

Acceptance through Inclusion? Political and Economic Participation and the Acceptance of Local Renewable Energy Projects in Switzerland

Isabelle Stadelmann-Steffen

University of Berne

isabelle.stadelmann@ipw.unibe.ch

Clau Dermont

Federal Statistical Office

clau.dermont@bfs.admin.ch

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Abstract

In the wake of transitioning from fossil and nuclear energy systems to a renewable energy age, industrialized countries face many challenges related to the question of how to *politically* implement local renewable energy projects. In the present paper, we investigate if local populations are more likely to support local infrastructure projects if they are economically and politically involved in said projects. We collected data from a representative sample of 4,141 individuals in Switzerland and use conjoint analysis to examine citizens' *general preference patterns* with regards to the design of localized renewable energy projects and related processes. The study goes beyond previous research by more systematically comparing the specific modes of political and economic participation and their effect on the acceptance of local renewable energy projects and by considering that political and economic participation may play a different role for different population groups. We find moderate positive effects of political and economic participation on individual support for RET projects. However, not all modes of inclusion are equally effective and the results reveal that individuals' general propensity to support or oppose such projects moderates the relationship between political and economic participation and local acceptance.

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1. Introduction

In the wake of transitioning from fossil and nuclear energy systems to a renewable energy age, industrialized countries face many challenges related to the question of how to *politically* implement local renewable energy projects. Research on the siting of energy-related infrastructure has repeatedly emphasized that the reasons and mechanisms driving communities' resistance to such projects are sundry and complex and clearly go beyond the famous and rebutted NIMBY (Not In My Backyard) syndrome [1]. In particular, some authors have identified procedural aspects such as citizens' involvement, information, or perceptions of fairness as important determinants of whether an implementation process is successful [2–7]. Nevertheless, we still lack systematic insights into how exactly and under what conditions process-related factors indeed facilitate the social acceptance of renewable energy technologies (RET) projects [4, 6].

In this study, we investigate if local populations are more likely to support local infrastructure projects (more strongly) if they are economically and politically involved in said projects. While previous research has shown that early involvement and participation matter, no studies systematically comparing different types of participation exist [8, p. 80]. Hence, our analysis focuses on the specific modes of political and economic participation and their effect on the acceptance of local RET projects. We use the term *political and economic participation* as an umbrella term to denote three different modes of public participation: public engagement, public decision-making, and economic participation. Public engagement refers to communication related to the project, namely how information flows between the project leaders and the public [4]. Political decision-making denotes a type of public participation whereby the population is included in the process as a decision-maker: individuals can vote on the project in a popular vote [9]. Last, economic participation considers how the population, i.e., the local municipality, is economically involved and affected by a RET project.

This study contributes to a better understanding of the bottom-up approach to social acceptance. The latter is particularly important given that policy makers and project initiators should not just impose consent from the top down but strive for real popular support for a good project [e.g. 9, 10, 11]. In particular, it seeks to theoretically and empirically disentangle how and under what conditions specific modes of participation influence the social acceptance of RET projects.

We use experimental data from a large-scale population survey conducted in Switzerland in 2016. While most existing studies have analyzed the acceptance of and opposition to renewable energy projects in specific cases, we adopt a more general approach and compare how citizens'

support for renewable energy projects differs contingent on the particular characteristics of such projects and related political processes. We have sought to formulate hypothetical projects mimicking real-world local projects and processes as much as possible. Yet, we acknowledge that our design does not really measure community acceptance but, rather, a localized version of socio-political acceptance [12]. Hence, our results may differ from case studies and cross-sectional studies of concrete, real-world projects. However, in contrast to case studies investigating *specific* projects that may explain why the latter succeeded or failed [e.g., 8, 13], our study examines the population's general preference patterns across varying designs of renewable energy technologies (RET) projects and related processes (for a similar, but non-experimental approach, see [14]). In this vein, our approach agrees with the methodological claim that energy research needs to become more comparative [15, p. 8]. The rest of the paper therefore uses *local acceptance* to denote this more general but localized type of social acceptance.

Although our study focuses on Switzerland and cannot necessarily be generalized to other contexts, we argue that the results are relevant beyond the Swiss case. The political and economic context of local infrastructure projects may vary across countries and entities. However, previous research has demonstrated that opposition to such projects is generally triggered by quite similar factors and fears and that local factors, especially, tend to play an important role in very different political contexts [16]. For example, a comparison of U.S. and European citizens (including Swiss respondents) reveals that reactions to wind farms and, most important, the patterns of correlation were similar across the different contexts [17]. Hence, knowing more about citizens' reactions to different modes of political and economic participation provides relevant insights into the topic in general, beyond the case of Switzerland. Moreover, unlike previous experimental studies, our work is not limited to one specific energy source like wind [8] or hydropower [7]. Rather, it considers four renewable energy sources simultaneously: wind, small-scale hydropower, solar, and geothermal energy. This enables us to identify patterns and constellations under which RET projects may face less opposition or gain higher acceptance.

2. Theoretical background

While renewable energy and related technologies have been shown to be popular with citizens (contributing to their high socio-political acceptance [12, p. 2685]), renewable energy generation infrastructure tends to trigger opposition [12, 17, 18]. An increasing number of studies have focused on the “social side” [11] of RET implementation. A lack of *social*

acceptance is considered “one factor that can potentially be a powerful barrier to the achievement of renewable energy targets” [12, p. 2683].

Research on the siting of energy-related infrastructure has thereby repeatedly emphasized that the reasons and mechanisms driving the resistance to such projects are sundry and complex, and clearly go beyond the famous and criticized NIMBY syndrome [1]. In particular, procedural aspects, such as citizens’ involvement, information, perceptions of fairness or economic participation, have been identified as conducive to a successful implementation process [2, 3, 5, 6, 9, 15, 19–22]. However, we still need a better understanding of how and under what conditions process-related factors matter [4, 6]. In the following, we combine different strands of the literature to discuss how various modes of political and economic participation affect the social acceptance of RET projects.

2.1. Political participation

The literature has long argued that certain implementation characteristics can play a crucial role for the social acceptance of RET projects [24]. This effect is independent and complementary to general opposition to a particular technology and the design of a specific project. Many studies document the negative effect of “bad” implementation processes: In particular, processes that are perceived as unfair or in which citizens’ concerns are not taken seriously [5, 8, 14, 24] have been shown to dampen community acceptance of RET projects. Conversely, there is a “fair process effect” [24] – development processes that are perceived as fair and inclusive increase the likelihood that local actors will also accept the final result, even if the latter may not satisfy all of their concerns. Most recently, Mills et al. [22] conclude that procedural justice – which includes opportunities for local residents to provide input and the perception that community inputs are heard – not only improves the evaluation of a wind energy project in the short-run, but also leads to positive trends in acceptance over time. As a result, project developers arguably need to create a specific “community engagement plan” [25] ensuring that the local community is included from the project’s very start [3, 4, 14, 20, 25].

Based on research on direct democracy, we expect that two main mechanisms can be at play when local communities participate in an RET project: Public participation can either lead to outcomes that are closer to citizens’ preferences or trigger a procedural effect, whereby involvement obtains a value of its own [26, 27]. More precisely, in the case of local RET

projects the first mechanism suggests that the local population's participation can lead to "better projects". Indeed, opposition to such initiatives may occur for good reasons [9, p. 361, 10] and some individuals may only support specific projects [28, 29]. Thus, incorporating existing concerns and inputs into the development process can increase a project's (objective or perceived) quality and earn citizens' conditional acceptance. Conversely, the second mechanism emphasizes the normative aspects of participation: i.e., citizens' involvement is normatively expected. As Bidwell [3, p. 2] puts it, the involvement of the local population is "an end in itself — it is 'the right thing to do'" (see also [25]). In this vein, different studies show that *perceived* procedural fairness is a primary driver of public support (e.g., [21, 24]).

However, the political participation of the local population can take different forms [31]. Theoretically and conceptually, a variety of different notions and terms have been used to refer to varying modes of population participation or involvement. This conceptual ambiguity has limited the analytical clarity of theoretical and empirical approaches to populations' participation [31]. Aitken et al. [32] argue that the conceptual complexity of public participation empirically results in a variety of "engagement methods", which, however, predominantly focus on consultation and awareness raising. Moreover, previous research tells us little about the effectiveness of different modes of political participation, i.e., what a successful "community engagement plan" [25] should look like.

In the following, we therefore aim to formulate theoretical expectations about how and why specific modes of political participation should improve citizens' procedural perceptions, and, ultimately, support for RET projects. In this vein, we assume that different *modes* of political participation, i.e., the mechanisms or tools used to get the population involved, are related to different *levels of inclusiveness*, i.e., varying degrees to which the population can influence the final project [31]. Based on previous research [3, 4, 20, 30] as well as on the spectrum of public participation proposed by the International Association of Public Participation (IAP2) [33], we identify four levels of inclusiveness. First, in its most basic form, political participation can just mean that the population is *informed* about the project. A second level of participation can be distinguished if project developers seek to obtain feedback, i.e., *consult* the population. Third, the impact of the population further increases if public participation seeks to integrate a community's concerns and inputs, i.e., *involving* the population. Finally, the fourth level of inclusiveness describes a situation, where the population is *empowered* to politically decide on the final project. Naturally in a specific situation, the level of participation will heavily depend

on project developers' transparency and willingness to really engage with the public [15, 20]. However, it can be expected that varying modes of public participation will be related to different levels of public participation [31].

Most previous research has focused on modes of political participation that Dwyer and Bidwell [4] identify as *public engagement*. They can be characterized based on the communication processes related to RET projects, namely on the information flows between the project leaders and the public [4]. These information flows can be one-sided, i.e., it is the project developers that inform the public about the decisions that have been taken. This corresponds to the lowest level of inclusiveness, i.e., *information*. If public engagement is limited to this kind of one-sided information and awareness raising, developers retain most or total control of the process [32], while public concerns and opinions likely remain unheard [14]. The risk of the latter phenomenon taking place is at least somewhat reduced if the information flow is two-sided, i.e., if there is some face-to-face exchange of information. This can for example happen during a public event, where project developers and citizens meet and where project developers can receive public inputs and feedback. This mode of public engagement likely involves some *consultation* – the second level of inclusiveness. There is some evidence that this might be all citizens ask for. For example, Schweizer-Ries et al. [34] confirm that the population wants to participate in Germany, whereby information and consultation are the minimal requirements. However, others argue that public engagement needs to be more substantial to positively affect the acceptance of RET projects [14]. In fact, social acceptance of RET projects has been shown to be higher [21] where citizens have the feeling that they have had the opportunity to really influence the project and its implementation process and that their concerns and inputs have been considered. The highest level of social support would be most likely, if citizens were specifically integrated into the development process. Several authors document that such stronger *involvement* – e.g., roundtables, citizens' panels, focus groups, consensus conferences – is associated with higher levels of acceptance and faster implementation [33, 34].

Summarizing this discussion, we assume that the different modes of public engagement are related to different levels of inclusiveness, i.e., different degrees to which the population can influence the final project, which in turn influence the local acceptance of RET projects. This is mainly the result of the mechanisms discussed above, but the association is further reinforced because the mode of public engagement chosen in an implementation process is likely related

to the project developers' openness and transparency. Based on these considerations, we formulate the first hypothesis:

H1: More inclusive modes of public engagement increase the local acceptance of RET projects.

Only few studies have investigated the fourth level of inclusiveness, namely the population's involvement as a decision-maker. We argue that *public decision-making*, i.e., allowing the population to decide on the final project in a popular vote, is different from the previously discussed modes of public engagement for at least two reasons. First, Dermont et al. [9] emphasize the relevance of the different roles citizens may assume in the policy-making process, and their consequences for the type of acceptance required for a successful outcome (i.e., a successful RET implementation). In this context, citizens' direct-democratic involvement is conceptualized to require the strongest form of social acceptance: active citizen support in a vote. We argue that, from the citizens' perspective, this type of political participation is most likely to trigger the positive substantial and procedural effect explained above [26, 27]. Moreover, this highest level of inclusiveness also affects project developers. The prospect of a popular vote *obliges* project developers to listen to public concerns and integrate them. The inclusion of citizens' concerns and inputs is no longer something that project developers can engage with on a more or less voluntary basis; it becomes a condition necessary to win the popular vote [37].

To the best of our knowledge, only two studies have ever explicitly tested the role of direct democratic votes on the social acceptance of RET projects. Both have relied on survey experiments. In their choice experiment focusing on hydropower, Tabi and Wüstenhagen [7] corroborate the positive effect of political participation, but do not find a distinct referendum effect. However, their attribute definition does not allow them to disentangle the effect of public engagement and public decision-making. Similarly, Walter [8] investigates whether respondents are more likely to support a wind power project if they are informed about the result of a positive or negative preceding ballot vote (compared to a situation without such a referendum). He finds that prior ballot approval does not increase project support, while a prior rejection at the ballot is related to lower support. However, this study does not allow for specific conclusions about the procedural effect of public decision-making. Summarizing the discussion, we formulate a second hypothesis:

H2: Public decision-making increases the local acceptance of RET projects.

2.2. Economic participation

Economic participation is also expected to foster the social acceptance of RET projects [14, 21]. Theoretically, many studies on the social acceptance of renewable energy policies and related technologies argue that actors' evaluation of policies and projects is often strongly related to economic considerations. Economic costs have been identified as *the* factor reducing citizens' support for renewable energy policies [38]. Voters tend to prefer higher real income today over a better environmental quality in the future [37, 38]. In the following, we focus on community involvement, as recent research suggests that collective economic concerns may be even more important for public opinion than individual materialistic considerations [7, 39]. In this vein, and related to RET projects, favorable economic conditions are shown to be positively associated with the deployment of renewable energy infrastructures [15, 40]. Pedersen et al. [43] even find that economic benefits reduce the level of noise annoyance, which, for example, is one of the important reasons behind opposition to wind farms. In the specific case of local hydropower projects, Tabi and Wüstenhagen [7] demonstrate that the local economic benefits derived from a project, such as the revenue collected from a water tax and the number of created jobs, increase the likelihood that a project is selected in a choice experiment. Moreover, in a trade-off between a generally positive attitude toward renewable energy and a local project's negative impact on local landscape and noise emissions, community benefits seem to dampen the relevance of the negative environmental externalities [43].

In this study, we are mainly interested in whether the positive effect of such economic benefits depends on the latter's interaction with the simultaneously occurring costs, as well in their time horizon. In previous experimental studies, community benefits have been formulated in a very concrete way, e.g., the number of jobs that will be created, how much the municipality will benefit financially, or how farmers will be compensated for their loss of land [7, 8]. However, in reality, when local communities decide on a project, the expected economic costs and benefits always involve uncertainty. Project developers may, for example, promise to create jobs, but the population cannot know for sure whether and how many jobs will eventually be created. Similarly, the plant's profits, and thus the future municipality benefits, may heavily depend on factors such as changing energy prices or changing energy market regulations [44]. We argue that this uncertainty needs to be considered when analyzing the effects of a community's economic involvement on the social acceptance of RET projects. Uncertainty

about future benefits may reduce the positive effect of expected benefits (for a similar argument at the level of household investments, see [45]). Moreover, based on prospect theory [46], citizens' interpretation of choices as gains and losses affects attitudes towards risky or uncertain (e.g., future) options. More precisely, "people hate to lose even more than they love to win" [47, p. 3], which systematically biases their evaluation of potential projects. In other words, the negative aspects of a project are accorded more weight than its (potential) positive aspects [48, p. 291]. Based on these considerations, we derive two hypotheses. The first directly follows from previous findings in the field, whereby economic benefits increase the social acceptance of RET projects, while the second specifically includes the uncertainty aspect:

H3: Potential economic benefits increase the local acceptance of RET projects.

Moreover, we expect that visible immediate costs are weighed more heavily than potential future benefits, i.e., that potential financial gains cannot compensate for short-term visible costs. As a result, we hypothesize:

H4: Short-time economic costs reduce the local acceptance of RET projects, even if the latter are expected to generate future gains.

2.3. Can public participation get a project's opponents on board and convince the "ambivalents"?

So far, our hypotheses have suggested that several aspects of local communities' political and economic participation in RET projects have the potential to increase local acceptance of such initiatives *in general*. However, while it is quite logical to assume that individuals with different attitudes will react to these types of involvement differently [24], not all groups play the same role in the successful implementation of RET projects [9]. Dermont et al. [9] emphasize different institutional actors and their roles (arguing that while voters are a very important group to consider in a direct-democratic setting, they are less relevant in a purely representative context). We complement this argument with the idea that group differences within the population are relevant and should be studied.

Some individuals will be rather unconditionally supportive of RET projects, while others might be strongly against such technologies. Eventually, an inclusive or exclusive process may reinforce these individuals' general propensity to support or reject such projects, but they will most likely not be swayed by political or economic participation. In contrast, it is logical to

assume that there is a middle group, which is neither very supportive of RET projects in general nor generally opposed to such projects, but somewhere in between. Individuals there are more ambivalent. This group may be “in between” for different reasons: attitudinal ambivalence, uncertainty, political dissatisfaction, etc. While we do not delve deeper into why exactly this group is “in between”, we assume that political or economic participation is most likely to influence these individuals exactly because of their ambivalence towards RET projects. Thus, especially for this group, a non-inclusive political process can trigger opposition and rejection, thereby losing possible supporters, while an inclusive process may engage uncertain or dissatisfied individuals. Moreover, a convincing economic participation, especially the prospect of communal economic benefits, might persuade even individuals without environmental priorities, turning the project into an economic, rather than an environmental, endeavor. Conversely, weak economic prospects will bring individuals to question the feasibility of a project.

Summarizing, we assume that the ambivalent middle group is most likely to react to different types of political and economic participation. While this group is neither fundamentally against RET projects nor clearly supportive of them, its acceptance of local projects may be most contingent on the project itself and the process that characterizes its implementation [24]. This is closely related to the idea of qualified support suggested by Bell et al. [29]. We therefore formulate the following hypothesis:

H5: Economic and political participation most strongly influences the local acceptance of those individuals who are ambivalent, i.e., those who neither clearly support nor decisively oppose local RET projects.

3. Research Design

3.1. Case selection

The analyses presented herein come from Switzerland. In its Energy Strategy 2050 and the discussions preceding its adoption, the Swiss government proposed to phase out nuclear energy and increase the production of energy from renewable sources. A first set of measures focused on the promotion of renewable energy production and greater energy efficiency. They were approved in a popular vote on May 21, 2017. Nevertheless, the implementation of these renewable energy goals proves to be difficult. The case of wind power is illustrative: most current projects are on hold, being blocked by local opposition.

3.2. Methodological approach and data

We test our hypotheses using a factorial survey experiment in which respondents are asked to rate various policy proposals (see Fig. 1). In contrast to single-item questions (e.g., “Would you support the construction of a wind power plant?”), factorial survey experiments reflect preferences for different variants of RET projects and thus better approximate a real-world scenario where a combination of multiple factors, rather than a single attribute, affects an individual’s opinion of a project. Methodologically, this paper follows Hainmueller et al. [49] and Stadelmann-Steffen & Dermont [38] in applying a fully randomized conjoint design (For more information on the survey, please refer to the online supplemental materials).¹

The data used in this contribution were collected between March and May, 2016. The trilingual survey² on future energy provision in Switzerland contains 8,287 responses from a representative sample provided by the Federal Statistical Office. Respondents were invited to participate in an online survey by mail.³ The response rate after three invites was 41.7%. The demographic composition of the final sample corresponds to that of the Swiss resident population with respect to gender and civic status (see Table A.2. in the Appendix). Conversely and as is common in surveys, the highly educated and high-income groups are overrepresented. Moreover, foreigners living in Switzerland and citizens over 75 years of age had lower response rates, which is likely to be explained by the exclusive use of an online survey. As far as political orientation is concerned, the collected sample features more respondents from the political middle compared to the composition of Swiss voters according to the 2015 Swiss Election Study [50], with a similar share of left-wing respondents and fewer right-wing respondents. Note, however, that this deviation does not necessarily entail a biased sample, as the election study is characterized by the strong self-selection of politically motivated persons, while our sample is broader in that respect.

¹ In contrast to the most widely used fractional factorial and orthogonal design, this approach does use the full sample of potential attribute combinations and therefore does not require any assumptions about choice probabilities [54].

² The survey was conducted in German, French, and Italian - the three most frequently spoken of Switzerland’s four national languages. 65.4% of all participants filled out the survey in German, 26.0% - in French, and 8.6% - in Italian. Romansh-speaking individuals likely used the German version to respond to the survey.

³ While the sample (i.e., the used postal addresses) was provided by the Federal Office of Statistics based on the “Stichprobenrahmen für Personen- und Haushaltserhebungen” (SRPH), the data collection process (i.e., sending the invitations out, programming the online survey, and collecting the responses) was conducted by the LINK Institute in Lucerne – a private company specialized in Survey Research – in close collaboration with the authors.

The survey comprised two conjoint modules and respondents were randomly assigned to one of the two. 4,141 individuals answered the module on local RET projects used in the present paper. The conjoint setup varied on nine attributes (for a detailed description of the attributes and attribute levels see Table A.1 in the Appendix). In keeping with our hypotheses, we focus on the attributes related to citizens' political and economic participation:

- *Information of the population:* This attribute captures different modes of public engagement. The attribute levels correspond to the three modes of public engagement that we expect to correlate with different levels of inclusion. Information through “information brochure and website” describes a one-sided information flow and, thus, corresponds to the lowest level of inclusiveness: *information*. “Public information event” is an example of a mode of public engagement that allows for an exchange of information and inputs (i.e., it corresponds to the inclusiveness level *consultation*).⁴ Finally, the attribute level “Integration of the population in the development process” indicates that a more significant *involvement* of the population takes place, corresponding to the most inclusive mode of public engagement. Concerning the latter, we do not further specify how exactly this involvement will be set up, e.g., whether there will be roundtables, citizens' panels, focus groups, or else. On the one hand, we think that this is not necessary in the Swiss context, where citizens have quite concrete ideas of their possible involvement. Hence, even in this generalized form, it can be assumed that citizens will have a realistic sense of what citizen's involvement means. On the other hand, since the specific type of involvement may differ in different situations and regional contexts, keeping the attribute level's description general aligns well with our goal of analysing general patterns of local acceptance, i.e., going beyond project-specific community acceptance.

⁴ Of course, it can be questioned whether a public information event deserves the label “consultation,” because these events mainly allow the project developers or the local administrations to present a project to the population in a one-sided way. However, in the Swiss local context, such information events are quite common and, especially in municipalities with direct-democratic assemblies, authorities see them as a first test of how a project is perceived by the public (and, thus, whether it has any chance of passing a direct-democratic vote). This is why these information events always include a questions-and-answers round, whereby the authorities get important feedback on what the challenges and red lines with respect to public support could be. In this vein, public information events are well in keeping with the IAP2 [33]'s proposed definition of “consultation,” i.e., “To obtain public feedback on analysis, alternatives and/or decisions.”

- *Decision-making*: This attribute captures the dimension of public decision-making, i.e., the fourth level of inclusiveness. This item has two levels, namely whether a direct-democratic vote takes place or whether there is no such popular vote.
- *Consequences for the municipality*: This attribute integrates economic participation by describing different combinations of (potential) financial community costs and gains. As a reference category, we use “Neither costs nor benefits”. The attribute level “Potentially new jobs and lower taxes” captures the traditional argument that economic benefits will increase acceptance; however, we allow for uncertainty by specifying that these benefits are *potential*. Finally, the attribute level “Short-term tax increases to (co-)finance the project, with opportunities for benefits in the longer run” helps to test the interaction between short-term costs and uncertain future benefits.

Table 1.
Attribute list and levels used in the conjoint analysis.

ATTRIBUTES	LEVELS
Energy source	Solar power
	Geothermal power
	Wind power
	Small-scale hydro power
Impact on the environment	Almost none
	Moderate
	Strong
Location	On a former military site
	Along a road with heavy traffic
	In an agricultural zone
	In or along the woods
	Close to a residential zone
Information for the population	Information brochure and website
	Public information event
	Integration into the development process
Decision-making	Direct-democratic vote
	No direct-democratic vote
Consequences for the municipality	Neither costs nor remuneration

	Short-term tax increase to (co-)finance the project, long-term opportunities for financial gains
	Potential new jobs and tax cuts
Project developer I	Local electricity provider
	Cantonal electricity provider
	National electricity provider
	Electricity company from abroad
Project developer II	Private company
	Public
Additional electricity supply	For about 200 households
	For about 500 households
	For over 1,000 households

Notes: The attributes and levels were randomly assigned to each task (see Hainmueller et al., 2014).

Not only do these attributes and attribute levels reflect our theoretical expectations, they have also been present in many real-world local projects, which makes us confident that our respondents found the resulting scenarios realistic.⁵ We presented the policy proposals at random, reflecting random combinations of attribute levels. Table 2 presents an example of what such a paired choice looked like.

After seeing a paired choice of two random projects, respondents were asked to indicate which of the two projects they preferred. Moreover, they had to rate both projects in terms of the likelihood that they would support each project. Hence, this question enabled respondents not only to choose between the two projects, but also to indicate whether they (dis)liked either option. More precisely, we asked: “How likely would you support these two projects?” (translation from German), whereby respondents could use a scale from 0-100 percent to indicate their level of support for each project. We use the rating question as our dependent variable in the following models.⁶ Each respondent rated seven paired policy proposals, which results in 14 ratings per respondent, a total of 57,974 observations, and enough information on all of the different attribute combinations.

⁵ We did not explicitly ask respondents about how plausible they found the proposals nor do we have information on which attributes they found most and least important.

⁶ We prefer the rating question for two reasons. First, the rating question better corresponds to our theoretical arguments that target varying *degrees of local acceptance*. Second, empirically, support for such projects will also strongly depend on an individual’s general propensity to be in favor of or against RET projects – an important aspect that is captured by the rating question but not by the choice question.

Table 2.

An example of a paired choice

Characteristics	Project 1	Project 2
<i>Energy Source</i>	Geothermal power	Wind power
<i>Impact on environment</i>	Moderate	Moderate
<i>Location</i>	In an agricultural zone	In or along the woods
<i>Information for the population</i>	Integration into the planification process	Public information event
<i>Decision-making</i>	Direct-democratic vote	No direct-democratic vote
<i>Consequences for the municipality</i>	Neither costs nor remuneration	Potential new jobs and tax cuts
<i>Project developer 1</i>	National electricity provider	National electricity provider
<i>Project developer 2</i>	Public company	Private company
<i>Additional electricity supply</i>	For over 1,000 households	For about 200 households

Switzerland is a very suitable context for implementing this type of survey. The frequency of direct-democratic ballots in Switzerland suggests that Swiss respondents are quite familiar with the decision situation mimicked in the conjoint analysis. Swiss citizens are used to be asked about their opinions on a variety of issues, which in a campaign context are often reduced to just a few arguments and dimensions. While this familiarity can increase the validity and consistency of their responses [38], it also reduces the risk that respondents develop protest attitudes or consider this exercise unrealistic. The assumption of a high content validity [51] was corroborated through our debriefing question at the end of the survey, where the conjoint experiments triggered only a few negative comments, while many respondents praised the survey for raising important and relevant questions.

To analyze the role of the attributes, we present their average marginal component effects (AMCE, Hainmueller et al., [49]). The AMCE is the “marginal effect of an attribute averaged over the joint distribution of the remaining attributes,” i.e., the influence of a specific piece of information similar to a marginal treatment effect when we control for all other combinations of attributes [49, p. 10]. We use the R package *cjoint*, which computes generalized linear models considering standard errors clustered per individual. These models allow us to observe the individual effects of certain attributes, and thus disentangle the multidimensional treatment. Due to the randomized setup of the experiment, no control variables are needed to obtain valid attribute estimates. To test the validity of the responses, we estimated additional models, in which we excluded both respondents who used too little time to carefully evaluate these

questions and respondents who used too much time. Moreover, in order to test for dependence across the choice sets, we also re-estimated our models only using the first five paired choices (see supplemental material). These additional models produce results that are very similar to those presented below.

To measure an individual's general propensity to support RET projects, we rely on his/her mean support for the 14 rated RET projects coded on a scale from 0 to 10, and classify respondents into four groups. Individuals with a mean support below 3 are considered to be generally "strongly against" local RET projects. Respondents with a mean support between 3 and 5 fall into the "against" category and respondents with a mean support between 5 and 7 are assigned to the category "in favor" of RET projects. Finally, individuals who rate the 14 projects with an average value of 7 and more, are considered to be "strongly in favor" of such projects. To analyze whether these groups react differently to economic and political involvement, we integrate interactions between all attributes and this grouping variable. In the results section, we present the *conditional* AMCEs [49], i.e., the AMCEs for the different respondents groups. This is similar to presenting marginal effects for different values/categories of the interacted variables in a standard regression context.

4. Empirical results

Figure 1 depicts the results of the factorial survey experiment. At first glance, holding all other attributes constant, solar power clearly is the preferred technology and individuals are least likely to support geothermal projects.⁷ Moreover, in keeping with previous research [7, 50], both a project's impact on the environment and its location are strong predictors of its support, while a foreign project developer decreases local acceptance. However, in addition to these factors, both political and economic involvement are relevant to respondents' support for these hypothetical projects.

As far as political participation is concerned, our analysis allows us to distinguish between different modes of public engagement and public decision-making and, thus, varying degrees of inclusiveness. We find a significant increase in respondents' support for a project if the latter is subject to a direct-democratic vote. Thus, in contrast to Walter [8] who focuses on the outcome of a direct-democratic vote, our analysis confirms the positive procedural effect of

⁷ In additional models (see Appendix, Fig. A.1.), we also integrated interaction effects between the different energy sources and the attributes capturing involvement. These interactions proved not to be significant, which indicates that the role of involvement is largely independent from that of technology.

public decision-making. The results further indicate that the mode of public engagement is not relevant for project support. This non-effect does not mean that information is not necessary; rather, it implies that respondents do not distinguish between one-sided information, consultation, and involvement in the implementation process. Following earlier research from varying contexts [7, 8, 32], one explanation for this finding could be that information and consultation are the minimal requirements for project support. Conversely, a more substantial involvement without formal public decision-making competencies (that is, with no guarantee that public concerns and inputs will be integrated) does not further increase local acceptance. In this vein, we can conclude that some public engagement is necessary for public project support but it is difficult to increase the latter by choosing more inclusive modes of public engagement. To do so, an additional level of inclusiveness is needed: namely, that citizens be integrated into the process as decision makers.

While our results are similar to those of Tabi and Wüstenhagen [7], we cannot exclude the possibility that the non-findings about public engagement have to do with the formulation of our attribute levels. While we sought to choose general formulations to describe the different modes of public engagement in an effort to generalize across different projects, the attribute levels of involvement may have been too abstract.

As far as economic participation is concerned, the analysis clearly provides empirical support to the relevance of short-term and long-term costs and benefits. The prospect of economic benefits, such as new jobs and lower taxes, increases support for local projects. This result is not surprising and is in accordance with previous research [7], [13], but it does demonstrate that economic benefits positively affect local acceptance of RET projects even if the uncertainty of future benefits is made explicit. However, if these potential future gains are combined with short-term costs, support for the project sharply decreases. Thus, short-term costs clearly outweigh the prospect of future gains. Interestingly, a project that does not economically affect a municipality at all is even more likely to be supported than a project that will probably generate economic benefits in the future but involves some short-term costs.

Preferences for RET projects AMCE of projects

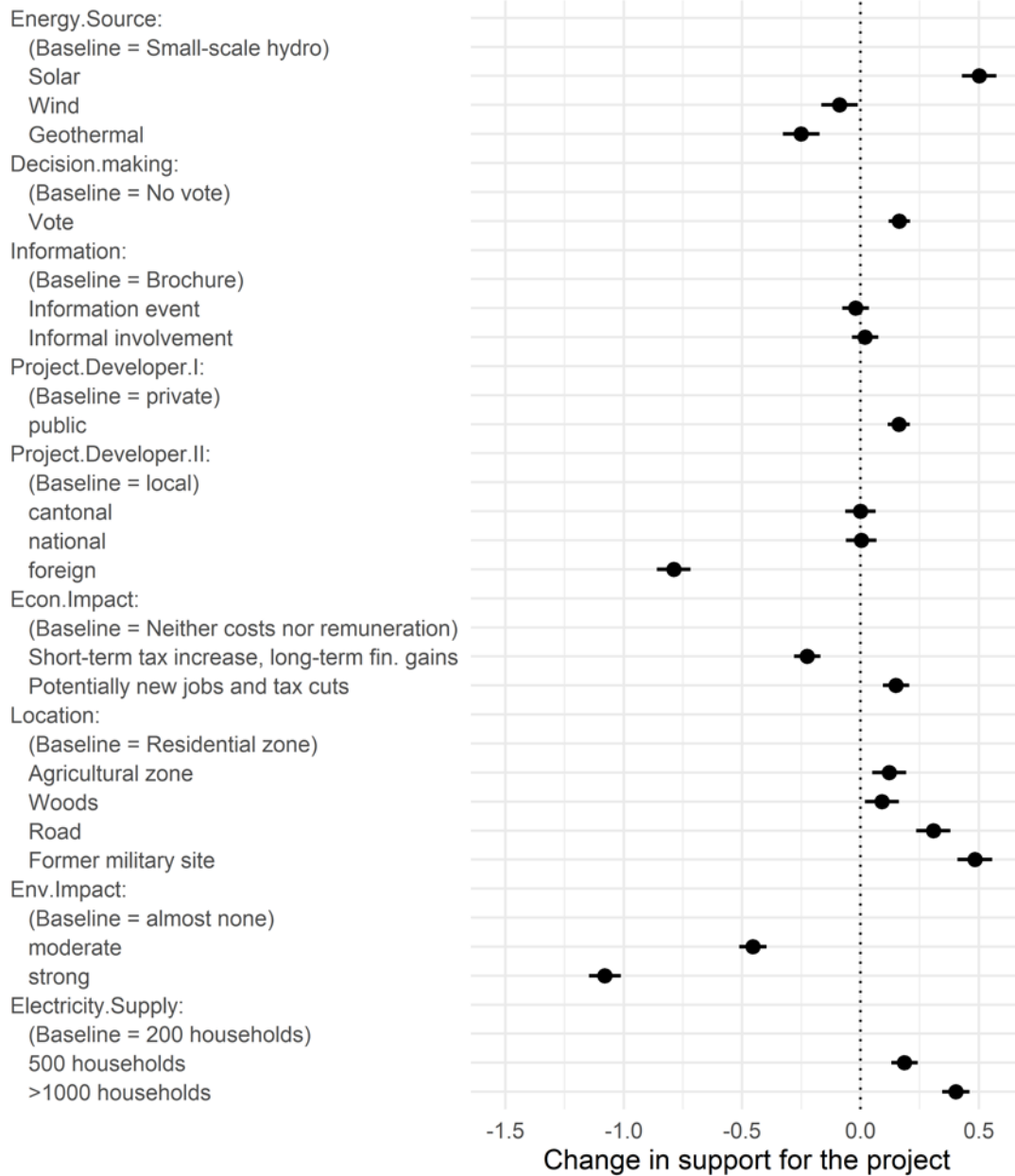


Fig. 1: Overall results. Attributes and the (changing) probability that a proposal is supported. Note: Average Marginal Component Effect (mean and 95% confidence interval).

However, overall and compared to the AMCEs of attributes such as a project’s environmental impact, its siting, or its size, the effects of political and economic participation seem to be moderate at best, i.e., the AMCEs are often smaller than those of the factors listed above. For example, the positive effect of having a popular vote is only about half as large as the negative effect of a moderate environmental impact. Likewise, the prospect of new jobs and tax cuts increases support to a degree commensurate with that of increasing the size of a project from

200 to 500 powered households. In this vein, the results also corroborate previous research emphasizing the relevance of a project's specific characteristics [7, 23].

We proceed by investigating whether respondents with different general propensities to support local RET projects differ in their reactions to varying types of economic and political participation. Note that grouping respondents based on their propensity to support local RET projects, i.e., their mean level of support *across the 14* rated projects, is by far not the same as determining their support for *one specific* rated project. Figure A.2 in the Appendix illustrates this, showing that the variance in support for a particular project is large within all groups. In fact, the respondents most critical of RET still rate 15% of the random projects with an average support above 50%, while, conversely, those strongly in favor of RET projects assign a mean support below 50% to 5% of the hypothetical projects.⁸ Those individuals rated as more against RET in general still evaluate half of the tasks below and half of the tasks above the threshold of 50% support; those more in favor reject around 30% of all tasks. Put differently, even if a respondent has a very high general propensity to support RET projects, his/her degree of support, i.e., his/her rating on the scale of 0 to 10, varies considerably across projects and can even go down to full rejection.

Figure 2 shows our initial model including interactions between the four groups of respondents and the project's attributes. The general preference patterns are rather similar across the groups, i.e., most interaction effects are not statistically significant (full results, including the significance of the interaction terms, can be found in the supplemental materials). In particular, concerns related to the environment, i.e., where the project is sited and the project's environmental impact, clearly affect support for RET projects independent of respondents' general propensity to support such projects. This further corroborates the notion that support is not unconditional even among such projects' strongest proponents.

Besides these general patterns, however, some relevant group differences do exist.⁹ As far as political participation is concerned, the results corroborate our previous finding that support for local RET projects is not a function of specific modes of public engagement. Independent of whether respondents are generally sceptic about RET projects or tend to support them rather unconditionally, they do not have specific preferences on whether the local population is

⁸ For the more moderate groups "against" and "in favor" of RET projects, the share of hypothetical projects with a mean support above 50% roughly accounts to 50% and 70%, respectively.

⁹ As the conditional AMCEs presented in Fig. 2 are similar to marginal effects in a standard regression, we cannot directly see in the graph whether the *differences* in the AMCEs across the different groups are statistically significant. We report group differences based on two criteria. We consider whether the conditional AMCEs are significant for some groups but not for others (which can be seen in the graph) and whether there are significant interaction terms (see full results in the supplemental materials).

informed, consulted, or more substantially involved in the process. Moreover, in accordance with the results presented above, both those who are (strongly) against RET projects and those who generally exhibit a rather positive position towards such projects are more likely to support a specific project if citizens can decide on a project in a popular vote. Conversely, a direct-democratic vote is not a relevant criterion for individuals who are strongly in favor of RET projects. Accordingly, the interaction effect for this group is statistically significant, i.e., significantly different from those of the other groups (see the online supplemental materials). Hence, while the latter is in keeping with our hypothesis that the most supportive group will support RET projects quite independent of their implementation process, the results indicate that in contrast to our expectation, the most critical group reacts positively to public decision-making. This implies that the procedural effect of direct democracy—namely, knowing that the population will have the final say on that project and, therefore, that the authorities are obliged to listen to citizens’ concerns—can also positively influence that group’s support.

With respect to economic participation, the group-specific analysis corroborates the relevance of short-term costs. Even individuals who have the strongest propensity to support local RET projects react to short-term costs that come together with potential future gains. This reaction is significant and negative. Interestingly, this negative economic effect is similar across all groups (the only exception being the group “in favor” of RET projects, for which the reaction is significantly less negative). Conversely, and in accordance with our hypothesis, individuals who are neither strongly against, nor strongly in favor of such projects are significantly more likely to support a project if it entails potential economic benefits for the municipality (but no evident costs). This is not the case for those who strongly oppose or support RET projects (which, again is reflected in the significant interaction effects).

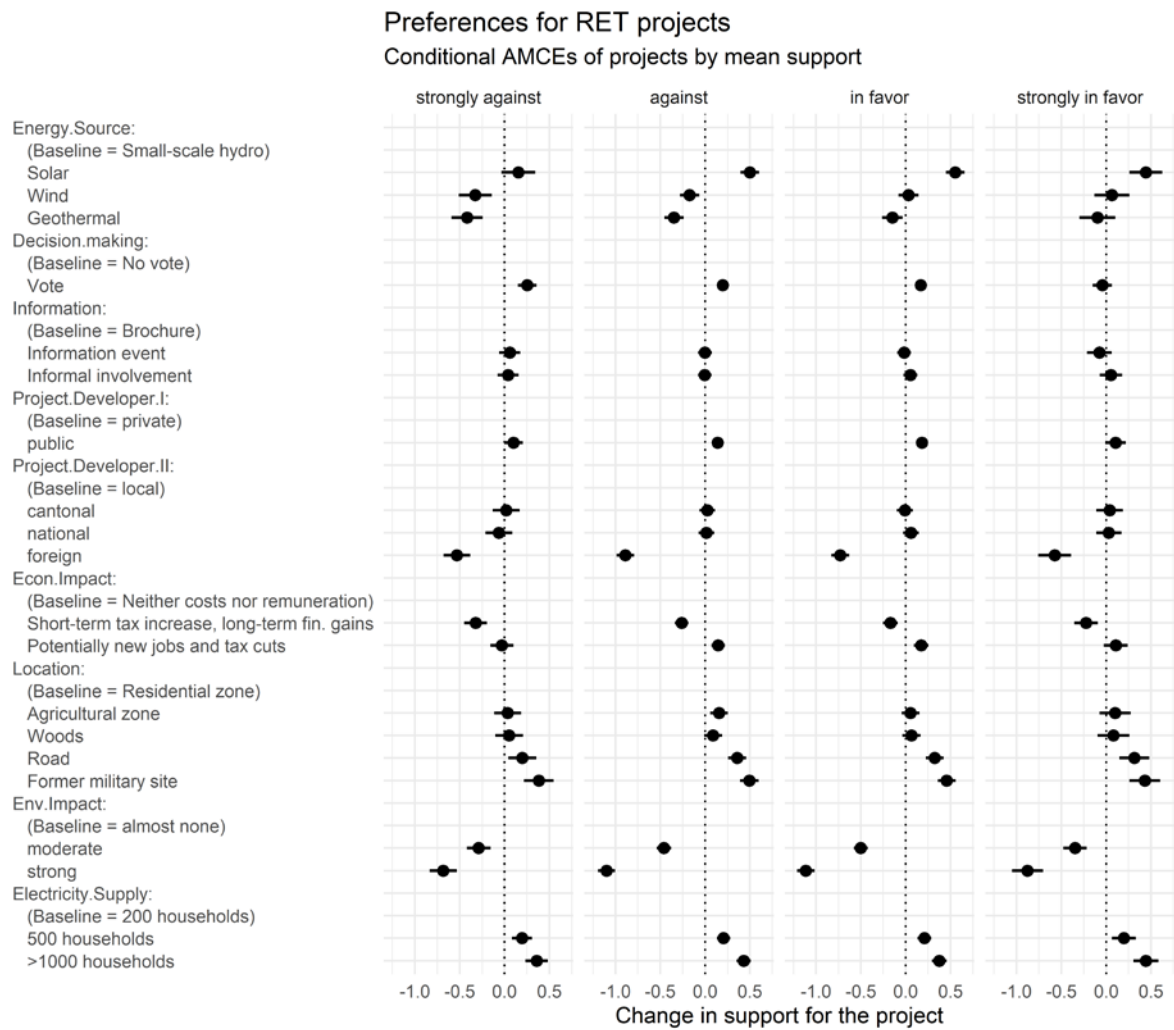


Fig. 2: Reactions to attributes by level of general support. Note: Conditional Average Marginal Component Effects (mean and 95% confidence interval).

5. Conclusion: the potential of political and economic participation

This paper has examined whether and how varying modes of a local community's political and economic participation in a local infrastructure project affects local acceptance of such initiatives. The most important findings can be summarized as follows:

The results of a conjoint experiment lead to the conclusion that communities' political and economic participation is related to individual support for local RET projects. Nevertheless, these process-related factors are only of moderate importance compared to other, more project-related aspects, such as the new infrastructure's location or its environmental impact.

In particular, if local communities' political participation in such projects is limited to public engagement, i.e., a more or less inclusive exchange of information, it may not be enough to specifically foster acceptance of renewable energy projects in Switzerland. Only when citizens

are allowed to decide on the project in a popular vote do we observe an increase in support. Moreover, municipalities' economic participation does not come without risks. If the municipality is likely to profit from future gains, support for the project does increase. However, short-term costs, such as investments, have a strong negative effect on citizens' support, which future gains cannot compensate for, and may therefore hinder a project's implementation.

An important assumption of this study is that not all people will find political and economic participation in local RET projects equally important. In particular, we expected that an individual's general propensity to support or oppose RET projects influences how and to what a degree different modes of participation matter in his or her opinion formation with respect to a specific project. The analyses presented in this paper lend support to this expectation: strong proponents of local RET projects often do not react to different modes of economic and political participation. In contrast, individuals with more ambivalent positions on RET projects are generally more likely to support specific projects if the project is accepted through a direct-democratic decision and if it entails (future) benefits and no costs for the municipality. Individuals with the lowest propensity to support RET projects also react to public decision-making. Their reactions indicate that holding a direct-democratic vote has the potential to integrate this group into the discussion and the process of adopting local RET projects. However, interestingly, the prospect of future economic gains does not help increase this group's support for such projects. One explanation could be that the uncertainty of future economic gains is strongly considered and heavily weighed by this group.

While the results suggest that public decision-making as well as implementation models that generate local benefits may facilitate political support for local RET projects, especially among "critical" groups (i.e., those who are most likely to actively oppose a project and those who are most ambivalent to such projects in general), our findings also document inherent challenges to successful local projects. One such challenge is that even the support of the most supportive group cannot be taken for granted. Indeed, projects that generate immediate costs for the municipality or have a strong environmental impact may "lose" even this group (see also [1]). More generally, our results imply that economic participation is not simply an easy path to local acceptance. The prospect of economic benefits for the municipality increases the support of the crucial "middle" group whose support is most strongly conditional. However, the positive effect of such economic involvement may be worn out by (short-term) costs.

Our study is certainly not without limitations. While our experimental design has advantages mainly with respect to internal validity, it can raise concerns about external validity. Given the

hypothetical nature of the projects presented in the conjoint module and the focus on a single country, we cannot be sure that in real-world situations citizens will behave exactly according to the factors identified in this study. From the perspective of social acceptance, our results do not strictly refer to community acceptance, but to a more general form of local acceptance. We cannot exclude the possibility that, e.g., the moderate effects of political participation result from this specific focus. Moreover, the substantive and methodological advantages of the Swiss case that we have already referred to, especially the population's experience with direct democratic votes, also raise some concerns regarding the generalizability of the findings. Naturally, we cannot exclude that our findings on public engagement and political inclusion are influenced by the specificity of the Swiss case. Nevertheless, we argue that it is plausible to assume that the results are relevant beyond Switzerland. We provide new insights into how individuals make up their minds about RET projects and the role different modes of public participation may play. In light of previous research findings that local political factors play a crucial role in RET processes across varying political contexts [16], it is only natural to assume that different modes of political and economic participation are also relevant across different contexts. This is even more the case, as we do not study community acceptance [12] (i.e., one or few specific projects), but analyze a more general form of local acceptance (i.e. across a variety of possible projects). Moreover, Switzerland may be an outlier in terms of its use of direct democracy at the national level, but direct-democratic instruments are increasingly widespread at the local level [53]. Hence, we conclude that future research should investigate the degree to which the role of political and economic participation depends on the broader country context more systematically, while project developers might find it valuable to consider making public decision-making part of their “community engagement plans” [25].

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Appendix

Table A.1.

Data and descriptive statistics

VARIABLE	VALUES	POPULATION
Individuals	4,141 for conjoint experiment on policies	
Conjoint Ratings	7 tasks * 2 concepts * 4,141 individuals = 57,974	
Support		
from 0 (no support) to 10 (full support)	mean = 4.857	
Language		
German	65%	63%
French	27%	23%
Italian	8%	8%
Gender		
male	50%	48%
female	50%	52%
Age		
18–35 years	27%	28%
36–50 years	28%	27%
51–65 years	27%	24%
65+ years	17%	21%
Education		
low (no education, mandatory, professional)	48%	57%
middle (middle/higher professional)	22%	24%
high (tertiary)	30%	19%

Income

low (<4,999 CHF)	24%	45%
middle (5,000-8,999 CHF)	37%	31%
high (>=9,000 CHF)	40%	17%

Left/Right

left	23%	24%
middle	49%	36%
right	28%	40%

Notes: Summary statistics refer to the subsample of individuals who answered the conjoint module. Population statistics based on various sources provided by the Swiss Federal Office of Statistics and Lutz [48].

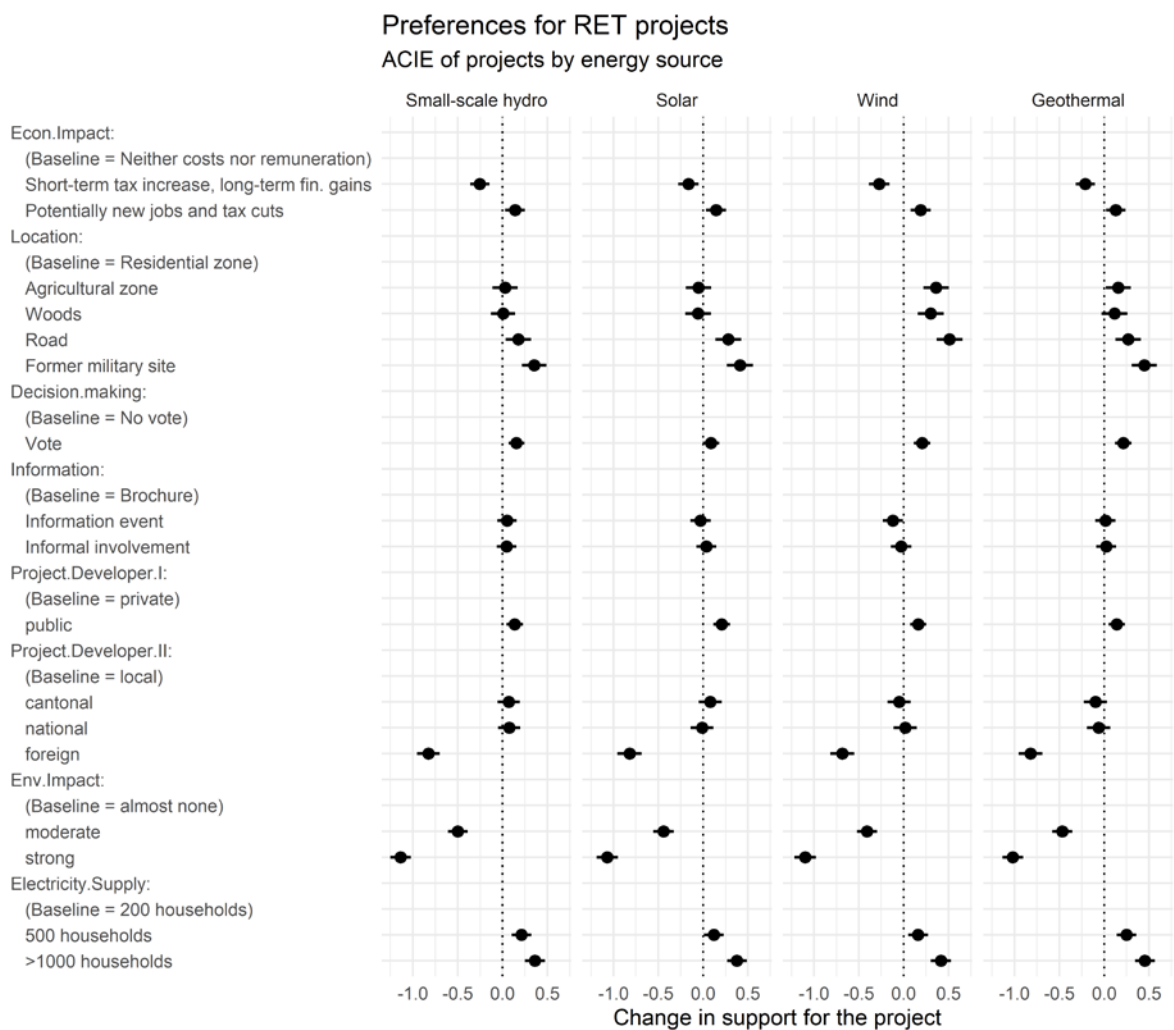


Fig. A.1. Conjoint analysis by energy source. Note: Average Component Interaction Effect (mean and 95% confidence interval).

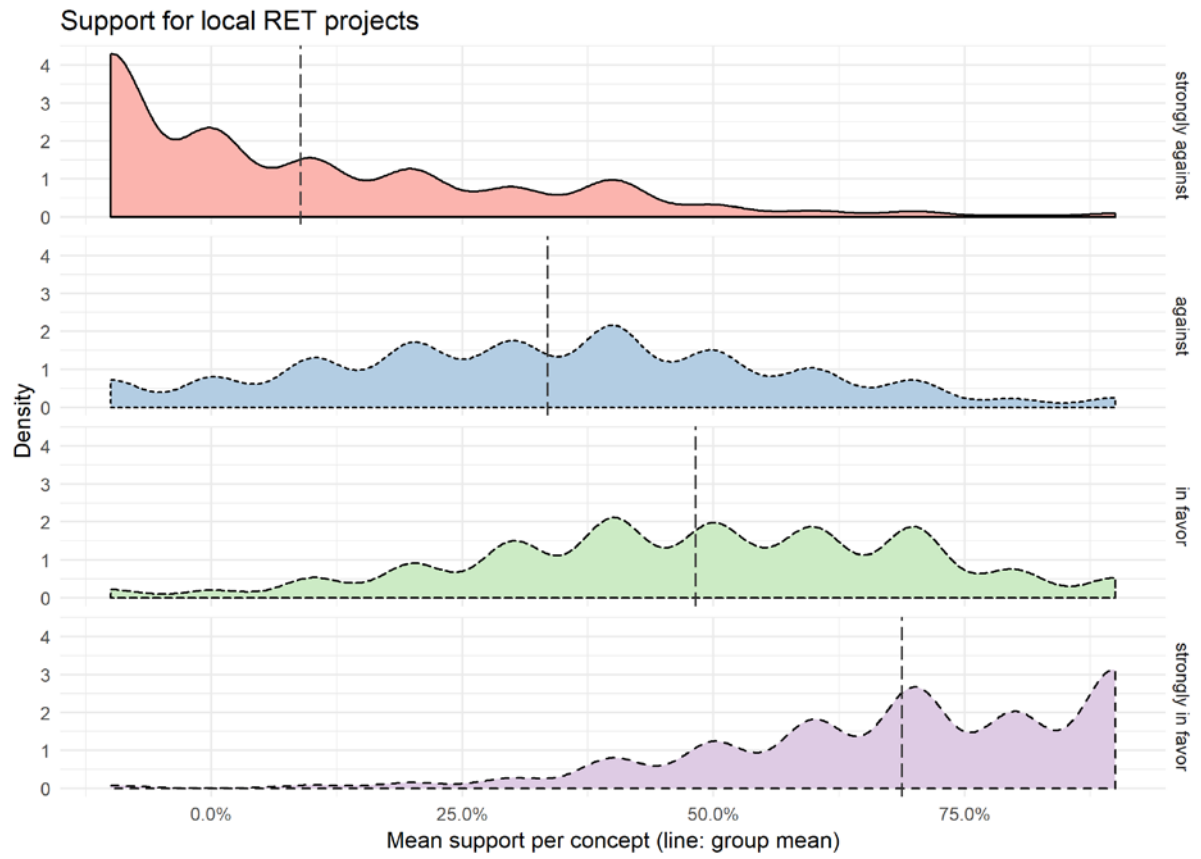


Fig. A.2.: Mean support for all RET proposals by group. Note: Support for RET projects by general propensity to support RET projects. Mean reported support per project. The dashed line represents the mean for each group.