability to join (efficacy to join), their perceived ability to make a contribution to the CEI (participative efficacy), and whether people felt represented by the CEI, could explain potential differences between men's and women's participation in CEIs.

In the first experiment, Study 6, we examined whether the acceptability of and willingness to join a CEI would be affected by i) the diversity of members of the CEI, and ii) whether or not the CEI stated to value diversity. The study was conducted based on a representative sample of the Dutch population. We tested four conditions: all-men without a diversity statement, all-men with a diversity statement, an equal number of men and women with a diversity statement, and a diverse group of people with regard to gender, age, and ethnicity with a diversity statement.

In the second experiment, Study 7, we aimed to replicate the findings from Study 6 in Italy, a country with a different socio-political context. Italy has a relatively low gender equity score, with a Gender Equality Index score below the European average, whereas the Netherlands has a moderate to high gender equity score, scoring 5th in the EU (Gender Equality Index Report, 2020). In addition, based on the cultural dimensions as identified by Hofstede (2001), Italy scores substantially higher on masculinity¹⁵ (MAS score of 70) compared to the Netherlands (MAS score of 14). In addition, CEIs are still of a niche character in Italy compared to the

¹⁵ Masculinity is defined by Hofstede (2001; p. 297) as “[...] standing for a society in which social gender roles are clearly distinct: Men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life.” Femininity on the other hand stands for a society in which social gender roles overlap. Importantly, these dimensions refer to a societal and not an individual characteristic.

Netherlands (Bertel et al., 2022; Schwanitz, 2023). In this study we replaced the generally diverse condition with an all-women condition.

Each of the studies and hypotheses were pre-registered on OSF (Study 6: <https://osf.io/64qfh>; Study 7: <https://osf.io/t3zby>).

2.3.1 Study 6 the Netherlands

2.3.1.1 Sample and design

Data was collected among a representative sample of the Dutch population (based on gender, level of education, income, and age). Participants were recruited between July 18th until August 18th 2023, through Panel Inzicht. This is a Dutch pre-recruited online participant panel and included Dutch-speaking individuals who were at least 18 years old. Data were collected online using the online survey software Qualtrics. Respondents received 2.50 euro for their participation in this study.

An equal number of men and women were randomly assigned to one of our four diversity conditions, resulting in a 2 (gender) x 4 (diversity) factorial design. As there is no experimental research on differences of set-ups of CEIs and involvement among different socio-demographic groups, and effects are typically small for hypothetical manipulations within psychology, we conducted a power analysis using G*Power in which we calculated the effect size detecting a small effect size ($f = .10$), a standard error probability of $\alpha = .05$, and a power of $.80$. This resulted in a sample size of 181 per group. Thus, we aimed for a sample size of $N = 1448$ participants (362 participants per group, equally divided among men and women). We targeted about a 10% higher number of participants due to exclusion of respondents after the attention and/or manipulation checks in previous studies.

A total of 1591 participants participated in this study. We removed 95 respondents as they failed both general attention checks, 13 respondents who filled in the questionnaire below 3 minutes and had missing values on one of the key items included in this study, and 10 respondents because they indicated to identify with a different gender than man/woman (as the focus in this study is on women specifically and this group is generally too small to for statistical analysis). We additionally excluded 98 respondents who failed the attention checks after reading the scenarios¹⁶, which reduced the sample used for analyses to a total of 1375 participants. Dropout was slightly higher than expected, resulting in 69 respondents less than the sample size aimed at in our power analysis. Dropout differed somewhat between conditions resulting in 348 participants (25.3%) for the all-men no statement group, 347 (25.2%) for the all-men with statement group, 329 (23.9%) for the gender diverse statement group, and 351 participants (25.5%) participating in the mixed diverse statement group. In total, 52.3% of participants identified themselves as women and 47.7% identified themselves as men, with their age ranging from 19 to 94 years old ($M = 52.41$, $SD = 15.96$). The median household income level was 2000-2999 euros net per month (ranging from less than 500 euros net per month to 5000 euros or more per month).

¹⁶ For the first attention check respondents had to indicate whether the GreenCoop initiative was a supermarket, a renewable energy initiative or a foundation for animal protection. For the second attention check respondents had to select the 4 names of the board members from a list of 10 names.

2.3.1.2 Procedure and experimental conditions

After consenting to participate, participants filled in questions about their socio-demographics, energy poverty, values, and political orientation. Next, participants were randomly assigned to one of our four conditions varying in the degree of diversity, with equal allocation of genders within the conditions. Participants were presented with a picture of a fictitious CEI that had been set up in their neighbourhood. They read a short description of the CEI and the composition of the board of the CEI being 1) all-men without a diversity statement (AMN), 2) all-men with a diversity statement (AMS), 3) mixed-gender (an equal number of men and women) with a diversity statement (MGS), and 4) diverse with regard to gender, age and ethnicity with a diversity statement (DGS; see Appendix 4.7 for detailed descriptions of the scenarios used). The diversity statement consisted of a sentence indicating that the members of the board value diversity and find it important to take the perspectives of people from various backgrounds within society into account. To strengthen the experimental manipulation, we added names and photos of the board of the CEI, corresponding to their gender, ethnicity, and age. After reading the text, we checked whether people paid attention while reading the scenario, and participants filled in the rest of the survey¹⁷.

2.3.1.3 Measures

The survey contained the following measures relevant to this study: efficacy to join, participative efficacy, and perceived representation (see Table 13 for descriptive statistics and correlations; see Appendix 4.9 for a detailed overview of all measures used in Studies 6 & 7). Measures were answered on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), unless otherwise stated.

Willingness to join was measured using 2 items adapted from Sloot and colleagues (2018): “I am interested in joining GreenCoop” and “I want to become involved in GreenCoop”.

Acceptability of the community energy initiative. Acceptability was measured as in Studies 2 to 5.

Efficacy to join. Efficacy to join was measured via the single item: “I think that I can become involved in the community energy initiative (investing time, money etc.)” (adapted from Ajzen, 1991).

Participative efficacy. Participative efficacy was measured using 4 items (Hamann & Reese, 2020), e.g., “I think I can make a significant contribution, so that the community energy initiative can promote a sustainable energy transition”.

Perceived representation. Perceived representation was measured using one item: “I feel represented by the members of GreenCoop”.

¹⁷ The survey also included measures of energy initiative membership (current and past), perceptions of motivations for a sustainable energy transition across demographic groups, perceived inclusion, and various measures of identification with the CEI.

Perceived diversity check. To assess the perceived diversity of the CEI, participants were requested to answer four items. First, respondents were asked to indicate whether they thought the board of the CEI consisted of an equal number of men and women. Second, they were asked whether they thought the board of the CEI consisted of people from various ethnic backgrounds. Third, respondents were asked whether they believed the board of the CEI values diversity, and fourth, whether they believed the board takes the interests of different groups of people into account. The last two questions were collapsed into one measure ($r_{sb} = .90$).

Table 13. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	<i>M</i>	<i>SD</i>	1	2	3	4	5
1 Acceptability	.93	5.25	1.32					
2 Willingness to Join	.94	3.81	1.62	0.49**				
3 Gender	-	-	-	-0.00	0.12**			
4 Efficacy to join	-	4.20	1.55	0.39**	0.61**	0.09**		
5 Participative efficacy	.97	3.92	1.39	0.41**	0.67**	0.08**	0.72**	
6 Perceived personal representation	-	3.85	1.45	0.47**	0.65**	0.33	0.56**	0.65**

Note. $N = 1375$.

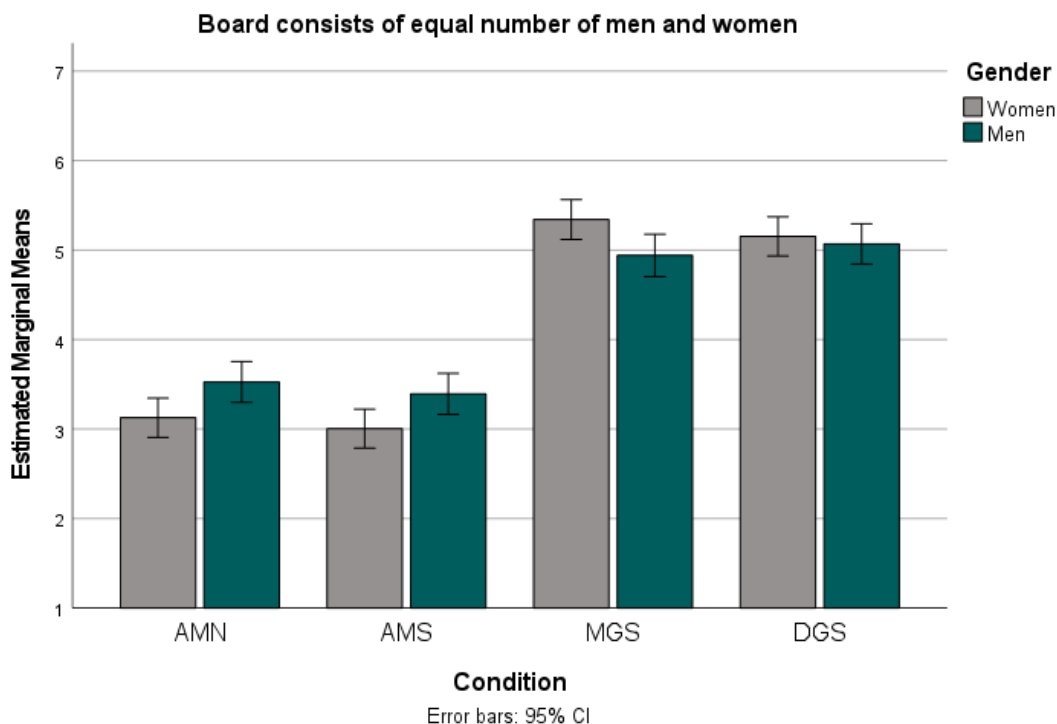
* $p < .05$, ** $p < .01$.

2.3.1.4 Results

Perceived diversity check. First, we checked whether the participants perceived the group composition of the CEIs as intended, using a factorial MANOVA. The univariate results showed significant differences between conditions on perceived gender equality of the board, $F(3, 1367) = 177.140$, $p < .001$, $\eta_p^2 = .280$. As expected, participants in the gender diverse conditions rated the board of the CEI more often as consisting of an equal number of men and women, compared to the all-men conditions. We also found a significant interaction effect between gender and condition, $F(3, 1367) = 5.706$, $p < .001$, $\eta_p^2 = .012$, indicating that women answered this question more accurately (see Figure 18). We also found significant differences between conditions for the perceived ethnic diversity of the board, $F(3, 1367) = 66.660$, $p < .001$, $\eta_p^2 = .128$. As expected, participants in the diverse condition rated the board of the CEI more often as consisting of people with ethnically diverse backgrounds, compared to the all-men without a statement, $M\Delta = 1.41$, $CI_{95}(1.18; 1.64)$, $p < .001$, and the all-men with statement conditions, $M\Delta = 1.46$, $CI_{95}(1.23; 1.70)$, $p < .001$. In addition, as expected, we also found that participants in the diverse condition scored significantly higher compared to the mixed-gender condition, $M\Delta = 0.96$, $CI_{95}(.72; 1.19)$, $p < .001$. Yet, also a substantial number of respondents in the first two groups (i.e., AMN and AMS) indicated that they believed to be ethnically diverse (see Figure 19). We did not find an interaction effect, $F(3, 1367) = 1.529$, $p = .205$, $\eta_p^2 = .003$. Finally, we found significant differences between conditions for the third check, $F(3, 1367) = 32.093$, $p < .001$, $\eta_p^2 = .066$. There was a significant increase over the conditions¹⁸ with regard to perceiving the board as valuing diversity and them taking the interests of different groups of people into account, although a substantial number respondents also indicated to believe this to be true for the board in in the all-men without a statement condition (see Figure 20).

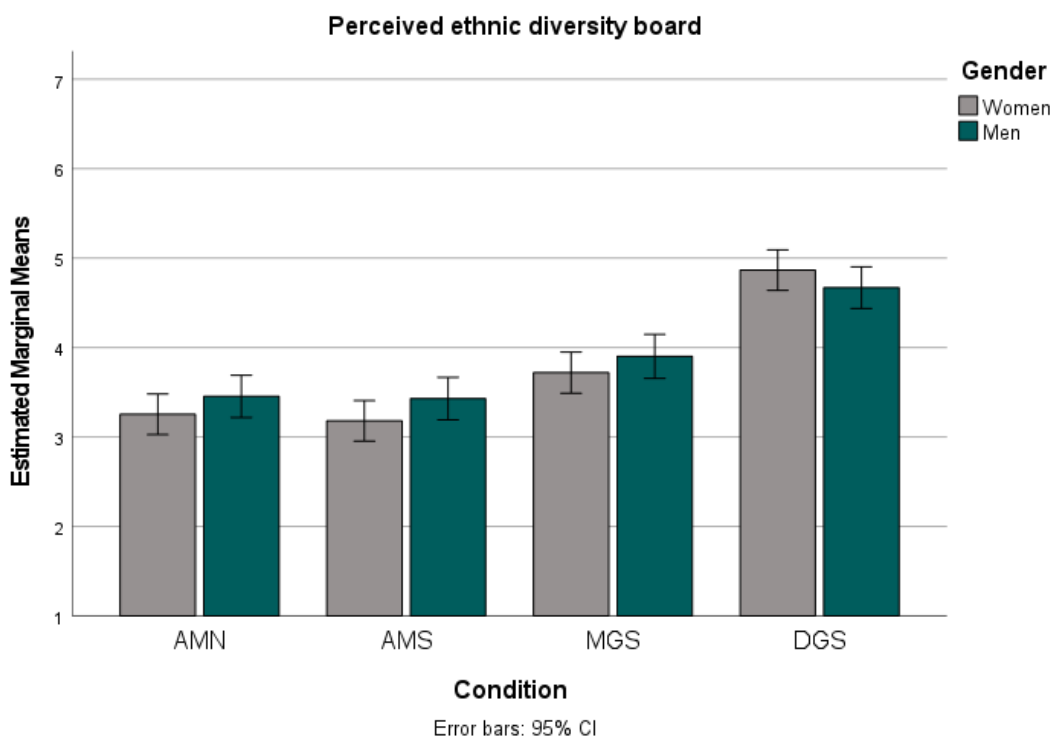
¹⁸ To check whether our manipulation also worked beyond the board members of the CEI, we additionally assessed whether participants perceived the CEI as consisting of members who represented the diversity of people in society. We found that also here, participants in the DGS condition scored significantly higher compared to AMN and AMS conditions ($F(3, 1367) = 10.410$, $p < .001$, $\eta_p^2 = .022$), giving some indication that, indeed, people extrapolated from the board to the members of the CEI.

Figure 18. Group mean comparisons gender equal check by gender



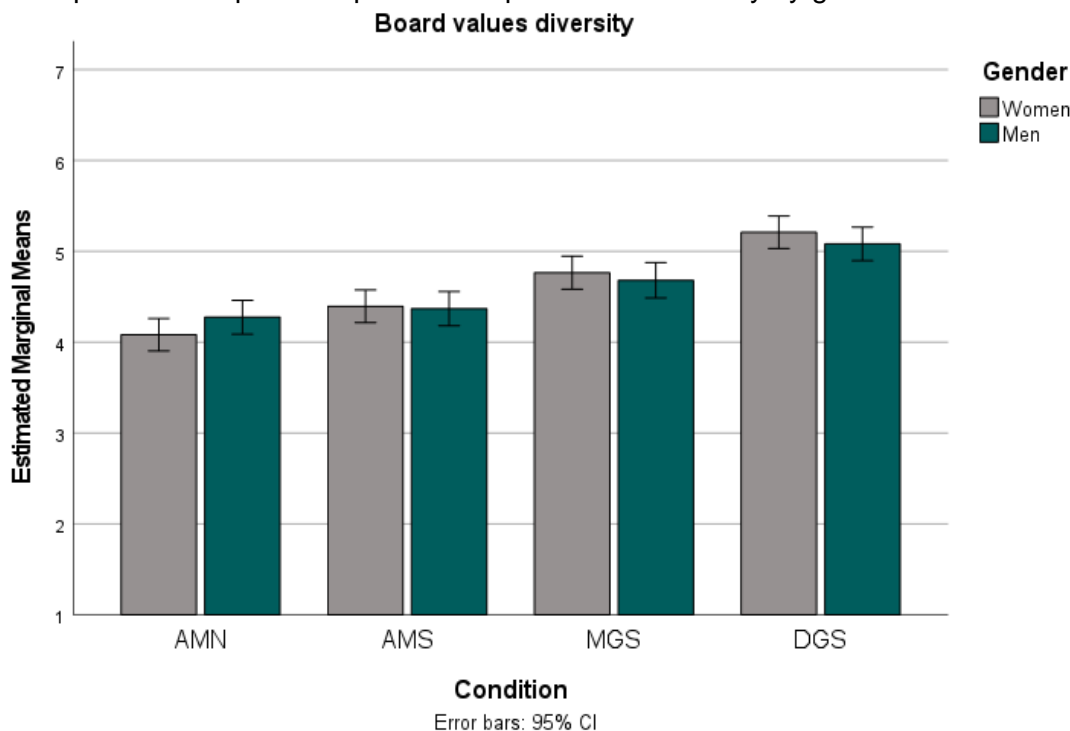
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement

Figure 19. Group mean comparisons ethnic diversity check by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement

Figure 20. Group mean comparisons perceived openness to diversity by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement

Effects of gender and diversity of the community energy initiative. We conducted a MANOVA to determine whether gender interacted significantly with condition, for willingness to join and acceptance of a CEI. For willingness to join, univariate results showed no significant interaction between gender and condition, $F(3,1367)=1.938$, $p = .122$, $\eta_p^2 = .004$, suggesting that willingness to join does not vary across conditions in women versus men (see Table 14 and Figure 21). The main effect of condition on willingness to join, $F(3, 1367) = 1.034$, $p = .376$, $\eta_p^2 = .002$, was also not significant, yet the main effect of gender was, $F(1,1367) = 18.715$, $p < .001$, $\eta_p^2 = .014$. Thus, men indicated to be more willing to join the CEI, compared to women. Interestingly, this effect seems mainly attributable to significant differences between men and women in the all- men with statement condition, $M\Delta = -.538$, $CI_{95}(-.878; -.197)$, $p = .002$, and the mixed-gender condition, $M\Delta = -.619$, $CI_{95}(-.968; -.269)$, $p < .001$. For acceptability, we found no significant interaction between gender and the level of diversity of the CEI, $F(3,1367) = 0.588$, $p = .623$, $\eta_p^2 = .001$. We also found no main effects of condition, $F(3,1367) = 0.981$, $p = .401$, $\eta_p^2 = .002$, or gender, $F(1,1367)= 0.043$, $p = .836$, $\eta_p^2 = .000$. This suggests that acceptability does not vary across conditions between women and men.

We also conducted a factorial MANOVA on our process variables, efficacy to join, participative efficacy, and perceived representation. For efficacy to join, we found no significant interaction between gender and condition, $F(3,1367) = 1.033$, $p = .377$, $\eta_p^2 = .002$, suggesting that efficacy to join does not vary across conditions between women and men. The main effect of condition was also not significant, $F(3, 1367) = .839$, $p = .472$, $\eta_p^2 = .002$). Yet, also here, we found a significant main effect of gender, $F(1,1367) = 10.910$, $p < .001$, $\eta_p^2 = .08$, indicating that, overall, women felt less efficacious to join the CEI (see Figure 22). For participative efficacy, we again found no significant interaction effect, $F(3,1367) = 0.640$, $p = .589$, $\eta_p^2 = .001$, no significant main effect of condition, $F(3, 1367) = 0.588$, $p = .623$, $\eta_p^2 = .001$, but we did find a significant

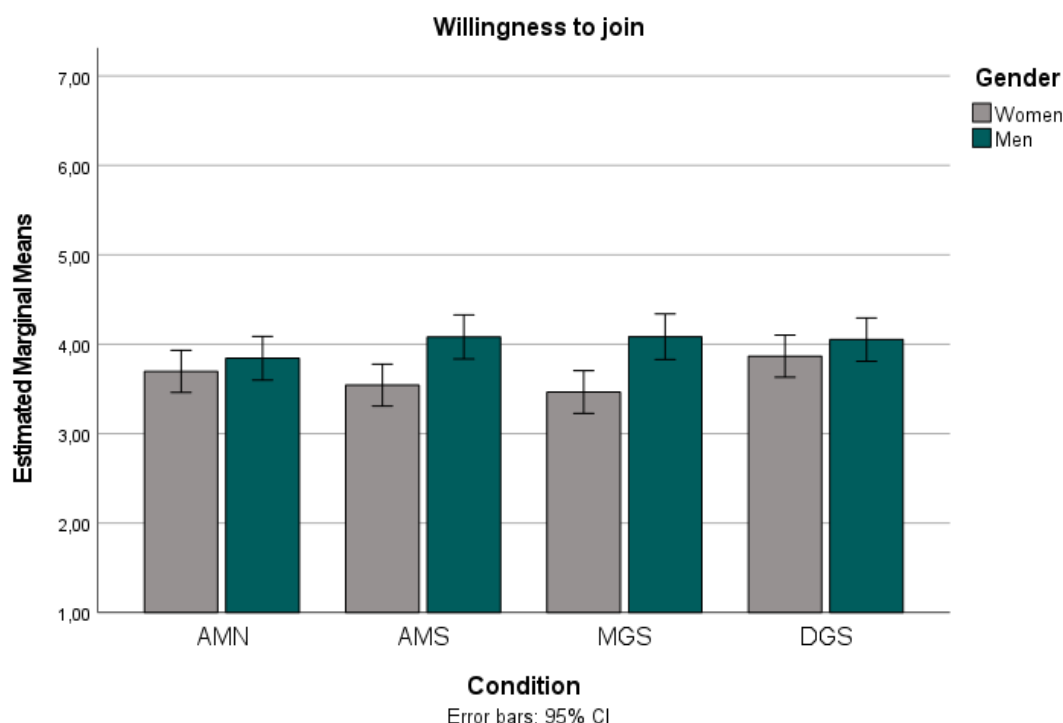
main effect of gender, $F(1,1367) = 9.910, p = .002, \eta_p^2 = .07$. This indicates that women felt less able to make a contribution to the CEI, compared to men (see Figure 23). For perceived representation, we found no significant main effects of condition, $F(3,1367) = 2.193, p = .087, \eta_p^2 = .005$, or gender, $F(1,1367) = 1.506, p = .220, \eta_p^2 = .001$, and no significant interaction effect, $F(3,1367) = 1.093, p = .351, \eta_p^2 = .002$. Yet, women feel significantly more represented in the diverse condition, compared to the all-men condition without statement, $M\Delta = .39, CI_{95}(.089;.685), p = .011$, and with statement, $M\Delta = .36, CI_{95}(.065;.661), p = .017$. Contrary to our expectations, we do not find that women feel significantly more represented in the mixed-gender condition (see Figure 24).

Table 14. Means and standard deviations per experimental condition and by gender

Condition	Gender	Willingness to join		Acceptability		Efficacy to join		Participative efficacy		Perceived representation	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AM	Women	3.69	1.49	5.28	1.17	4.08	1.48	3.82	1.32	3.65	1.35
	Men	3.84	1.71	5.25	1.29	4.11	1.64	3.92	1.58	3.78	1.54
AMS	Women	3.53	1.61	5.20	1.34	4.08	1.59	3.76	1.28	3.68	1.50
	Men	4.08	1.56	5.30	1.31	4.42	1.53	4.08	1.45	3.96	1.47
MGS	Women	3.47	1.62	5.25	1.25	4.02	1.55	3.74	1.32	3.87	1.39
	Men	4.08	1.65	5.08	1.57	4.42	1.49	4.09	1.35	3.94	1.55
DGS	Women	3.86	1.53	5.32	1.35	4.09	1.54	3.92	1.39	4.04	1.33
	Men	4.05	1.74	5.36	1.31	4.43	1.57	4.09	1.44	3.94	1.45

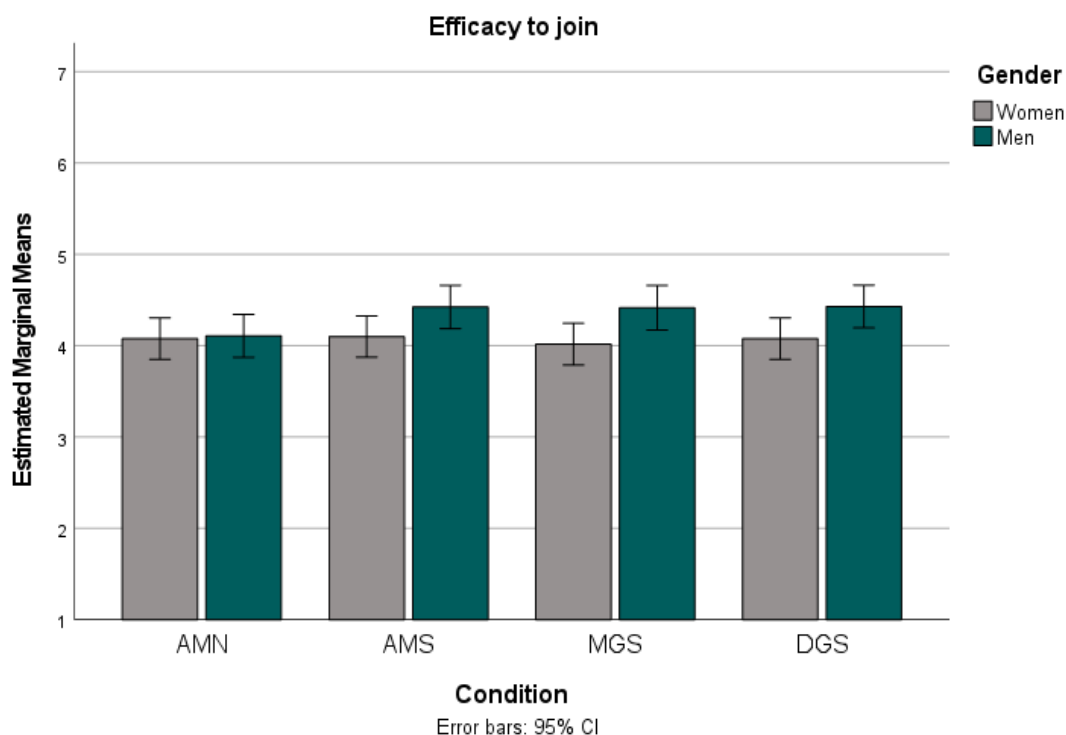
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement.

Figure 21. Group mean comparisons willingness to join by gender



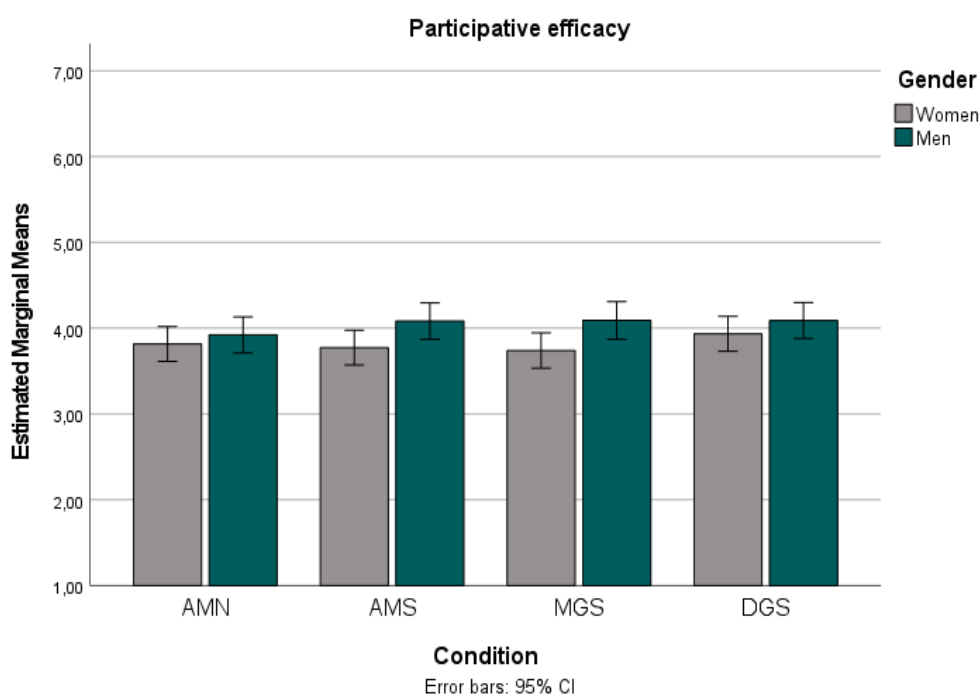
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement

Figure 22. Group mean comparisons efficacy to join by gender



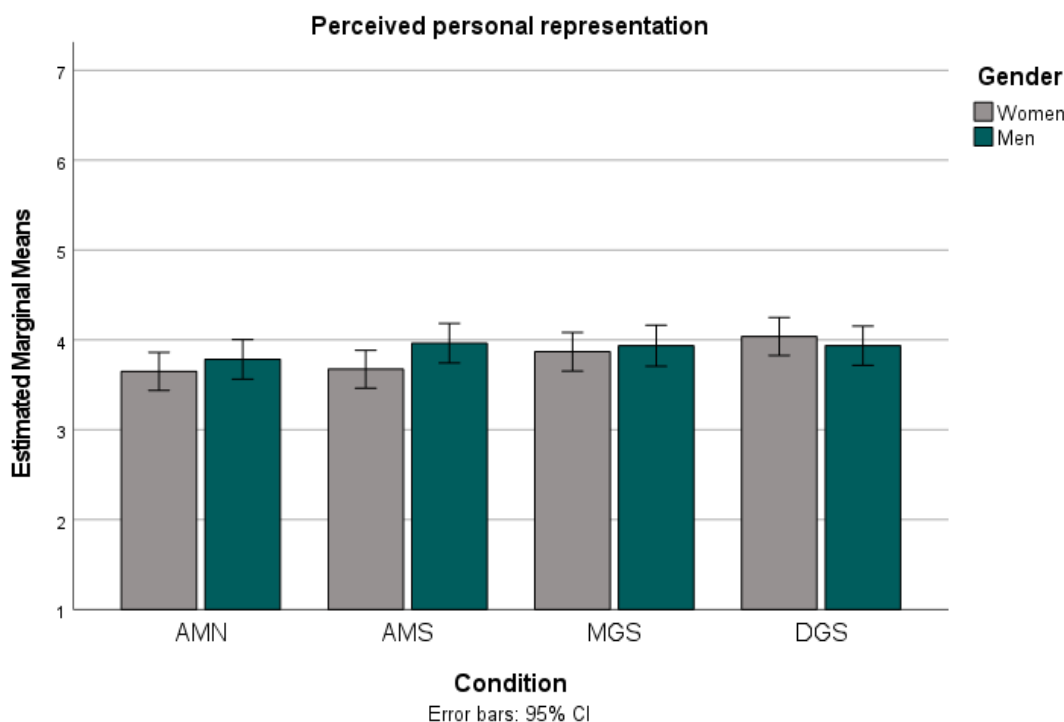
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement.

Figure 23. Group mean comparisons participative efficacy by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement.

Figure 24. Group mean comparisons perceived representation by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, DGS = Diverse with statement.

2.3.1.5 Conclusion

To conclude, we find that, overall, men are more willing to join a CEI, feel they are more efficacious to join and to make a contribution to the CEI, compared to women, independent of how the CEI is presented in terms of the diversity of the board members. Partly, this could be due to the fact that our scenarios presented differences in socio-demographic backgrounds in the board of the CEIs and not the average members of the CEI. Future research is needed to assess whether people also adjust their perceptions about the members of the CEI when presented with a message from the board. Furthermore, future research could include an all-women group as a stronger representation manipulation. Finally, as women are less involved in the energy sector more generally, stereotyping may be an additional explanation, which might not be counteracted by merely presenting people with a scenario in which more women are included.

2.3.2 Study 7 Replication Italy

In our second experiment, Study 7, we conducted a replication study of Study 6 in another country and socio-political context: Italy. In this study we replaced the generally diverse condition with an all-women condition

2.3.2.1 Sample and design

Data was collected among a gender-balanced sample of the Italian population. Participants were recruited between September 19th until October 6st 2023, through Prolific. This is an online participant panel and included Italian-speaking individuals who were at least 18 years old. Data were collected online, using the online survey software Qualtrics. Following completion of the questionnaire, participants were paid at an hourly rate of £8.00.

As in Study 6, we aimed at a similar sample size of $N = 1448$ participants (362 participants per group, equally divided among men and women), considering the small effect sizes we found in the previous study.

A total of 1546 participants clicked on the link to take part in the study. We removed 8 respondents because they gave no informed consent, 6 respondents who failed both attention checks, 39 respondents who did not complete the survey, and 36 respondents because they indicated to identify themselves with a different gender than man/woman, and 1 respondent who indicated to be younger than 18 years. Our final sample used for the analyses consisted of 1456 participants.

In total, 368 participants (25.3%) participated in the all-men no statement group, 367 (25.2%) for the all-men with statement group, 357 (24.5%) for the gender diverse with statement group, and 364 participants (25.0%) participating in the all-women with statement group. In total, 49.9% of participants identified as women and 50.1% identified as men, with their age ranging from 18 to 71 years old ($M = 30.73$, $SD = 9.34$). The median household income level was 1000-1999 euros net per month (ranging from less than 500 euros net per month to 5000 euros or more per month). In contrast to Study 6, this sample did include participants that lived together with their parents or guardians with 47.6% of the participants living with parents or guardians and 52.4% not living with their parents or guardians¹⁹.

2.3.2.2 Procedure and experimental conditions

For this study, we followed a similar procedure and design as Study 6, with the exception of replacing the diverse condition based on gender, age, and ethnicity with an all-women condition. We tested four conditions; all- without a diversity statement (AMN), all-men with a diversity statement (AMS), mixed-gender (equal number of men and women) with a diversity statement (MGS), and all-women with a diversity statement (AWS; see Appendix 4.8 for a detailed description of the scenarios).

2.3.2.3 Measures

Willingness to join, acceptance, gender, efficacy to join, participative efficacy, and perceived representation were measured similar to Study 6, except for the second group composition check. Instead of asking respondents whether they thought the board of the CEI consisted of people from various ethnic backgrounds, participants were asked whether the board consisted of only women (see Appendix 4.9 for an overview of all items used in Studies 6 & 7). For items, descriptive statistics, and correlations, see Table 15.

¹⁹ Participants living with their parents or guardians were included here as in Italy this is a very common living situation and we were afraid that we would otherwise not reach the required sample size.

Table 15. Descriptive statistics, reliability values, and correlations

Variable	α / r_{sb}	<i>M</i>	<i>SD</i>	1	2	3	4	5
1 Acceptability	.85	5.80	1.37					
2 Willingness to Join	.94	4.75	1.38	0.31**				
3 Gender	-	-	-	-0.07**	-0.09**			
4 Efficacy to join	-	5.29	1.13	0.31**	0.61**	-0.07*		
5 Participative efficacy	.95	4.48	1.22	0.19**	0.53**	0.02	0.47**	
6 Perceived representation	-	4.43	1.35	0.28**	0.51**	-0.02	0.46**	0.39**

Note. *N* = 1456.

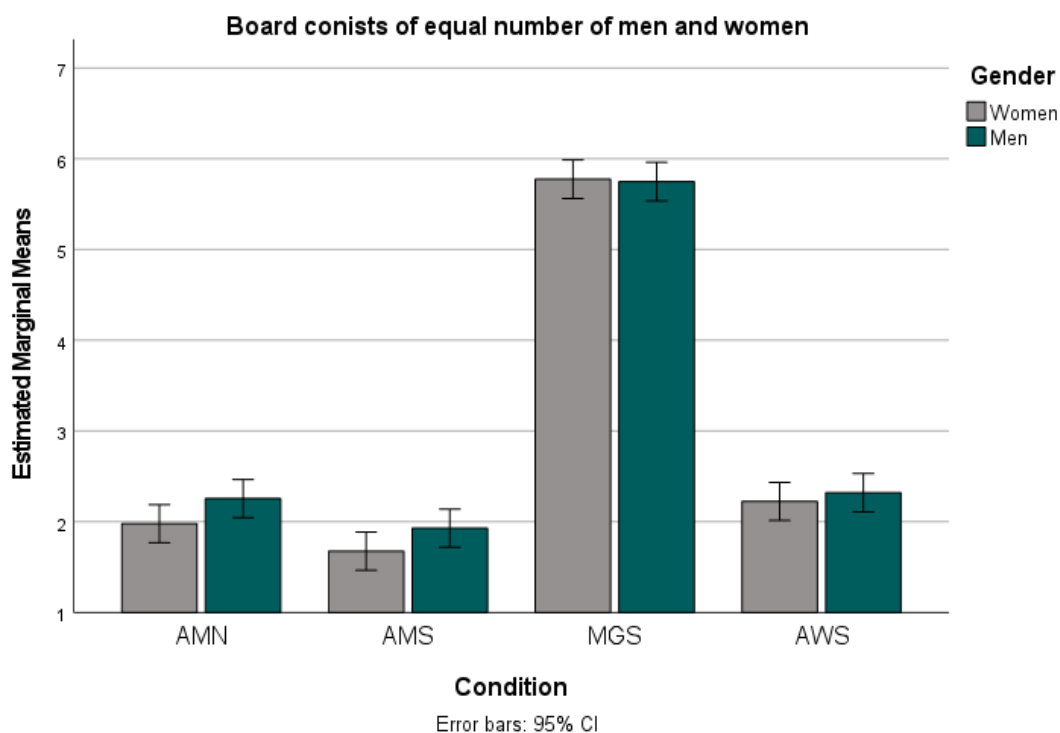
* $p < .05$, ** $p < .01$.

2.3.2.4 Results

Perceived diversity check. Again, we first checked whether the participants perceived the group composition of the board of the CEIs as intended, using a factorial MANOVA. The univariate results showed significant differences between conditions on the gender equal check, $F(3, 1448) = 590.552, p < .001, \eta_p^2 = .550$, the women-only check, $F(3, 1448) = 852.401, p = .000, \eta_p^2 = .638$, and the diversity statement check, $F(3, 1448) = 99.285, p < .001, \eta_p^2 = .171$. As expected, participants in the mixed-gender condition scored significantly higher on the gender equal check compared to the other groups (see Figure 25). Furthermore, participants in the all-women condition scored significantly higher than participants in any of the other conditions on the women only check (see Figure 26), while the participants in the mixed-gender condition scored higher compared to the all-men conditions. In addition, participants in the all-men with statement condition, the mixed-gender condition, and the all-women condition scored significantly higher on the statement check, compared to participants in the all-men without statement condition.

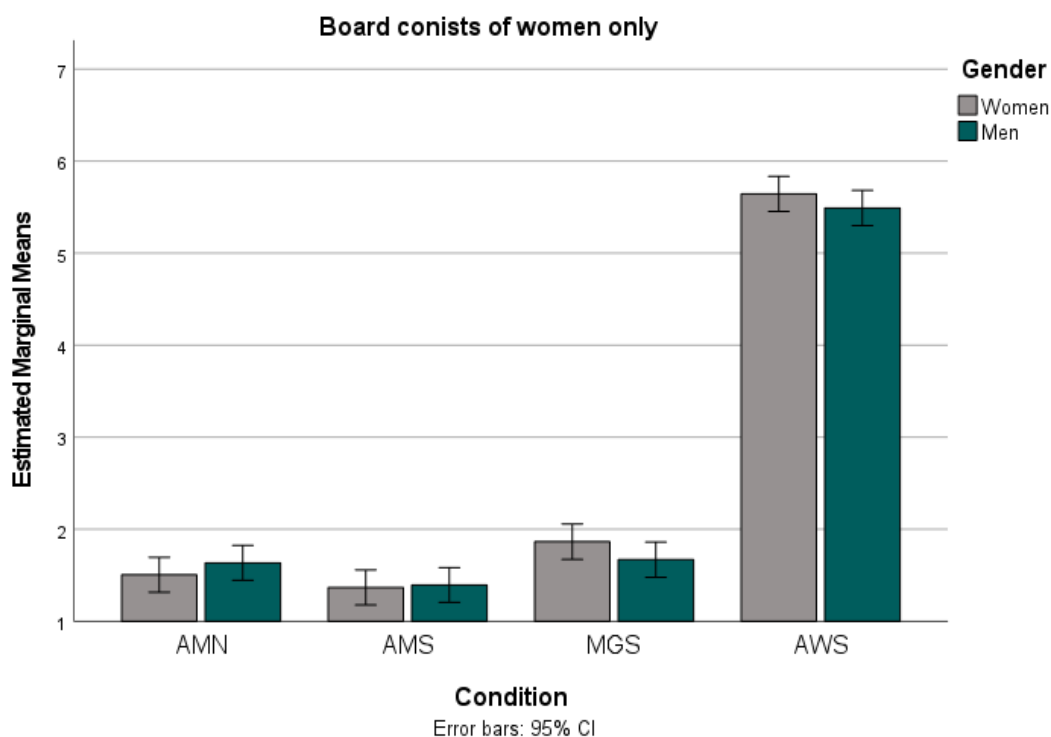
Similarly to Study 6, also here people seem to associate the statement with the actual diversity of the board, with participants in the mixed-gender condition scoring higher than the all-men with statement condition, $M\Delta = 1.188, CI_{95}(.994; 1.382), p < .001$, and the all-women with statement condition, $M\Delta = .205, CI_{95}(.011; .399), p = .039$. Interestingly, the all-women condition with statement is perceived to be more open to diversity, compared to the all-men condition with statement, $M\Delta = 1.188, CI_{95}(.994; 1.380), p < .001$. We also found a small but significant interaction effect between gender and condition, $F(3, 1448) = 3.037, p = .028, \eta_p^2 = .006$, with men more often perceiving the CEI as valuing diversity in both the all-men without statement condition, $M\Delta = .283, CI_{95}(.010; .555), p = .042$, and the all-men with statement condition, $M\Delta = .312, CI_{95}(.040; .585), p = .025$, compared to women (see Figure 27).

Figure 25. Group mean comparisons gender equal check by gender



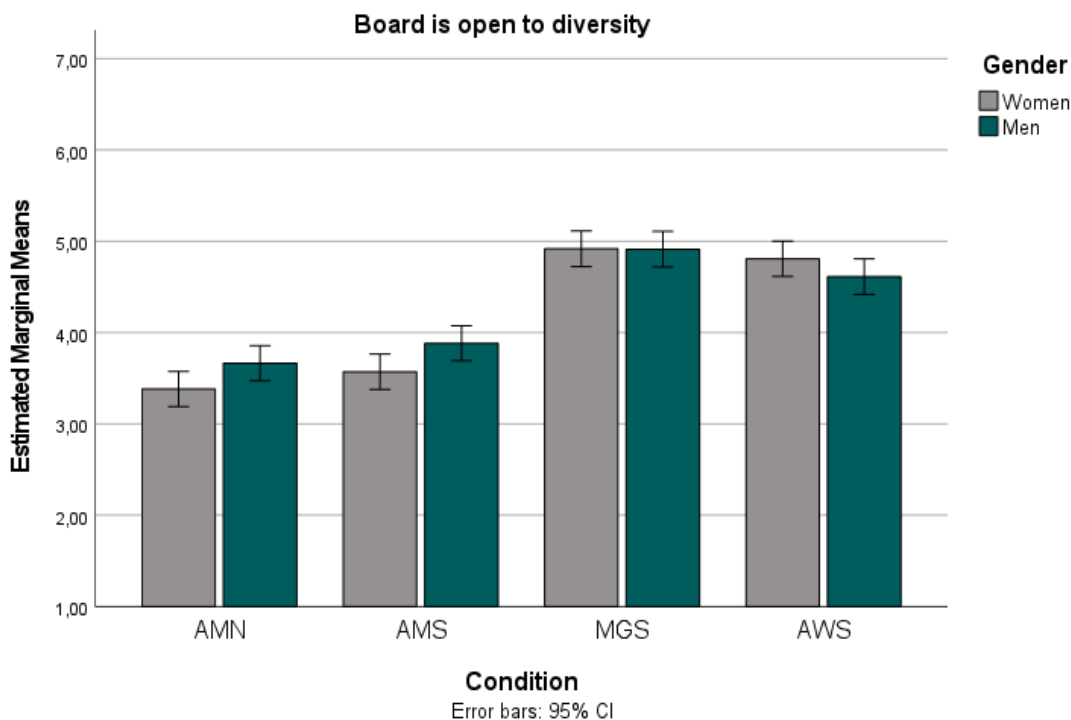
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

Figure 26. Group mean comparisons all-women check by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

Figure 27. Group mean comparisons perceived openness to diversity by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

Effects of gender and diversity of the community energy initiative. We conducted a MANOVA to determine whether gender interacted significantly with condition for willingness to join, acceptance of a CEI, efficacy to join, participative efficacy, and perceived representation. For willingness to join, univariate results showed no significant interaction between gender and condition, $F(3,1448) = .162, p = .922, \eta_p^2 = .000$, suggesting that willingness to join does not significantly vary across conditions in women versus men. The main effect of condition, $F(3, 1448) = .340, p = .796, \eta_p^2 = .001$, was also not significant, yet the main effect of gender was, $F(1,1448) = 10.733, p = .001, \eta_p^2 = .007$ (see Figure 28). However, contrary to our results from Study 6, women actually indicated to be more willing to join the CEI, compared to men, instead of less. This effect seems mostly driven by women being significantly more willing to join the CEI in the all-women condition compared to the all-men, $M\Delta = .31, CI_{95}(.024; .591), p = .034^{20}$.

For acceptability, we also found no significant interaction between gender and condition, $F(3,1448) = 1.749, p = .155, \eta_p^2 = .004$, nor did we find a main effect of condition, $F(3,1448) = 2.307, p = .075, \eta_p^2 = .005$. Again, we did find a main effect of gender, $F(1,1448) = 6.814, p = .009, \eta_p^2 = .005$, with women being more accepting of the CEI compared to men. Yet, there was no significant difference between men and women in the all-men without statement condition. Furthermore, women's acceptance seems to increase over the conditions (see Figure 29), although only significantly in the all-women condition compared to the all-men without statement

²⁰ Exploratory results show that, overall, women were significantly more willing to volunteer in an CEI, $F(1,1454) = 48.726, p < .001, \eta_p^2 = .033$, while we did not find a significant difference between men and women when it comes to financially investing in the energy communities, $F(1,1454) = 1.177, p = .278, \eta_p^2 = .001$.

condition, $M\Delta = .38$, $CI_{95}(.098;.656)$, $p = .008$, while we did not find significant differences across conditions for men.

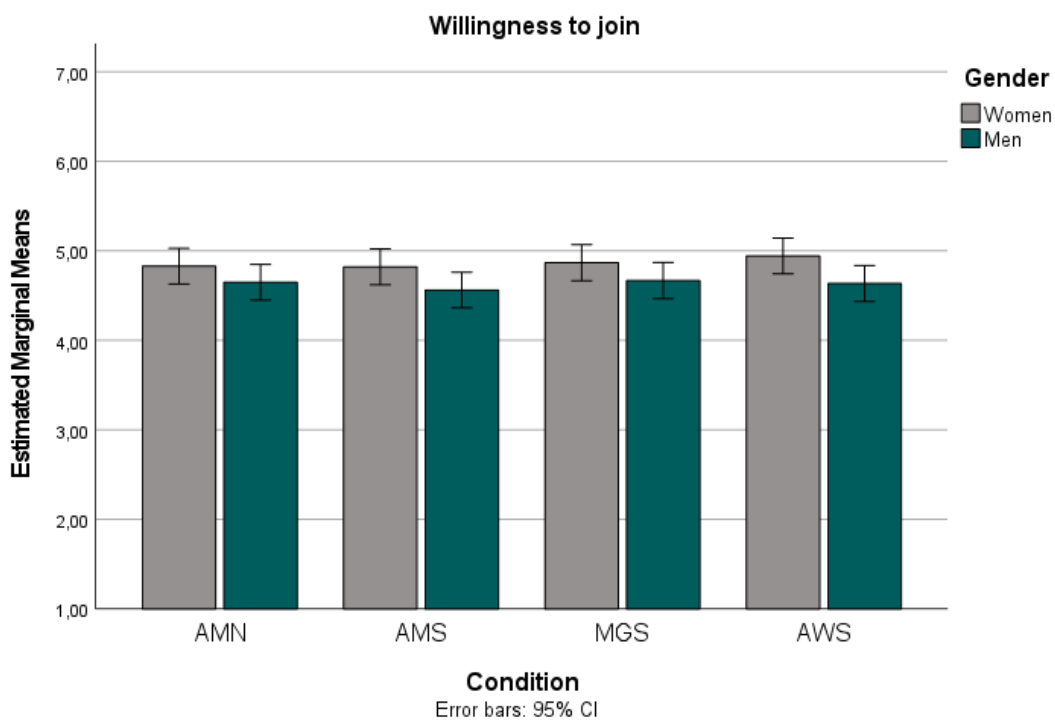
Next, we examined our process variables: efficacy to join, participative efficacy, and perceived representation. For efficacy to join, we found no significant interaction between gender and condition, $F(3,1448) = .883$, $p = .449$, $\eta_p^2 = .002$, suggesting that efficacy to join does not vary across conditions between women and men. The main effect of condition was also not significant, $F(3, 1448) = 1.508$, $p = .211$, $\eta_p^2 = .003$. Again, we did find a significant main effect of gender, $F(1,1448) = 6.307$, $p = .012$, $\eta_p^2 = .004$, indicating that women felt more efficacious to join the energy initiative (see Figure 30). This effect seems mainly driven by a difference between men and women in the mixed-gender condition, $M\Delta = .30$, $CI_{95}(.070;.538)$, $p = .011$. For participative efficacy, we again found no significant interaction effect, $F(3,1448) = .749$, $p = .523$, $\eta_p^2 = .002$, no significant main effect of condition, $F(3, 1448) = 1.968$, $p = .117$, $\eta_p^2 = .004$, and, contrary to Study 6, we also did not find a significant main effect of gender, $F(1,1448) = .393$, $p = .531$, $\eta_p^2 = .000$. Thus, there does not seem to be a significant difference in perceived ability to have an influence on the CEI between men and women. For perceived representation, we did find a significant interaction effect between gender and condition, $F(3,1448) = 6.273$, $p < .001$, $\eta_p^2 = .013$. Women seem to feel significantly more represented in the all-women condition, $M\Delta = .47$, $CI_{95}(.198; .745)$, $p < .001$, and men felt significantly more represented in the all-men condition, $M\Delta = .30$, $CI_{95}(.027; .571)$, $p = .031$ (see Figure 31).

Table 16. Means and standard deviations per experimental condition

Condition	Gender	Willingness to join		Accept-ability		Efficacy to join		Participative efficacy		Perceived representation	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
AM	Women	4.83	1.30	5.71	1.47	5.28	1.09	4.35	1.20	4.03	1.48
	Men	4.65	1.43	5.80	1.36	5.22	1.13	4.54	1.16	4.33	1.34
AMS	Women	4.82	1.26	5.89	1.36	5.30	1.09	4.42	1.11	4.03	1.26
	Men	4.56	1.57	5.57	1.43	5.15	1.23	4.37	1.36	4.19	1.38
MGS	Women	4.87	1.40	5.91	1.32	5.43	1.06	4.46	1.27	4.57	1.31
	Men	4.67	1.43	5.63	1.48	5.12	1.32	4.52	1.31	4.38	1.47
AWS	Women	4.94	1.29	6.09	1.27	5.43	1.01	4.62	1.16	4.81	1.10
	Men	4.64	1.46	5.85	1.19	5.35	1.04	4.59	1.18	4.34	1.26

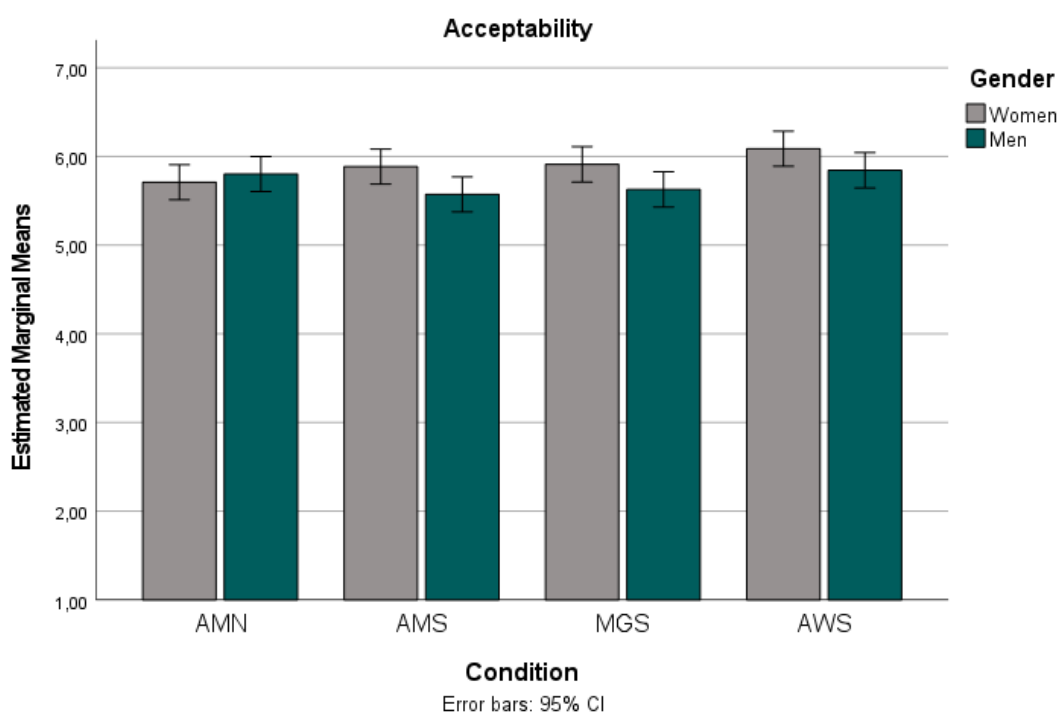
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement.

Figure 28. Group mean comparisons willingness to join by gender



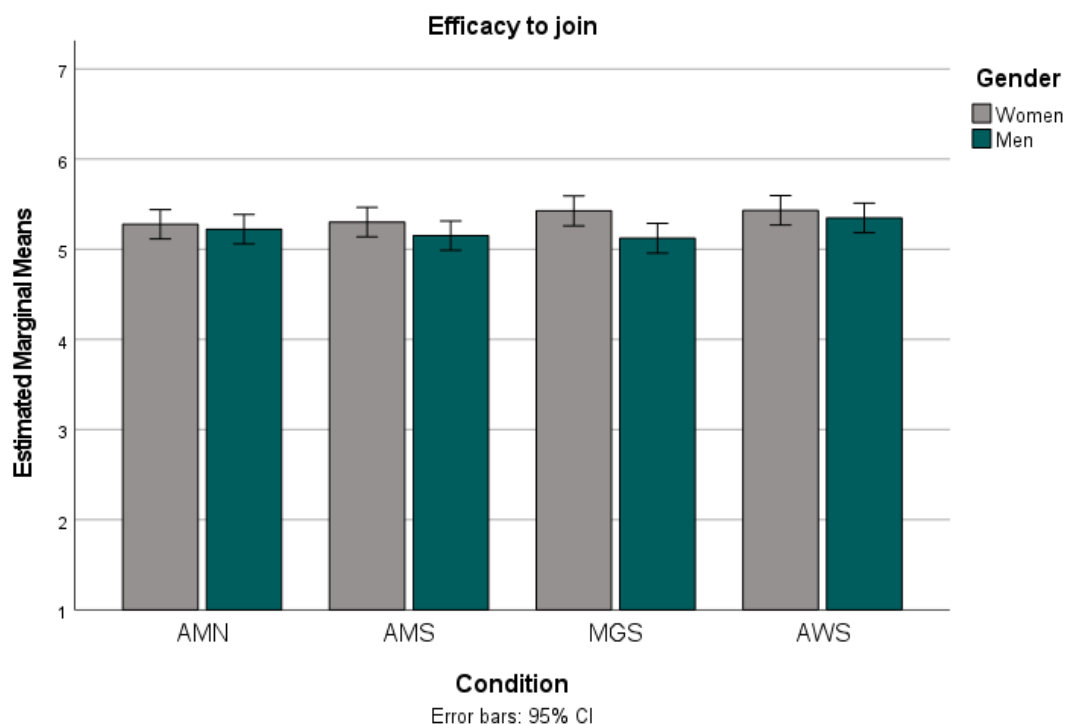
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

Figure 29. Group mean comparisons acceptability by gender



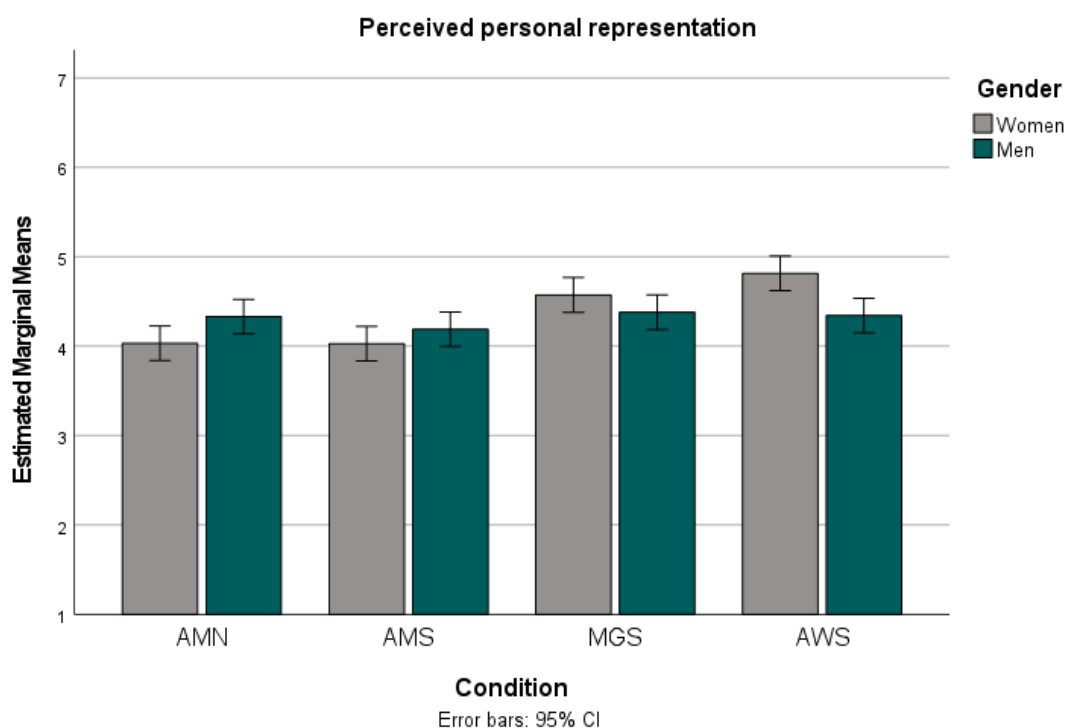
Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

Figure 30. Group mean comparisons efficacy to join by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

Figure 31. Group mean comparisons perceived representation by gender



Note. AMN = All-men no statement, AMS = All-men with statement, MGS = Mixed-gender with statement, AWS = All-women with statement

2.3.2.5 Conclusion

To conclude, we find that in Italy, contrary to the Netherlands, overall women were more willing to participate in the described CEI, more accepting of the CEI, and felt more efficacious to join. Women were especially more accepting of and willing to join the CEI when the board consisted of women only. Furthermore, women felt more represented by the mixed-gender and all-women boards, whereas men felt more represented by the men only boards. As such, the difference in gender effects between Studies 6 and 7 effects can partly be explained by the fact that participants were presented with an all-women board, which was not included in the Netherlands. Furthermore, while our sample in Italy was representative in terms of gender, participants were on average substantially younger and more often living with their parents or guardians. A country specific explanation for these findings may be that CEIs are only starting to develop in Italy and as such people may have a less clear preconception of CEIs, and possibly existing inequalities in gender representation. Finally, cultural differences may play a role. As women on average participate less in the labour market and are more often involved in the community compared to the Netherlands (Gender Equality Index Report, 2020), women in Italy may be more likely to be involved in more informal local networks in which energy communities are often embedded at the start. Future research could examine the effects of such factors on the willingness to join among men and women, including potential intersectionalities, in order to gain a better understanding of the complexity of participation among different genders, within different socio-political contexts.

2.4 Energy citizenship at the local, national, and EU level

The last three studies focus on energy citizenship at different geographical levels. It is important to understand the contexts and conditions under which energy citizenship might emerge. However, there is currently still a gap in the literature when it comes to studying how energy citizenship and energy communities relate to different geographies (Lode et al., 2022). Therefore, there is a growing need to understand how energy citizenship unfolds at different geographical levels, including regional, national, and supranational contexts, such as the European Union. Furthermore, more insight is needed into how these variations influence individuals' willingness to engage in energy-related initiatives, like CEIs, at the different geographical levels. We conducted a series of studies in Austria, the Netherlands, and Germany, examining whether disparities in collective energy citizenship exist based on the chosen level of engagement (local, national, EU), and how these distinctions impact individuals' motivations and readiness to participate in CEIs, as well as their perceptions of these CEIs at the different geographical levels. These studies aim to provide insights into the multifaceted nature of energy citizenship and its implications for the advancement of sustainable energy practices across different geographical contexts.

In the following set of studies conducted in Austria (Study 8), the Netherlands (Study 9) and Germany (Study 10), we therefore set out to answer the following research questions:

RQ: “Is there a difference in collective Energy Citizenship depending on the level (local/national/EU) and how does this affect willingness to join an energy initiative at these different levels?”

We expect that collective energy citizenship will be influenced by the group level (local/national/EU). Specifically, we assume that larger groups (national/EU) will score higher on

collective energy citizenship than smaller groups (local).

Larger groups, such as national or European groups, are assumed to score higher on collective energy citizenship, because people might feel that they are part of a larger group and may share a larger proportion of responsibility in the energy transition, and that, as part of a larger group, they will be able to achieve more change. National and EU-level groups often have access to more resources, both in terms of financial support and technical infrastructure. This can facilitate collective efforts and bring upon a sense of empowerment, as individuals within these larger groups may feel better equipped to address energy-related issues.

Each of the studies, and hypotheses, were pre-registered on the OSF (Study 8: https://osf.io/8fqt4/?view_only=f1555fc22eb544dd9122660d5dc4fc33; Study 9: https://osf.io/nt7za/?view_only=992e4e7809d14af2829c259d54a7f029; Study 10: https://osf.io/wjgd3/?view_only=073de64493e34b9c8c0219cd080751c4).

2.4.1 Study 8 Austria

2.4.1.1 Sample and design

As there is little experimental research on influence of geographical levels on energy citizenship, we based our power estimation on more general assumptions and conducted a power analysis using G*Power. For this study, as well as for Study 9 and 10, we chose a sample size that would allow us to detect a small effect size using a standard error probability ($\alpha = .05$), and a power of .80. For a sample size of 600, with a power of .8 and alpha = .05, a one-way ANOVA with 3 groups would detect small effects of $f = .127$.

In this study, as well as in studies 9 and 10, data collection followed APA guidelines for the ethical conduct of research and received ethical approval by the ethics committee of the University of Graz. Using the online panel “Talk”, a representative sample of the Austrian population (based on age, gender, and education) was gathered. Respondents were invited to take part in the online survey, which was conducted in German and programmed with Limesurvey. Participants were compensated for their participation by the panel with 2.85 euro. In total, 1030 people clicked on the survey link, out of which 67 had to be excluded because they did not pass the attention check. In total, 640 completed the whole survey. From these, 12 people had to be excluded because they completed the survey in under three minutes, making it unlikely that they read the questions. This left us with a final sample of 628 (52.7% men and 47.3% women). The age ranged from 18 to 82, with a mean age of $M = 51.27$ ($SD = 15.51$). Sixty-nine percent had completed at least lower-level education, 17% had a high school degree and 14% a university degree. Fifty-one percent were currently full-time employed while 32% were retired.

2.4.1.2 Procedural and experimental conditions

After consenting to participate, participants filled in questions about their socio-demographics. Next, participants were randomly assigned to one of three conditions, either the local condition, national (Austrian) condition, or the EU condition. Depending on their condition, participants were then asked about their identification with either their local neighbourhood, their nation (Austria), or the EU. Next, their perceived agency of their group (local, national, or EU), individual energy citizenship and collective energy citizenship (depending on their group; local,

national or EU) was asked. Then, participants received a short, general information text about CEIs and were asked whether they currently participate in a CEI. Lastly, different perceptions of either local, national, or EU CEIs (depending on the condition) were asked, for example regarding their trustworthiness, transparency, and general competence. In the end, participants received questions about their willingness to join a CEI.

2.4.1.3 Measures

The survey contained the following measures that are relevant for the current study; individual energy citizenship, collective energy citizenship, and willingness to join a community energy initiative (see Appendix 4.10 for the full description of all included items in Studies 8-10). Measures were answered on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). For descriptive statistics and correlations, see Table 17.

Individual energy citizenship. This was assessed, as in Studies 1 to 3, through nine items (Held et al., 2022), including statements such as “I consider affordable sustainable energy as an important right” and “I perceive it as my responsibility to help others participate in the sustainable energy transition (for example by sharing my knowledge).”

Collective energy citizenship. This was assessed through nine items (Held et al., 2022), including statements such as “We [group] consider affordable sustainable energy as an important right” and “We [group] perceive it as our responsibility to help others participate in the sustainable energy transition (for example by sharing our knowledge).”

Willingness to join. Willingness to join was assessed with four items adapted from Sloot et al. (2018), for example “I am interested in joining a community energy initiative” and “I want to become involved in a community energy initiative”.

Table 17. Descriptive statistics and correlations

Variable	<i>M</i>	<i>SD</i>	1	2
1 Willingness to Join	4.82	1.26		
2 Individual Energy Citizenship	4.87	1.24	.593**	
3 Collective Energy Citizenship	4.12	1.47	.506**	.737**

Note. *N* = 628.

* $p < .05$, ** $p < .01$.

2.4.1.4 Results

A one-way ANOVA was performed to compare the effect of the three different geographical levels (local, national, EU) on collective energy citizenship scores. The one-way ANOVA revealed that there was a statistically significant difference in mean collective energy citizenship scores between at least two groups, $F(2, 625) = 5.319$, $p = .005$.

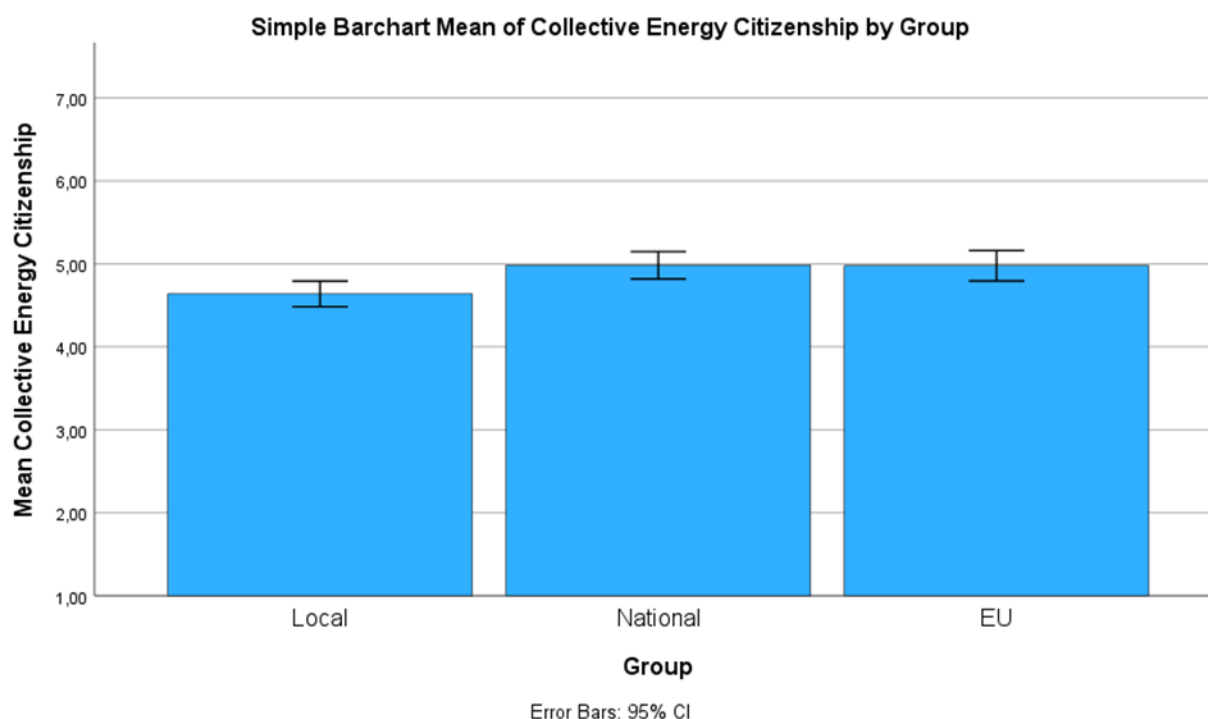
Tukey’s HSD Test for multiple comparisons found that the mean value of collective energy citizenship was significantly different between the local and the national level ($p = .012$, $CI_{95} = [-0.63, -0.06]$). On average, people in the national group scored higher on collective energy citizenship than people in the local group. Furthermore, there was a significant difference in collective energy citizenship between the local and EU level ($p = .014$, $CI_{95} = [-0.63, -0.06]$). People in the EU group scored, on average, higher than people in the local group. There was no statistically significant difference in collective energy citizenship between the national and EU

level ($p = .999$; see Table 18 & Figure 32).

Table 18. Mean, standard deviation, and reliability values of energy citizenship per group

Group	Variable	<i>N</i>	α	<i>M</i>	<i>SD</i>
Local	Individual Energy Citizenship	203	.91	4.73	1.24
	Collective Energy Citizenship	203	.91	4.64	1.12
National	Individual Energy Citizenship	214	.92	4.89	1.25
	Collective Energy Citizenship	214	.93	4.98	1.22
EU	Individual Energy Citizenship	211	.91	4.85	1.28
	Collective Energy Citizenship	211	.95	4.98	1.35

Figure 32. Group mean comparisons collective energy citizenship



Next, we compared the effect of the three different geographical levels (local, national, EU) on the willingness to join a CEI. We did not find a significant difference in the willingness to join a CEI between the different groups ($p = .918$; see Table 19).

Table 19. Means, standard deviations, and reliability values of willingness to join per group

Group	Variable	<i>N</i>	α	<i>M</i>	<i>SD</i>
Local	Willingness to join	203	.85	4.13	1.48
National	Willingness to join	214	.84	4.15	1.44
EU	Willingness to join	211	.87	4.09	1.51

2.4.1.5 Conclusion

In this study, we observed that individuals tend to report higher levels of collective energy citizenship related to the national and EU contexts, compared to the local setting. Interestingly, we found no significant differences among the groups concerning participants' willingness to join a CEI. This suggests that while people may feel stronger collective energy citizenship at the national or EU level, this may not necessarily translate into an increased desire to actively

participate in CEIs.

This study highlights the potential difference of geographical levels in collective energy citizenship, specifically indicating higher levels of collective energy citizenship within larger, national or European, groups. However, it's essential to note that the differences observed, while statistically significant, are rather small. This prompts a fundamental question: are these findings confined to the Austrian context, or can they be generalised to other institutional settings? Therefore, we set out to replicate these findings in the Netherlands and Germany, to determine whether they hold across different nations and institutional contexts.

2.4.2 Study 9 Replication the Netherlands

2.4.2.1 Sample and design

We aimed to replicate the results from the Austrian study in a Dutch sample. Using the online panel, Panel Inzicht, a representative sample of the Dutch population (based on age, gender and education) was gathered and invited to take part in the online survey, which was conducted in Dutch and programmed with Limesurvey. Participants were compensated for their participation by the panel with 2.75 euro. In total, 941 people clicked on the survey link, out of which 75 had to be excluded because they did not pass the attention check. In total, 650 completed the whole survey. From these, 33 people were excluded because they completed the survey in under three minutes, making it unlikely that they read the questions. This left us with a final sample of 617 (46.4% men and 53.3% women). The age ranged from 18 to 85, with a mean age of $M = 50.02$ ($SD = 17.61$). Seven percent of the sample had a low education level, 57.1% had a medium education level, and 36% had a high education level. Sixty percent were full-time employed, 22% were retired, 4% were students, and 11% were currently unemployed.

2.4.2.2 Procedure and experimental conditions

This study followed a similar procedure and design as the Austrian study (Study 8); only the national level was now set to the Netherlands instead of Austria.

2.4.2.3 Measures

The survey contained the following measures that are relevant for this study: individual and collective energy citizenship, and willingness to join a CEI. Measures were answered on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The same measures as described in Study 8 were used. For descriptive statistics and correlations, see Table 20.

Table 20. Descriptive statistics and correlations

Variable	<i>M</i>	<i>SD</i>	1	2
1. Willingness to Join	4.38	1.30		
2. Individual Energy Citizenship	4.49	1.17	.741**	
3. Collective Energy Citizenship	4.54	1.26	.709**	.791**

Note. $N = 617$.

* $p < .05$, ** $p < .01$.

2.4.2.4 Results

A one-way ANOVA was performed to compare the effect of the three different geographical

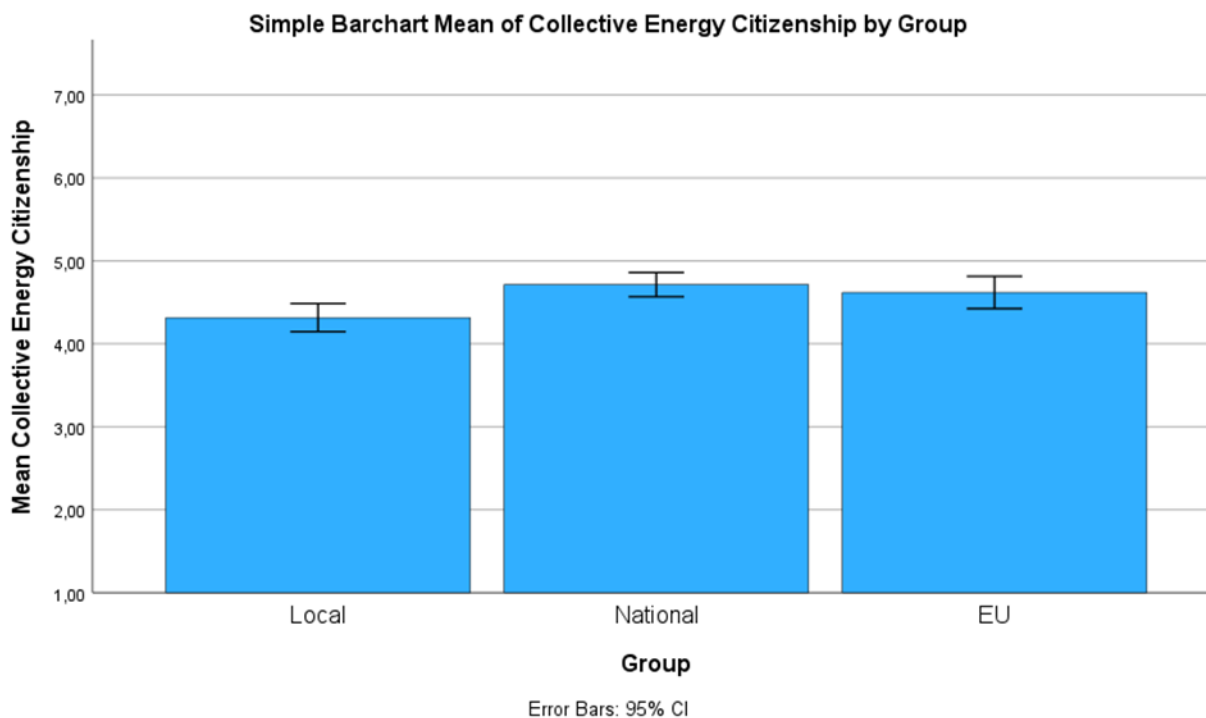
levels (local, national, EU) on collective energy citizenship scores. The one-way ANOVA revealed that there was a statistically significant difference in mean collective energy citizenship scores between at least two groups, $F(2, 614) = 5.887, p = .003$.

Tukey's HSD Test for multiple comparisons found that the mean value of collective energy citizenship was significantly different between the local and the national level ($p = .003, CI_{95} = [-0.69, -0.11]$). On average, people in the national group scored higher on collective energy citizenship than people in the local group. Furthermore, there was a significant difference in collective energy citizenship between the local and EU level ($p = .035, CI_{95} = [-0.59, -0.02]$). People in the EU group scored, on average, higher on collective energy citizenship than people in the local group. There was no statistically significant difference in collective energy citizenship between the national and EU level ($p = .732$; see Table 21 & Figure 33).

Table 21. Means, standard deviations, and reliability of energy citizenship per group

Group	Variable	<i>N</i>	α	<i>M</i>	<i>SD</i>
Local	Individual Energy Citizenship	222	.92	4.52	1.20
	Collective Energy Citizenship	222	.95	4.32	1.28
National	Individual Energy Citizenship	196	.91	4.50	1.11
	Collective Energy Citizenship	196	.93	4.71	1.04
EU	Individual Energy Citizenship	199	.91	4.46	1.12
	Collective Energy Citizenship	199	.96	4.62	1.39

Figure 33. Group mean comparisons collective energy citizenship



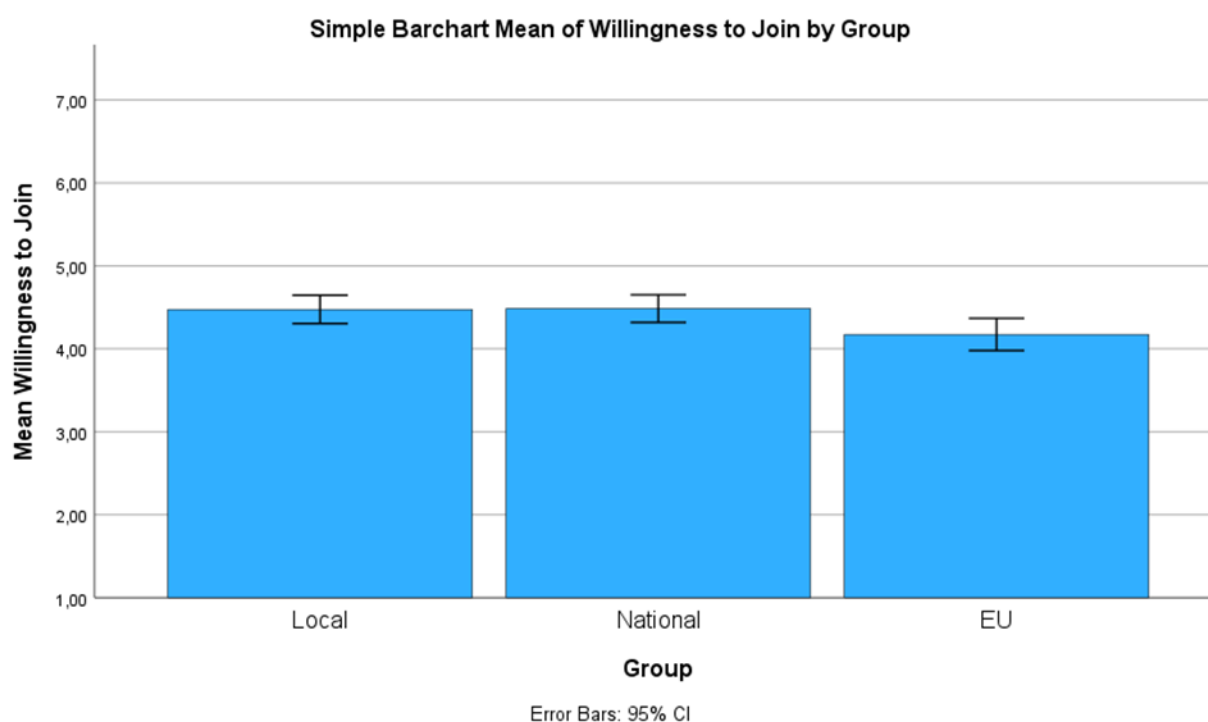
Next, another one-way ANOVA was performed to compare the effect of the three different geographical levels on the willingness to join a CEI. The one-way ANOVA revealed that there was a statistically significant difference in the willingness to join an CEI between at least two groups, $F(2, 614) = 3.791, p = .023$.

Tukey's HSD Test for multiple comparisons found that the mean value of willingness to join a CEI was significantly different between the local and the EU level ($p = .045$, $CI_{95} = [0.01, 0.60]$). People in the local group scored on average higher on their willingness to join a CEI than people in the EU group. Furthermore, there was a significant difference in the willingness to join a CEI between the national and EU level ($p = .045$, $CI_{95} = [0.01, 0.62]$). On average, people in the national group reported a higher willingness to join a CEI than people in the EU group. There was no statistically significant difference in the willingness to join a CEI between the local and the national level ($p = .997$; see Table 22 & Figure 34).

Table 22. Means, standard deviations, and reliability of willingness to join per group

Group	Variable	<i>N</i>	α	<i>M</i>	<i>SD</i>
Local	Willingness to join	222	.88	4.48	1.29
National	Willingness to join	214	.85	4.48	1.18
EU	Willingness to join	211	.89	4.17	1.39

Figure 34. Group mean comparisons willingness to join



2.4.2.5 Conclusion

In the Dutch sample of Study 9, we continued to observe the consistent trend seen in Study 8, with participants reporting higher levels of collective energy citizenship in both the national and EU level, compared to the local level. This reaffirms the notion that geographical levels play a substantial role in determining collective energy citizenship. However, an intriguing difference emerged in this study: individuals in the Dutch sample expressed a higher average willingness to join a CEI within both the local and national groups, as compared to the EU group.

When comparing the results of Study 8 and Study 9, a more comprehensive understanding of the intricate relationship between geographical context and collective energy citizenship begins to take shape. These findings suggest that while overarching trends can exist, the interplay of

cultural, contextual, and geographical factors can result in diverse responses.

2.4.3 Study 10 Replication Germany

2.4.3.1 Sample and design

Lastly, we aimed to replicate the results from the Austrian and Dutch studies in a German sample. Using the online panel “Talk”, a representative sample of the German population (based on age, gender and education) was gathered and invited to take part in the online survey, which was conducted in German and programmed with Limesurvey. Participants were compensated for their participation by the panel with 2.85 euro. In total, 1431 people clicked on the survey link, out of which 16 had to be excluded because they failed the attention check. In total, 743 people completed the whole survey. From these, 87 people had to be excluded because they completed the survey in under three minutes, making it unlikely that they read the questions. This left us with a final sample of 656 (48.2% men and 51.5% women). The age ranged from 18 to 80, with a mean age of $M = 53.27$ ($SD = 15.52$). Fifty-nine percent had completed at least lower-level education, 17% had a high school degree and 24% a university degree. Fifty-five percent were full-time employed, 34% were retired and 5% were currently unemployed.

2.4.3.2 Procedure and experimental conditions

This study followed a similar procedure and design as the Austrian and Dutch studies (Study 8 and 9) only the national level was now set to Germany.

2.4.3.3 Measures

The survey contained the following measures that are relevant for the current study; individual and collective energy citizenship, and willingness to join a CEI. Measures were answered on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The same measures as described in Study 8 were used. For descriptive statistics and correlations, see Table 23.

Table 23. Descriptive statistics and correlations

Variable	<i>M</i>	<i>SD</i>	1	2
1 Willingness to Join	4.00	1.52		
2 Individual Energy Citizenship	4.08	1.18	.709**	
3 Collective Energy Citizenship	4.71	1.24	.631**	.774**

Note. $N = 656$.

** $p < .05$.

2.4.3.4 Results

A one-way ANOVA was performed to compare the effect of the three different geographical levels (local, national, EU) on collective energy citizenship scores. The one-way ANOVA revealed that there was no statistically significant difference in mean collective energy citizenship scores between the groups ($p = .778$; see Table 24).

Table 24. Means, standard deviations, and reliability of energy citizenship per group

Group	Variable	<i>N</i>	α	<i>M</i>	<i>SD</i>
Local	Individual Energy Citizenship	221	.91	4.04	1.12
	Collective Energy Citizenship	221	.94	4.69	1.22
National	Individual Energy Citizenship	210	.91	4.21	1.13
	Collective Energy Citizenship	210	.92	4.76	1.09
EU	Individual Energy Citizenship	225	.92	3.99	1.28
	Collective Energy Citizenship	225	.94	4.68	1.39

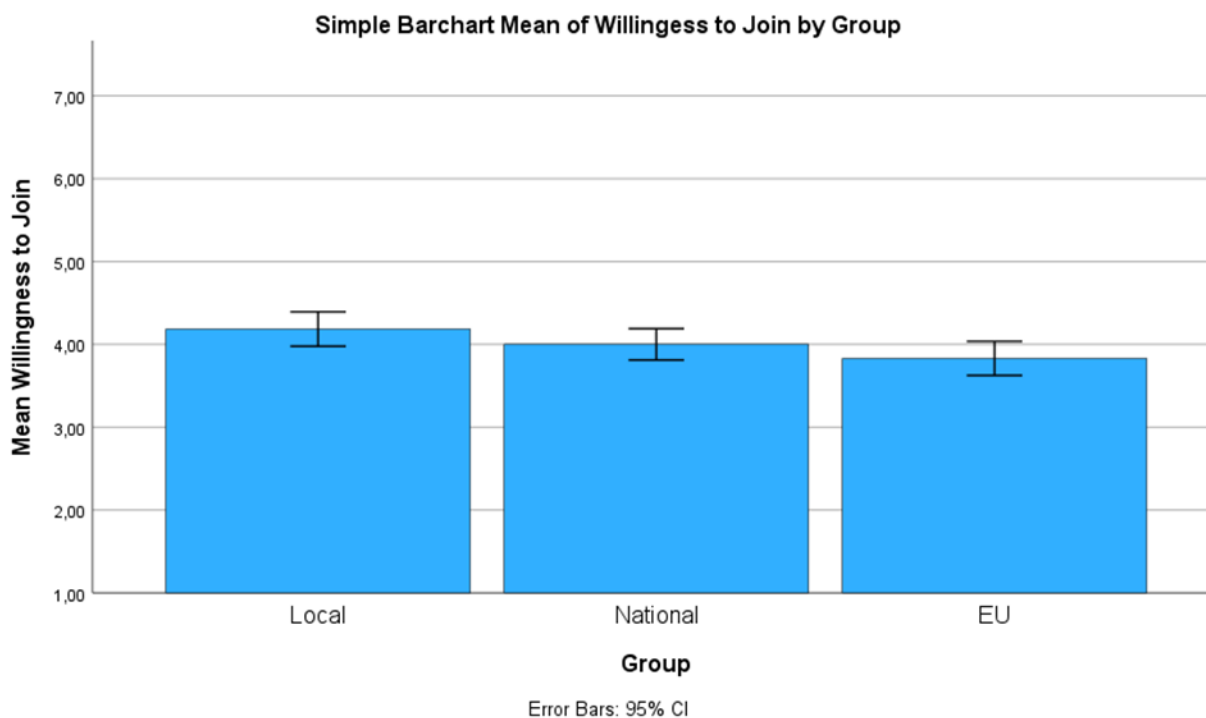
Next, another one-way ANOVA was performed to compare the effect of the three different geographical levels on the willingness to join a CEI. The one-way ANOVA revealed that there was a statistically significant difference in the willingness to join a CEI between at least two groups, $F(2, 653) = 3.054, p = .048$).

Tukey's HSD Test for multiple comparisons found that the mean value of willingness to join a CEI was significantly different between the local and the EU level ($p = .037, CI_{95} = [0.02, 0.69]$). People in the local group scored, on average, higher in their willingness to join a CEI than people in the EU group. There was no statistically significant difference in the willingness to join a CEI between the local and national level ($p = .416$) and between the national and the EU level ($p = .472$; see Table 25 & Figure 35).

Table 25. Means, standard deviations, and reliability of willingness to join per group

Group	Variable	<i>N</i>	α	<i>M</i>	<i>SD</i>
Local	Willingness to join	221	.89	4.18	1.57
National	Willingness to join	210	.86	4.00	1.40
EU	Willingness to join	225	.89	3.83	1.57

Figure 35. Group mean comparisons willingness to join



2.4.3.5 Conclusion

In the German sample of Study 10, a notable deviation from the patterns observed in Studies 8 and 9 became evident. Unlike in prior studies, we did not find any significant differences in collective energy citizenship among the three groups. We did, however, find a difference regarding the willingness to join a CEI, as individuals in the local group reported a higher willingness to join CEIs compared to those in the EU group.

The findings from Studies 8, 9, and 10 show nuanced trends that may be specific to certain institutional contexts. In Studies 8 and 9, we observed a general pattern of higher levels of energy citizenship reported at the national and EU levels, although this trend remained non-significant in Study 10. At the same time, Studies 9 and 10 indicated greater willingness to join CEIs at the local level compared to the EU level, while in Study 8, this finding remained non-significant. These diverging trends in collective energy citizenship and the willingness to join CEIs call for a more in-depth exploration of the underlying factors that shape these constructs.

In conclusion, a nuanced and context-specific approach to understanding and fostering energy citizenship and willingness to join CEIs is needed. These findings offer a first insight into the multifaceted nature of energy citizenship and offer the potential to inform tailored strategies for promoting community engagement in diverse energy contexts.

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4 Appendix

4.1 Scenarios used to describe different set-ups of energy communities Study 1

Support Condition	Uninvolved Condition	Opposition Condition
<p><i>Please imagine the following scenario:</i></p> <p>SMART: A local energy initiative in your neighbourhood, with the support and involvement of the municipality</p> <p>Residents of your neighbourhood, together with the municipality, have established an initiative called "SMART" to promote sustainable energy consumption in your neighbourhood. Participation in "SMART" is voluntary and the initiators and the municipality have jointly agreed on the energy-saving measures they want to take. The SMART initiative plans to use smart meters in the neighbourhood to encourage more efficient, and therefore more sustainable, collective energy consumption. Smart meters measure the current energy demand in an area. They recommend waiting to use appliances when energy demand is high (e.g. in the morning when people are getting ready for work/school) and starting appliances when energy demand is low. Balancing the energy demand in a neighbourhood over the day eases the load on the energy grid and reduces overall energy consumption.</p> <p>If users give permission, a smart meter can provide specific feedback on the use</p>	<p><i>Please imagine the following scenario:</i></p> <p>SMART: A local energy initiative in your neighbourhood, founded by people in your neighbourhood</p> <p>Residents in your neighbourhood have themselves set up an independent initiative called "SMART" to promote sustainable energy use in your neighbourhood. The municipality is not involved in this initiative. Participation in "SMART" is voluntary and the initiators have jointly agreed on the energy-saving measures they want to take, The SMART initiative plans to use smart meters in the neighbourhood, to encourage more efficient, and therefore more sustainable, collective energy consumption. Smart meters measure current energy demand in an area. They recommend waiting to use appliances when energy demand is high (e.g. in the morning when people are getting ready for work/school) and starting appliances when energy demand is low. Balancing the energy demand in a neighbourhood over the day eases the load on the energy grid and reduces overall energy consumption.</p> <p>If users give permission, a smart meter can provide specific feedback on the use of each household appliance</p>	<p><i>Please imagine the following scenario:</i></p> <p>SMART: A local energy initiative in your neighbourhood, despite opposition from the municipality</p> <p>Residents in your neighbourhood have themselves set up an independent initiative called "SMART" to promote sustainable energy use in your neighbourhood. The municipality disagrees with this initiative, because the initiative's plans obstruct a project of the municipality. Participation in "SMART" is voluntary and the initiators have jointly agreed on the energy-saving measures they want to take. The SMART initiative plans to use smart 39 meters in the neighbourhood to encourage more efficient, and therefore more sustainable, collective energy consumption. Smart meters work by measuring the current energy demand in an area. They recommend waiting to use appliances when energy demand is high (e.g. in the morning when people are getting ready for work/school) and starting appliances when energy demand is low. Balancing the energy demand in a neighbourhood over the day eases the load on the energy grid and reduces overall energy consumption.</p>

<p>of each household appliance individually via an app.</p> <p>With the SMART initiative, residents of your neighbourhood and the municipality aim to make your neighbourhood's energy consumption more sustainable.</p>	<p>individually via an app.</p> <p>With the SMART initiative, residents of your neighbourhood want to make your neighbourhood's energy consumption more sustainable, without depending on the municipality.</p>	<p>If users give permission, a smart meter can provide specific feedback on the use of each household appliance individually via an app.</p> <p>With the SMART initiative, residents of your neighbourhood want to make your neighbourhood's energy consumption more sustainable, despite opposition from the municipality.</p>
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4.2 Scenarios used to describe different set-ups of energy communities Study 2

Community-led	Municipality-led	Jointly led
<p><i>Please imagine the following scenario:</i></p> <p>SMART: A local energy initiative in your neighbourhood, founded by inhabitants of your neighbourhood themselves.</p> <p>Inhabitants of your neighbourhood have themselves founded an initiative called "SMART" to promote sustainable energy use in your neighbourhood. The municipality is not involved in the establishment of this initiative. Participation in "SMART" is voluntary and the inhabitants of your neighbourhood have jointly decided which energy-saving measures they want to take.</p> <p>The SMART initiative plans to use smart meters in the neighbourhood to encourage more efficient, and therefore more sustainable, collective energy use. Smart meters measure the current energy demand in an area. They recommend waiting to use appliances when energy demand and energy prices are high (e.g. in the morning when people are getting ready for work/school) and starting appliances when energy demand and energy prices are low. Balancing the energy demand in a neighbourhood over the day eases the load on the energy grid and reduces overall</p>	<p><i>Please imagine the following scenario:</i></p> <p>SMART: An energy initiative in your neighbourhood, founded by the municipality.</p> <p>The municipality has founded an initiative called "SMART" to promote sustainable energy use in your neighbourhood. Inhabitants of your neighbourhood are not involved in the establishment of this initiative. Participation in "SMART" is voluntary and the municipality has decided which energy-saving measures they want to implement.</p> <p>The SMART initiative plans to use smart meters in the neighbourhood to encourage more efficient, and therefore more sustainable, collective energy use. Smart meters measure the current energy demand in an area. They recommend waiting to use appliances when energy demand and energy prices are high (e.g. in the morning when people are getting ready for work/school) and starting appliances when energy demand and energy prices are low. Balancing the energy demand in a neighbourhood over the day eases the load on the energy grid and reduces overall energy use. If users grant permission, a smart meter can provide, via an app, specific feedback on the use</p>	<p><i>Please imagine the following scenario:</i></p> <p>SMART: A local energy initiative in your neighbourhood, founded by inhabitants of your neighbourhood and the municipality together.</p> <p>Inhabitants of your neighbourhood, together with the municipality, have founded an initiative called "SMART" to promote sustainable energy use in your neighbourhood. Participation in "SMART" is voluntary and the inhabitants of your neighbourhood and the municipality have jointly decided which energy-saving measures they want to take.</p> <p>The SMART initiative plans to use smart meters in the neighbourhood to encourage more efficient, and therefore more sustainable, collective energy use. Smart meters measure the current energy demand in an area. They recommend waiting to use appliances when energy demand and energy prices are high (e.g. in the morning when people are getting ready for work/school) and starting appliances when energy demand and energy prices are low. Balancing the energy demand in a neighbourhood over the day eases the load on the energy grid and reduces overall energy use. If users grant permission, a smart meter</p>

<p>energy use. If users grant permission, a smart meter can provide, via an app, specific feedback on the use of each household appliance individually.</p> <p>With the SMART initiative, inhabitants of your neighbourhood aim to make your neighbourhood's energy use more sustainable.</p>	<p>of each household appliance individually.</p> <p>With the SMART initiative, the municipality aims to make your neighbourhood's energy use more sustainable.</p>	<p>can provide, via an app, specific feedback on the use of each household appliance individually.</p> <p>With the SMART initiative, the municipality and inhabitants of your neighbourhood cooperatively aim to make your neighbourhood's energy use more sustainable.</p>
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4.3 Item overview Studies 1, 2, and 3

Measure	Study 1		Study 2		Study 3	
	Nr. items	Items	Nr. items	Items	Nr. items	Items
Acceptability of the energy initiative	1	The following questions are designed to gauge your opinion on "SMART". Please indicate on a scale of 1 to 7 the extent to which you agree: -I approve of the SMART initiative.	3	To what extent do you agree with the below statement? In my opinion, the SMART initiative is very... unacceptable /acceptable, bad/good, negative/ positive	3	See Study 2.
Willingness to join	2	If you could actually participate in the SMART initiative, to what extent would you agree with the statements below? -I want to be involved in the SMART initiative. -I am interested in participating in the SMART initiative.	2	See Study 1.	2	See Study 1.
Identity leadership	4	The following questions are designed to gauge your opinion on "SMART". Please indicate on a scale of 1 to 7 the extent to which you agree: -The SMART initiative is representative of residents in my neighbourhood. -The SMART initiative creates a sense of belonging among residents of my neighbourhood. -The SMART initiative represents the interests of residents in my neighbourhood. -The SMART initiative engages in activities that are useful to the residents of my neighbourhood.	4	See Study 1.	4	See Study 1.

Collective efficacy

- 3 The following questions are designed to gauge your opinion on "SMART". Please indicate on a scale of 1 to 7 the extent to which you agree:
- I think the SMART initiative can promote a just and sustainable energy transition.
 - I think SMART initiative can promote an energy transition that is equitable and sustainable.
 - I believe joint actions by SMART members can lead to a just and sustainable energy transition.

Biospheric Values

- 2 Below, we describe several people. We would like to ask you to indicate for each person described to what extent this person resembles you. The meanings of the scores are as follows: 1 means the person does not resemble you at all; and 7 means the person is very similar to you. The higher the number, the more similar the described person is to you. Probably not every description resembles you equally; try to reflect this distinction in your answers.
- It is important for this person to prevent environmental pollution and protect nature.
 - It is important for this person to feel connected to and respect nature.

- 3 The following statements are about your impression of the SMART initiative. Please imagine that the SMART initiative was actually founded. To what extent do you agree with the following statements?
- I think the SMART initiative can promote a just and sustainable energy transition.
 - I think SMART initiative can advance an energy transition that is sustainable.
 - I believe joint actions by SMART members can lead to a sustainable energy transition.

- 4 Before we ask for your opinion on the energy transition, we would like to know what you think is important in life more generally.

Below you will find 16 values. Behind each value there is a short explanation concerning the meaning of the value. Your scores can vary from -1 up to 7. The higher the number, the more important the value is as a guiding principle in your life. Try to distinguish as much as possible between your ratings of the values by using different numbers.

The rating scale is as follows:
-1 the value is opposed to the principles that guide you

- 3 The following statements are about your impression of the SMART initiative. Please imagine that the SMART initiative was actually founded. To what extent do you agree with the following statements?
- I think the SMART initiative can promote a just and sustainable energy transition.
 - I think SMART initiative can advance an energy transition that is sustainable.
 - I believe joint actions by SMART members can lead to a sustainable energy transition.

- 4 See Study 2.

0 the value is not important at all;
 it is not relevant as a guiding
 principle in your life
 3 the value is important
 6 the value is very important
 7 the value is of supreme
 importance as a guiding principle
 in your life; ordinarily there are no
 more than two

Please rate how important each
 value is for you as A GUIDING
 PRINCIPLE IN YOUR LIFE:

- RESPECTING THE EARTH:
 harmony with other species
- UNITY WITH NATURE: fitting
 into nature
- PROTECTING THE
 ENVIRONMENT: preserving
 nature
- PREVENTING POLLUTION:
 protecting natural resources

**Community
 identification**

1 The following questions are designed
 to gauge your opinion on "SMART".
 Please indicate on a scale of 1 to 7 the
 extent to which you agree:
 -I identify with the residents of my
 neighbourhood.

4 To what extent do you agree with
 the statements below?
 -I identify with the residents of my
 neighbourhood.
 -I feel committed to the inhabitants
 of my neighbourhood.
 -I am glad to be a member of the
 inhabitants of my neighbourhood.
 -Inhabitants of my neighbourhood
 form an important part of how I
 see myself.

4 See Study 2.

**Energy
citizenship**

- 9 To what extent do you agree with the statements below?
- I consider affordable sustainable energy to be an important right.
 - I consider it an important right to be informed about the energy efficiency of various products.
 - I consider being able to actively participate in the energy market (e.g., being able to produce/sell/exchange/store energy) to be an important right.
 - I see it as my responsibility to help others to participate in the sustainable energy transition (e.g., by sharing my knowledge).
 - I see it as my responsibility to contribute towards a sustainable energy transition.
 - I see it as my responsibility to actively participate in the energy market (e.g., produce/sell/exchange/store energy).
 - I am willing to play an active role in ensuring that no one is at a disadvantage during the sustainable energy transition.
 - Investing time, effort, and money to be able to use more renewable energy is a source of pride for me.
 - I am open to helping to influence energy policy and legislation.

9 See Study 1.

9 See Study 1.

Manipulation checks

- 3 To what extent do the following statements apply to the scenario you have read?
- The municipality is involved in and supports the SMART initiative.
 - The SMART initiative was only set up by residents in your neighbourhood.
 - The municipality opposed the SMART initiative.

- 3 Based on the scenario you have read, to what extent do you agree with the statements below?
- The municipality can determine the direction of the SMART initiative.
 - The municipality has influence over the SMART initiative.
 - The SMART initiative is formed by inhabitants of my neighbourhood themselves.
 - The municipality can steer the course of the SMART initiative.
 - The formation of the SMART initiative is initiated by the municipality.
 - Inhabitants of my neighbourhood can determine the direction of the SMART initiative.
 - Inhabitants of my neighbourhood can steer the course of the SMART initiative.
 - Inhabitants of my neighbourhood have influence over the SMART initiative.

- 3 Based on the scenario you have read, to what extent do you agree with the statements below?
- The municipality can determine the direction of the SMART initiative.
 - The municipality has influence over the SMART initiative.
 - The SMART initiative is formed by inhabitants of my neighbourhood themselves.
 - The municipality can steer the course of the SMART initiative.
 - The formation of the SMART initiative is initiated by the municipality.
 - Inhabitants of my neighbourhood can determine the direction of the SMART initiative.
 - Inhabitants of my neighbourhood can steer the course of the SMART initiative.
 - Inhabitants of my neighbourhood have influence over the SMART initiative.

Trust in the municipality

- 1 The following questions are about your trust in the government, your municipality, and inhabitants of your neighbourhood.
- To what extent do you agree with the statements below?
- I generally have trust in my municipality.

- 1 The following questions are about your trust in the government, your municipality, and inhabitants of your neighbourhood.
- To what extent do you agree with the statements below?
- I generally have trust in my municipality.

Comprehension checks

- 2 In order to check whether you have read and understood the content correctly, we ask you the following questions.
- Who has established the SMART initiative?
 - What was the purpose of the SMART-initiative?

- 2 In order to check whether you have read and understood the content correctly, we ask you the following questions. For the open question, please answer as completely as possible.
- Which sentence best fits the text you read about the role of the municipality and inhabitants of the neighbourhood in the SMART initiative?
 - -The municipality founded the initiative, inhabitants of the neighbourhood were **not** involved.
 - -Inhabitants of the neighbourhood founded the initiative; the municipality was **not** involved.
 - -Inhabitants of the neighbourhood and the municipality jointly founded the initiative.
 - -Inhabitants of the neighbourhood founded the initiative, with support of the municipality.
 - -Inhabitants of the neighbourhood founded the initiative, despite opposition from the municipality.
- What is the aim of the SMART initiative?

4.4 Scenarios used to describe different set-ups of energy communities Study 4

High moral motivation and ecovillage identification	Moderate moral motivation and ecovillage identification
<p><i>Please Imagine the following scenario about an ecovillage in your municipality:</i></p> <p>Ecovillage Ecotopia: <i>‘We are a great and unique community on a moral mission to protect the environment’</i></p> <p>The ecovillage considers unsustainable practices morally wrong. This means that in all their activities environmental protection is guiding.</p> <p>Among others, this includes vegetarianism as well as sustainable farming, composting and energy production. The members feel deeply connected to the eco village and the people living there and aim to contribute to this special community. The members welcome you to come join the events organized at the ecovillage, to teach others to live sustainably. The ecovillage organizes open house events, monthly markets with self-grown food. Additionally, they offer lessons in renewable energy solutions and regenerative agriculture for nearby schools.</p> <p><i>“As an ecovillage it is our moral duty to live sustainably”.</i></p>	<p><i>Please Imagine the following scenario about an ecovillage in your municipality:</i></p> <p>Ecovillage Ecotopia: <i>‘We are a great and unique community who cares about environmental protection’</i></p> <p>The ecovillage hopes to contribute to protecting the environment with their lifestyle.</p> <p>Among others, this includes not eating meat as well as sustainable farming, composting and energy production. The members feel deeply connected to the eco village and the people living there, and aim to contribute to this special community. The members welcome you to come join the events organized at the ecovillage, to share experiences of living sustainably. The ecovillage organizes open house events, monthly markets with self-grown food. Additionally, they offer lessons in renewable energy solutions and regenerative agriculture for nearby schools.</p> <p><i>“As an ecovillage we try to live sustainably”.</i></p>
High moral motivation and local identification	Moderate moral motivation and local identification
<p><i>Imagine the following scenario about an ecovillage in your municipality</i></p> <p>Ecovillage Ecotopia: <i>‘We are part of this great and unique municipality and have a moral mission to protect the environment’</i></p> <p>The ecovillage considers unsustainable practices morally wrong. This means that in all their activities environmental protection is guiding.</p> <p>Among others, this includes <u>vegetarianism</u> as well as sustainable farming, composting and energy production. The members feel</p>	<p><i>Imagine the following scenario about an ecovillage in your municipality</i></p> <p>Ecovillage Ecotopia: <i>‘We are part of this great and unique municipality and care about environmental protection’</i></p> <p>The ecovillage hopes to contribute to protecting the environment with their lifestyle.</p> <p>Among others, this includes not eating meat as well as sustainable farming, composting and energy production. The members feel deeply connected to our municipality and the people living there, and aim to contribute to</p>

deeply connected to our municipality and the people living there, and aim to contribute to our special community. The members welcome you to come join the events organized at the ecovillage, to teach fellow municipality members to live sustainably. The ecovillage organizes open house events, monthly markets with self-grown food. Additionally, they offer lessons in renewable energy solutions and regenerative agriculture for nearby schools.

“As municipality inhabitants, it is our moral duty to live sustainably”

our special community. The members welcome you to come join the events organized at the ecovillage, to share experience of living sustainably with fellow municipality members. The ecovillage organizes open house events, monthly markets with self-grown food. Additionally, they offer lessons in renewable energy solutions and regenerative agriculture for nearby schools.

“As municipality inhabitants, we try to live sustainably”

4.5 Scenarios used to describe different set-ups of energy communities Study 5

Pro-environmental motivation and members benefit	Mixed motivations and members benefit
<p><i>Please imagine the following scenario about an energy cooperative in your locality:</i></p> <p>GreenCoop: Join our pro-environmental energy cooperative and get exclusive member benefits.</p> <p>GreenCoop was set up by a group of local inhabitants who aim to support the sustainable energy transition for one shared reason: to protect the environment.</p> <p>Members of the initiative say: <i>“We all value the environment and want to do our best to protect it.”</i></p> <p>GreenCoop promotes sustainable energy practices amongst its members. Additionally, members can enjoy exclusive benefits. For instance, as a cooperative we offer our members access to our energy-saving workshops and other interesting events, alongside exclusive discounts to a variety of energy-saving measures, such as isolation. Moreover, we develop renewable energy projects in our locality, from which all members profit. This involves installing collectively purchased solar cells on community buildings and land. Any revenues made from such locally produced renewable energy go to benefit our members directly.</p> <p>We can only achieve our ambitions with your support. By joining and investing in GreenCoop, you will protect the environment and receive exclusive member benefits.</p>	<p><i>Please imagine the following scenario about an energy cooperative in your locality:</i></p> <p>EnerCoop: Join our energy cooperative and get exclusive member benefits.</p> <p>EnerCoop was set up by a group of local inhabitants who aim to support the sustainable energy transition for various reasons: from protecting the environment, to profiting from investing in renewable energy.</p> <p>Members of the initiative say: <i>“Some of us want to protect the environment, others want to save money”.</i></p> <p>EnerCoop promotes sustainable energy practices amongst its members. Additionally, members can enjoy exclusive benefits. For instance, as a cooperative we offer our members access to our energy-saving workshops and other interesting events, alongside exclusive discounts to a variety of energy-saving measures, such as isolation. Moreover, we develop renewable energy projects in our locality, from which all members profit. This involves installing collectively purchased solar cells on community buildings and land. Any revenues made from such locally produced renewable energy go to benefit our members directly.</p> <p>We can only achieve our ambitions with your support. By joining and investing in EnerCoop, you will protect the environment, save money and receive exclusive member benefits.</p>
Pro-environmental motivation and community benefits	Mixed motivations and community benefits
<p><i>Please imagine the following scenario about an energy cooperative in your locality:</i></p> <p>GreenCoop: Join our pro-environmental energy cooperative and create benefits for our entire local community.</p> <p>GreenCoop was set up by a group of local</p>	<p><i>Please imagine the following scenario about an energy cooperative in your locality:</i></p> <p>EnerCoop: Join our energy cooperative and create benefits for our entire local community.</p> <p>EnerCoop was set up by a group of local inhabitants who aim to support the sustainable</p>

<p>inhabitants who aim to support the sustainable energy transition for one shared reason: to protect the environment.</p> <p>Members of the initiative say: <i>“We all value the environment and want to do our best to protect it.”</i></p> <p>GreenCoop promotes sustainable energy practices amongst local inhabitants. Additionally, the entire local community can benefit from its activities. For instance, as a cooperative we offer energy-saving workshops and other interesting events for all local inhabitants, alongside discounts to a variety of energy-saving measures, such as isolation. Moreover, we develop renewable energy projects in our locality, from which the entire local community profits. This involves installing collectively purchased solar cells on community buildings and land. Any revenues made from such locally produced renewable energy are reinvested in the local community via a community benefit fund.</p> <p>We can only achieve our ambitions with your support. By joining and investing in GreenCoop, you will protect the environment and create benefits for the local community.</p>	<p>energy transition for various reasons: from protecting the environment, to profiting from investing in renewable energy.</p> <p>Members of the initiative say: <i>“Some of us want to protect the environment, others want to save money”.</i></p> <p>EnerCoop promotes sustainable energy practices amongst local inhabitants. Additionally, the entire local community can benefit from its activities. For instance, as a cooperative we offer energy-saving workshops and other interesting events for all local inhabitants, alongside discounts to a variety of energy-saving measures, such as isolation. Moreover, we develop renewable energy projects in our locality, from which the entire local community profits. This involves installing collectively purchased solar cells on community buildings and land. Any revenues made from such locally produced renewable energy are reinvested in the local community via a community benefit fund.</p> <p>We can only achieve our ambitions with your support. By joining and investing in EnerCoop, you will protect the environment, save money, and create benefits for the local community.</p>
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4.5 Overview items Studies 4 and 5

Study 4			Study 5	
Measure	Nr.	Items	Nr.	Items
Willingness to join	6	<ul style="list-style-type: none"> - I want to learn more about the ecovillage - I want to visit the ecovillage - I want to participate in activities organised by the ecovillage - I want to become involved in the ecovillage (investing time, money etc.) - I am interested in joining the ecovillage - I want to live at the ecovillage 	4	<ul style="list-style-type: none"> - I would like to receive more information about the energy cooperative - I would like to attend a meeting of the energy cooperative - I am interested in getting involved in the energy cooperative - I would like to become a member of the energy cooperative
Acceptability	3	See Study 2.	3	See Study 2.
Warmth	1	- I perceive the inhabitants of "Ecotopia" as... cold/warm	1	- I perceive the members of the energy cooperative as... cold/warm
Identification with the energy community			1	- I identify with the energy cooperative
Identification with the local community	1	- I identify with the inhabitants of my municipality	1	- I identify with the inhabitants of my local community
Perceived shared identity	3	<ul style="list-style-type: none"> -The ecovillage members and the municipality members belong to the same group -Ecovillage members and community members share common interests. -The ecovillage members and the community members represent different groups (reverse coding) 	1	Participants were provided with 10 pairs of circles, the white circle (yellow in the coloured version) representing the local community and the black circle (blue in the coloured version) the energy community. They were asked to select the number that best represents how close to, or distant from this group they felt.

4.7 Scenarios used to describe different set-ups of energy communities Study 6

Scenario without statement	Scenario with statement
<p>“GreenCoop” is looking for new members!</p> <p>“GreenCoop” is a local energy initiative founded by a group of local inhabitants of your neighbourhood. We, members of GreenCoop, want to stimulate sustainable energy sources and practices in our neighbourhood. Hereby we want to contribute to a sustainable energy transition. Participation in “GreenCoop” is open and voluntary. “GreenCoop” is fully controlled by its members.</p> <p>We can only achieve our ambitions with your support. Will you join us in our mission?</p> <p>On behalf of the Board of “GreenCoop”</p>	<p>“GreenCoop” is looking for new members!</p> <p>“GreenCoop” is a local energy initiative founded by a group of local inhabitants of your neighbourhood. We, members of GreenCoop, want to stimulate sustainable energy sources and practices in our neighbourhood. Hereby we want to contribute to a sustainable, just, and inclusive energy transition. Participation in “GreenCoop” is open and voluntary. “GreenCoop” is fully controlled by its members.</p> <p>At “GreenCoop” we find it important to take the interests of different groups of people into account. We value diversity and are open to people with diverse perspectives and from different backgrounds within society.</p> <p>We can only achieve our ambitions with your support. Will you join us in our mission?</p> <p>On behalf of the Board of “GreenCoop”</p>

Figure 36. Description of the fictitious community energy initiative all-men no statement



GroenCoop

GroenCoop is een lokaal energie-initiatief opgericht door een groep buurtbewoners. Als leden van GroenCoop willen we samen energie besparen en/of duurzame energie opwekken in onze buurt. Hiermee willen we bijdragen aan een duurzame energietransitie. GroenCoop is gebaseerd op open en vrijwillige deelname en wordt bestuurd door haar leden. We kunnen onze ambities alleen waarmaken met jouw steun.

Doe je mee met onze missie?

Namens het bestuur van
GroenCoop

Kees Peter Dennis Ben

GroenCoop is op zoek naar nieuwe leden!

Figure 37. Description of the fictitious community energy initiative all-men with statement



GroenCoop

GroenCoop is een lokaal energie-initiatief opgericht door een groep buurtbewoners. Als leden van GroenCoop willen we samen energie besparen en/of duurzame energie opwekken in onze buurt. Hiermee willen we bijdragen aan een duurzame, rechtvaardige en inclusieve energietransitie. GroenCoop is gebaseerd op open en vrijwillige deelname en wordt bestuurd door haar leden. Bij GroenCoop vinden we het belangrijk om rekening te houden met de belangen van verschillende groepen mensen. We waarderen diversiteit en staan open voor mensen met verschillende perspectieven en achtergronden uit de samenleving. We kunnen onze ambities alleen waarmaken met jouw steun.

Doe je mee met onze missie?

Namens het bestuur van
GroenCoop

Kees Peter Dennis Ben

GroenCoop is op zoek naar nieuwe leden!

Figure 38. Description of the fictitious community energy initiative mixed-gender with statement



GroenCoop

GroenCoop is een lokaal energie-initiatief opgericht door een groep buurtbewoners. Als leden van GroenCoop willen we samen energie besparen en/of duurzame energie opwekken in onze buurt. Hiermee willen we bijdragen aan een duurzame, rechtvaardige en inclusieve energietransitie. GroenCoop is gebaseerd op open en vrijwillige deelname en wordt bestuurd door haar leden. Bij GroenCoop vinden we het belangrijk om rekening te houden met de belangen van verschillende groepen mensen. We waarderen diversiteit en staan open voor mensen met verschillende perspectieven en achtergronden uit de samenleving. We kunnen onze ambities alleen waarmaken met jouw steun.

Doe je mee met onze missie?

Namens het bestuur van
GroenCoop

GroenCoop is op zoek naar nieuwe leden!

Kees Peter Karen Emma

Figure 39. Description of the fictitious community energy initiative diverse with statement



GroenCoop

GroenCoop is een lokaal energie-initiatief opgericht door een diverse groep buurtbewoners. Als leden van GroenCoop willen we samen energie besparen en/of duurzame energie opwekken in onze buurt. Hiermee willen we bijdragen aan een duurzame, rechtvaardige en inclusieve energietransitie. GroenCoop is gebaseerd op open en vrijwillige deelname en wordt bestuurd door haar leden. Bij GroenCoop vinden we het belangrijk om rekening te houden met de belangen van verschillende groepen mensen. We waarderen diversiteit en staan open voor mensen met verschillende perspectieven en achtergronden uit de samenleving. We kunnen onze ambities alleen waarmaken met jouw steun.

Doe je mee met onze missie?

Namens het bestuur van
GroenCoop

GroenCoop is op zoek naar nieuwe leden!

Kees Birol Karen Indra

4.8 Scenarios used to describe different set-ups of energy communities Study 7

Figure 40. Description of the fictitious community energy initiative all-men no statement



GreenCoop

“GreenCoop” è un’iniziativa energetica locale fondata da un gruppo di residenti della zona. Come membri di “GreenCoop”, insieme vogliamo risparmiare energia e/o generare energia sostenibile nel nostro quartiere. Così facendo, vogliamo contribuire a una transizione energetica sostenibile. “GreenCoop” si basa su una partecipazione aperta e volontaria ed è gestita dai suoi membri.

Possiamo realizzare le nostre ambizioni solo con il vostro sostegno. Ti unisci a noi nella nostra missione?

A nome del Consiglio di amministrazione di
GreenCoop

GreenCoop cerca nuovi membri!

Marco Matteo Stefano Aldo

Figure 41. Description of the fictitious community energy initiative all-men with statement



GreenCoop

“GreenCoop” è un’iniziativa energetica locale fondata da un gruppo di residenti della zona. Come membri di “GreenCoop”, insieme vogliamo risparmiare energia e/o generare energia sostenibile nel nostro quartiere. Così facendo, vogliamo contribuire a una transizione energetica sostenibile, socialmente equa, ed inclusiva. “GreenCoop” si basa su una partecipazione aperta e volontaria ed è gestita dai suoi membri. A “GreenCoop” crediamo che importante considerare gli interessi di diversi gruppi di persone. Apprezziamo la diversità e siamo aperti a persone con prospettive e background diversi.

Possiamo realizzare le nostre ambizioni solo con il vostro sostegno. Ti unisci a noi nella nostra missione?

A nome del Consiglio di amministrazione di
GreenCoop

GreenCoop cerca nuovi membri!

Marco Matteo Stefano Aldo

Figure 42. Description of the fictitious community energy initiative mixed-gender with statement



GreenCoop

“GreenCoop” è un’iniziativa energetica locale fondata da un gruppo di residenti della zona. Come membri di “GreenCoop”, insieme vogliamo risparmiare energia e/o generare energia sostenibile nel nostro quartiere. Così facendo, vogliamo contribuire a una transizione energetica sostenibile, socialmente equa, ed inclusiva. “GreenCoop” si basa su una partecipazione aperta e volontaria ed è gestita dai suoi membri. A “GreenCoop” crediamo che importante considerare gli interessi di diversi gruppi di persone. Apprezziamo la diversità e siamo aperti a persone con prospettive e background diversi.

Possiamo realizzare le nostre ambizioni solo con il vostro sostegno. Ti uniresti a noi nella nostra missione?

A nome del Consiglio di amministrazione di **GreenCoop**

GreenCoop cerca nuovi membri!






Marco Matteo Laura Giulia

Figure 43. Description of the fictitious community energy initiative all-women with statement



GreenCoop

“GreenCoop” è un’iniziativa energetica locale fondata da un gruppo di residenti della zona. Come membri di “GreenCoop”, insieme vogliamo risparmiare energia e/o generare energia sostenibile nel nostro quartiere. Così facendo, vogliamo contribuire a una transizione energetica sostenibile, socialmente equa, ed inclusiva. “GreenCoop” si basa su una partecipazione aperta e volontaria ed è gestita dai suoi membri. A “GreenCoop” crediamo che importante considerare gli interessi di diversi gruppi di persone. Apprezziamo la diversità e siamo aperti a persone con prospettive e background diversi.

Possiamo realizzare le nostre ambizioni solo con il vostro sostegno. Ti uniresti a noi nella nostra missione?

A nome del Consiglio di amministrazione di **GreenCoop**

GreenCoop cerca nuovi membri!






Valentina Sofia Laura Giulia

4.9 Overview items Studies 6 and 7

Measure	Nr.	Items
Willingness to join	2	-I want to become involved in the “GreenCoop” initiative (investing time, effort, money etc.). -I am interested in joining “GreenCoop”.
Acceptability of the EC	3	See Study 2.
Efficacy to join	1	-I think that I can become involved in the community energy initiative (investing time, effort, money etc.)
Participative efficacy	4	-I think I can make a significant contribution, so that the community energy initiative can promote a sustainable energy transition -I think I can make a significant contribution, so that the community energy initiative can promote a just energy transition -I think I can make a significant contribution, so that the community energy initiative can advance a sustainable energy transition -I think I can make a significant contribution, so that the community energy initiative can advance a just energy transition
Perceived representation	1	-I feel represented by the members of the “GreenCoop” initiative.

4.10 Overview items Studies 8,9 and 10

Measure	Group		
	Local	National [Study 8 = Austrian, Study 9= Dutch, Study 10= German]	EU
Individual Energy Citizenship	See Studies 1-3.		
Collective Energy Citizenship	<p>People are members of different social groups. The following statements concern your opinion as an inhabitant of your local neighbourhood. Please indicate the extent to which you, as a member of the community energy initiative, agree with the following</p> <ul style="list-style-type: none"> - We, inhabitants of our local neighbourhood, consider affordable sustainable energy to be an important right - We, inhabitants of our local neighbourhood, consider it an important right to be informed about the energy efficiency of various products - We, inhabitants of our local neighbourhood, consider being able to actively participate in the energy market (e.g., being able to produce/sell/exchange/store energy) to be an important right 	<p>People are members of different social groups. The following statements concern your opinion as a [...] citizen. Please indicate the extent to which you, as a member of the community energy initiative, agree with the following</p> <ul style="list-style-type: none"> - We, [...] citizens, consider affordable sustainable energy to be an important right - We, [...] citizens, consider it an important right to be informed about the energy efficiency of various products - We, [...] citizens, consider being able to actively participate in the energy market (e.g., being able to produce/sell/exchange/store energy) to be an important right - We, [...] citizens, see it as our responsibility to help others to participate in the sustainable energy transition (e.g., by sharing my knowledge) 	<p>People are members of different social groups. The following statements concern your opinion as an EU citizen. Please indicate the extent to which you, as a member of the community energy initiative, agree with the following</p> <ul style="list-style-type: none"> - We, EU citizens, consider affordable sustainable energy to be an important right - We, EU citizens, consider it an important right to be informed about the energy efficiency of various products - We, EU citizens, consider being able to actively participate in the energy market (e.g., being able to produce/sell/exchange/store energy) to be an important right - We, EU citizens, see it as our responsibility to help others to participate in the sustainable energy transition (e.g., by sharing my knowledge)

<p>Willingness to Join</p>	<ul style="list-style-type: none"> - We, inhabitants of our local neighbourhood, see it as our responsibility to help others to participate in the sustainable energy transition (e.g., by sharing my knowledge) - We, inhabitants of our local neighbourhood, see it as our responsibility to contribute towards a sustainable energy transition - We, inhabitants of our local neighbourhood, see it as our responsibility to actively participate in the energy market (e.g., produce/sell/exchange/store energy) - We, inhabitants of our local neighbourhood, are willing to play an active role in ensuring that no one is at a disadvantage during the sustainable energy transition - Investing time, effort, and money to be able to use more renewable energy is a source of pride for us, inhabitants of our local neighbourhood - We, inhabitants of our local neighbourhood, are open to helping to influence energy policy and legislation - I think that I can become involved in a local community energy initiative (investing time, money etc.) if I want to. - I approve of local community energy initiatives. 	<ul style="list-style-type: none"> - We, [...] citizens, see it as our responsibility to contribute towards a sustainable energy transition - We, [...] citizens, see it as our responsibility to actively participate in the energy market (e.g., produce/sell/exchange/store energy) - We, [...] citizens, are willing to play an active role in ensuring that no one is at a disadvantage during the sustainable energy transition - Investing time, effort, and money to be able to use more renewable energy is a source of pride for us, [...] citizens - We, [...] citizens, are open to helping to influence energy policy and legislation - I think that I can become involved in a [...] community energy initiative (investing time, money etc.) if I want to. - I approve of [...] community energy initiatives. 	<ul style="list-style-type: none"> - We, EU citizens, see it as our responsibility to contribute towards a sustainable energy transition - We, EU citizens, see it as our responsibility to actively participate in the energy market (e.g., produce/sell/exchange/store energy) - We, EU citizens, are willing to play an active role in ensuring that no one is at a disadvantage during the sustainable energy transition - Investing time, effort, and money to be able to use more renewable energy is a source of pride for us, EU citizens - We, EU citizens, are open to helping to influence energy policy and legislation - I think that I can become involved in a European community energy initiative (investing time, money etc.) if I want to.
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- I want to become involved in a local community energy initiative (investing time, money etc.)
- I am interested in joining a local community energy initiative.

- I want to become involved in a [...] community energy initiative (investing time, money etc.)
- I am interested in joining a [...] community energy initiative.

- I approve of European community energy initiatives.
 - I want to become involved in a European community energy initiative (investing time, money etc.)
 - I am interested in joining a European community energy initiative.
-

5 CRediT author contribution statement

Studies 1-3:

Conceptualization: Jans, L., Goedkoop, F., Perlaviciute, G., Hamann, K.R.S., Held, J., Corcoran, K.

Investigation: Jans, L., Burgerhof, B.L., Berrada, E.

Writing – original draft: Jans, L., Burgerhof, B.L.

Writing – reviewing and editing: Goedkoop, F., Perlaviciute, G., Hamann, K.R.S.

Formal Analysis: Jans, L.

Visualisation: Jans, L., Burgerhof, B.L.

Studies 4-5:

Conceptualization: Jans, L., Goedkoop, F., Perlaviciute, G., Hamann, K.R.S., Held, J., Corcoran, K.

Investigation: Jans, L., Walkenhorst, A., Becci, S., Goedkoop, F.

Writing – original draft: Goedkoop, F.

Writing – reviewing and editing: Perlaviciute, G., Jans, L., Hamann, K.R.S.

Formal Analysis: Goedkoop, F.

Visualisation: Goedkoop, F.

Studies 6-7:

Conceptualization: Goedkoop, F., Jans, L., Perlaviciute, G., Hamann, K.R.S., Held, J., Corcoran, K.

Investigation: Goedkoop, F.

Writing – original draft: Goedkoop, F.

Writing – reviewing and editing: Perlaviciute, G., Jans, L., Hamann, K.R.S.

Formal Analysis: Goedkoop, F.

Visualisation: Goedkoop, F.

Studies 8-10:

Conceptualization: Held, J., Corcoran, K.

Goedkoop, F., Jans, L., Perlaviciute, G., Hamann, K.R.S.

Investigation: Held, J.

Writing – original draft: Held, J.

Writing – reviewing and editing: Perlaviciute, G., Goedkoop, F., Jans, L., Hamann, K.R.S., Corcoran, K.

Formal Analysis: Held, J.

Visualisation: Held, J.

6 Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this report.

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