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sweet swiss energy research for the energy transition

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Summary

This report presents key findings from the **2nd EDGE survey**, conducted in 2025. The survey aimed to track temporal shifts in public opinion amid evolving boundary conditions and to explore emerging topics relevant to the EDGE consortium's research. It was guided by three central research questions:

1. How has social acceptance of Swiss energy policy evolved since 2022, particularly amid shifting boundary conditions?

2. What are the drivers and barriers influencing public acceptance of open-field/alpine PV and wind energy?

3. How do citizens perceive the distributional effects of energy policies, and how do these perceptions shape acceptance of specific measures?

While analytical work using the survey data remains ongoing, this report highlights preliminary findings addressing these questions. It examines how public opinion on energy technologies and policies has evolved over time and provides early insights into citizens' attitudes toward the electricity agreement with the European Union. Additionally, the report summarizes three in-depth studies, either published or soon to be submitted to scientific journals, with the following key implications:

A first study presented in Section 4 **f**ocuses on the role of perceived trade-offs and synergies in renewable energy infrastructure projects, distinguishing between personal beliefs and perceptions of others' views. The findings reveal that technology preferences are stable and resistant to information-based corrections. A critical implication is that misperceptions about others' opinions may persist and be strategically amplified by opposing actors, reinforcing local resistance even when a societal majority supports emission reductions. Addressing substantive sources of opposition, through participatory processes, benefit-sharing, and procedural fairness, is therefore essential, rather than relying solely on persuasion.

The second study (Section 5) inve**s**tigates the influence of second-order beliefs on homeowners' investments in PV. The analysis shows that perceptions of others' beliefs significantly impact individual investment decisions, while collective support for PV is systematically underestimated. Policymakers can bridge the gap between intention and action by emphasizing the broad socio-political consensus and framing solar PV as a normative societal standard.

The third study (Section 6) examines the distributional effects of ambitious regulatory policies in the residential sector. The findings indicate that visible distributional costs reduce policy support, and the support measures analyzed to improve distributional outcomes failed to increase support. To secure public support for such policies, stronger protection measures or clearer communication about the benefits of these policies are necessary. Moreover, such policies likely need to compensate for the adverse effects on both vulnerable homeowners and tenants.

The report concludes with three recommendations for the role of survey research in the energy transition: (1) It is relevant to m**onitor public opinion** in order to identify emerging trends, anticipate resistance, and adapt communication strategies to engage the population. (2) Surveys contribute to the energy transition by p**roviding insights into the mechanisms behind social acceptance, which** help policymakers design targeted interventions and policies. (3) **Highlighting the interdisciplinary model of the 2nd EDGE survey**, the EDGE surveys demonstrate how interdisciplinary collaboration can enhance the relevance and impact of survey-based insights.

Zusammenfassung

Dieser Bericht präsentiert zentrale Ergebnisse der **2. EDGE-Umfrage**, die 2025 durchgeführt wurde. Ziel der Umfrage war es, zeitliche Dynamiken in der öffentlichen Meinung angesichts sich verändernden Rahmenbedingungen zu verfolgen und für das EDGE Konsortium relevante aufkommende Themen zu erforschen. Die Umfrage wurde von drei zentralen Forschungsfragen geleitet:

1. Wie hat sich die Akzeptanz der Energiepolitik seit 2022 angesichts sich verändernden Rahmenbedingungen entwickelt?
2. Welches sind die Faktoren, welche die Akzeptanz von Freiflächen/alpiner PV und Windenergie fördern oder hemmen?
3. Wie nehmen Bürgerinnen und Bürger Verteilungseffekte von energiepolitischen Massnahmen wahr und wie beeinflussen diese Wahrnehmungen die Akzeptanz konkreter Massnahmen?

Obwohl die Auswertung der Umfragedaten noch andauert, werden in diesem Bericht erste zentrale Ergebnisse zu diesen Fragen vorgestellt. Der Bericht untersucht, wie sich die öffentliche Meinung zu Energietechnologien und -politiken im Laufe der Zeit entwickelt hat, und liefert erste Einblicke in die Haltung der Bürger:innen zum Stromabkommen mit der Europäischen Union. Darüber hinaus fasst der Bericht drei vertiefende Studien, die entweder bereits veröffentlicht oder demnächst zur Veröffentlichung in wissenschaftlichen Fachzeitschriften eingereicht werden, mit folgenden zentralen Implikationen zusammen:

Studie 1 (Abschnitt 4) konzentriert sich auf die Rolle wahrgenommener Trade-offs und Synergien bei erneuerbaren Energieinfrastrukturprojekten und unterscheidet zwischen persönlichen Überzeugungen und der Wahrnehmung der Meinungen anderer. Die Ergebnisse zeigen, dass Technologiepräferenzen stabil sind und sich kaum durch informationsbasierte Korrekturen ändern. Eine zentrale Schlussfolgerung ist, dass Fehlwahrnehmungen über die Meinungen anderer bestehen bleiben und von gegnerischen Akteuren strategisch angesprochen werden können, um lokalen Widerstand zu schüren; selbst wenn eine klare gesellschaftliche Mehrheit diese befürwortet. Es ist daher entscheidend, die inhaltlichen Gründe des Widerstands durch partizipative Prozesse, Nutzenverteilung und verfahrensmässige Fairness anzugehen, anstatt sich allein auf Überzeugungsarbeit zu verlassen.

Studie 2 (Abschnitt 5) untersucht den Einfluss von „Second-Order-Beliefs“ (d. h. Überzeugungen über die Überzeugungen anderer) auf die Investitionen von Hausbesitzer:innen in Photovoltaik (PV). Die Analyse zeigt, dass die Wahrnehmung der Meinungen anderer individuelle Investitionsentscheidungen massgeblich beeinflusst, während die kollektive Unterstützung für PV systematisch unterschätzt wird. Entscheidungsträger:innen können die Kluft zwischen Absicht und Handlung verringern, indem sie den breiten soziopolitischen Konsens betonen und PV als gesellschaftliche Norm darstellen.

Studie 3 (Abschnitt 6) analysiert die Verteilungseffekte ambitionierter regulativer Massnahmen im Gebäudebereich. Die Ergebnisse deuten darauf hin, dass sichtbare Verteilungskosten die Unterstützung für solche Politiken verringern und die untersuchten Massnahmen zur Verbesserung der Verteilungsergebnisse die Unterstützung nicht steigern konnten. Um die öffentliche Unterstützung für diese Politiken zu sichern, sind stärkere Schutzmassnahmen oder eine klarere Kommunikation über die Vorteile dieser Politiken erforderlich. Ausserdem gilt es, die negativen Auswirkungen nicht nur für vulnerable Mieter:innen, sondern auch für Hausbesitzer:innen ausgleichen.

Der Bericht schliesst mit drei Empfehlungen zur Rolle der Umfrageforschung im Rahmen der Energiewende: (1) Es ist relevant, die öffentliche Meinung zu verfolgen, um aufkommende Trends zu erkennen, Widerstand vorherzusehen und Kommunikationsstrategien anzupassen, um die Bevölkerung in die Energietransition einzubinden. (2) Umfragen leisten einen Beitrag zur Energiewende, indem sie Einblicke in die Mechanismen sozialer Akzeptanz bieten, die Entscheidungsträger:innen bei der Entwicklung gezielter Massnahmen unterstützen. (3) Die interdisziplinäre Ausrichtung der 2. EDGE-Umfrage zeigt, wie die Zusammenarbeit über Fachgrenzen hinweg die Relevanz und Wirkung umfragebasierter Erkenntnisse steigern kann.

Résumé

Ce rapport présente les résultats centraux de la 2e enquête EDGE, menée en 2025. L'objectif de cette enquête était de suivre les dynamiques temporelles de l'opinion publique face à des conditions-cadres en évolution et d'explorer les thèmes émergents pertinents pour le consortium EDGE. L'enquête était guidée par trois questions de recherche centrales :

1. Comment l'acceptation de la politique énergétique a-t-elle évolué depuis 2022, face à des conditions-cadres changeantes ?
2. Quels sont les facteurs qui favorisent ou entravent l'acceptation du photovoltaïque (PV) en plein champ/alpin et de l'énergie éolienne ?
3. Comment les citoyen·ne·s perçoivent-ils/elles les effets distributifs des mesures politiques énergétiques, et comment ces perceptions influencent-elles l'acceptation de mesures concrètes ?

Bien que l'analyse des données de l'enquête soit encore en cours, ce rapport présente les premiers résultats clés relatifs à ces questions. Il examine comment l'opinion publique sur les technologies et les politiques énergétiques a évolué au fil du temps, et offre un premier aperçu des attitudes des citoyen·ne·s envers l'accord sur l'électricité avec l'Union européenne. En outre, le rapport résume trois études approfondies, soit déjà publiées, soit sur le point d'être soumises à des revues scientifiques, avec les implications centrales suivantes :

Étude 1 (Section 4) se concentre sur le rôle des trade-offs et synergies perçus dans les projets d'infrastructures d'énergies renouvelables, en distinguant les attitudes personnelles et les perceptions des opinions d'autrui. Les résultats montrent que les préférences technologiques sont stables et peu sensibles aux corrections basées sur l'information. Une conclusion majeure est que les fausses perceptions des opinions d'autrui peuvent persister et être exploitées stratégiquement par des acteurs opposés pour renforcer la résistance locale, même lorsqu'une majorité sociétale soutient les mesures. Il est donc crucial d'aborder les sources substantielles de résistance par des processus participatifs, un partage des bénéfices et une équité procédurale, plutôt que de se fier uniquement à la persuasion.

Étude 2 (Section 5) étudie l'influence des « croyances de second ordre » (c'est-à-dire les croyances sur les croyances d'autrui) sur les investissements des propriétaires dans le photovoltaïque (PV). L'analyse révèle que la perception des opinions d'autrui influence significativement les décisions d'investissement individuelles, tandis que le soutien collectif au PV est systématiquement sous-estimé. Les décideurs peuvent réduire l'écart entre l'intention et l'action en mettant en avant le large consensus sociopolitique et en présentant le PV comme une norme sociétale.

Étude 3 (Section 6) analyse les effets distributifs des politiques réglementaires ambitieuses dans le secteur du bâtiment. Les résultats indiquent que les coûts distributifs visibles réduisent le soutien à ces politiques, et que les mesures étudiées pour améliorer les résultats distributifs n'ont pas réussi à augmenter ce soutien. Pour faciliter l'adhésion du public à ces politiques, des mesures de protection plus fortes ou une communication plus claire sur leurs avantages sont nécessaires. De plus, il est essentiel de compenser les effets négatifs non seulement pour les locataires vulnérables, mais aussi pour les propriétaires.

Le rapport conclut avec trois recommandations sur le rôle de la recherche par enquête dans la transition énergétique : (1) Il est pertinent de suivre l'opinion publique pour identifier les tendances émergentes, anticiper les résistances et adapter les stratégies de communication afin d'impliquer la population dans la transition énergétique. (2) Les enquêtes contribuent à la transition énergétique en offrant des perspectives sur les mécanismes de l'acceptation sociale, aidant ainsi les décideurs à concevoir des mesures ciblées. (3) L'approche interdisciplinaire de la 2e enquête EDGE montre comment la collaboration entre disciplines peut renforcer la pertinence et l'impact des connaissances issues des enquêtes.



Acknowledgment

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1 Introduction

The first EDGE population survey, conducted in autumn 2022, demonstrated the viability of cross-disciplinary collaboration between multiple social science teams and technical working groups in developing a large-scale population survey contributing to the EDGE consortium's research goals. Building on this foundation, and in response to evolving socio-political and energy landscape conditions, the EDGE consortium has identified a set of emerging research priorities warranting systematic empirical investigation through a second population survey. These priorities centre on public acceptance and societal perspectives, encompassing topics such as open-field and alpine photovoltaics (PV), distributional effects of energy policy, energy security, comparative public support for nuclear versus renewable energy, and attitudes toward European Union (EU) energy cooperation. The salience of these issues has grown considerably in the wake of the Russian invasion of Ukraine and in light of altered regulatory and policy frameworks. These developments present a substantive opportunity to connect changing empirical realities to the broader EDGE research agenda, and to deepen the integration of social scientific inquiry with energy system modelling efforts.

1. How has social acceptance of Swiss energy policy evolved since 2022, particularly amid shifting boundary conditions?

2. What are the drivers and barriers influencing public acceptance of open-field/alpine PV and wind energy?

3. How do citizens perceive the distributional effects of energy policies, and how do these perceptions shape acceptance of specific measures?

Against this background, the second EDGE survey was designed to serve a dual purpose: to extend and enrich the existing objectives and research questions of WP8 and to address novel questions arising from changed framework conditions and insights generated by prior EDGE findings. More specifically, three overarching research questions guided the survey design.

First, how has social acceptance of Swiss energy policy evolved since 2022, particularly amid shifting boundary conditions? To address this question, the survey replicated a selection of items from the first EDGE survey (as well as from the SWEET SURE survey conducted in 2024) in order to capture temporal dynamics in policy preferences and technology acceptance. In addition, the survey incorporated new items reflecting recent developments expected to shape public acceptance, including EU energy cooperation and evolving societal dynamics such as second-order beliefs.

Second, what are the drivers and barriers influencing public acceptance of open-field/alpine PV and wind energy? To address this question, the survey focused on trade-offs inherent to the energy transition, in particular, between the expansion of renewable energy infrastructure to reduce CO2 emissions and potentially competing goals such as biodiversity conservation and land use. The underlying assumption was that, from a socio-political perspective, these trade-offs are not primarily a matter of objective trade-offs, but rather of how such trade-offs are perceived and politicised in the debate.

Third, how do citizens perceive the distributional effects of energy policies, and how do these perceptions shape acceptance of specific measures? This question speaks to one of the EDGE consortium's core research interests: the role of distributional consequences of renewable energy policies. The second EDGE survey aimed to contribute to this line of inquiry by examining how modelling results that illustrate distributional effects influence citizens' policy acceptance.

This deliverable report provides an overview of the 2nd EDGE survey and a selection of results. The next section presents the structure of the survey and data collection, before Section 3 documents selected temporal dynamics in public opinion. The subsequent sections then provide summaries of three in-depth

studies based on data from the 2nd EDGE survey. The report closes with some conclusions. It is important to note that further studies and analyses, not covered in this report, are in preparation and will be published later and/or be integral elements of subsequent deliverables of the EDGE consortium.

2 The 2nd EDGE Survey

Table 1 shows the structure of the 2nd EDGE survey. At the center of the survey were four survey modules including an experiment of the distributional effects of residential sector policies (Module D, see Section 5), an experiment on second-order beliefs and trade-offs related to renewable energy technologies (Module E, see Section 4), a module on how polarization affects the acceptance of wind and alpine PV (Module F) and a module on PV adoption (Module G, see Section 6). In addition, Module C was specifically integrated to capture temporal dynamics, thereby repeating questions already included in the first EDGE survey as well as in the survey conducted in the context of the Sweet SURE consortium. Besides, a series of socio-demographic, political and behavioural questions were integrated that primarily serve as “explanatory” or control variables in the varying analyses.

The survey has been approved in full by the institution's ethics commission, which provided ethical clearance on April 16, 2025, with the serial number 192025, and was preregistered (https://osf.io/5atwq).

Table 1: Survey structure

Survey module	Description
Introduction	General information about the survey
A General climatic and environmental attitudes	Statements about climate change and environmental threats
B Behavioural patterns	Questions about environmental-relevant behaviour
C Energy Policy	Questions about energy policy attitudes
D Residential sector policies	Experiment on public support given effectiveness, fairness, and redistribution
E Trade-offs	Experiment on second-order beliefs and trade-offs related to renewable energy technologies
F Polarization	Polarization and the acceptance of wind and alpine PV
G PV Adoption	Adoption and second-order beliefs
H Politics	Personal political attitudes
Z Socio-demographics	Other personal characteristics
Debrief	Survey end page and further project information

To recruit participants, we drew a random sample of 6,000 individuals aged 18 to 75 from the Swiss population using the Federal Statistical Office's sampling frame. Sampled individuals were contacted by post with a personalised invitation letter containing a survey link (also accessible via QR code) along with a unique personal access token. Participation was further encouraged through two subsequent postal reminders. The online survey, hosted on Qualtrics, was administered between May 10 and August

4, 2025. A total of N = 1,831 respondents completed the survey, corresponding to a response rate of 30.5%. The sample is broadly representative for the Swiss population with respect to gender and age, though individuals with higher levels of education and income are slightly overrepresented. While the survey successfully engaged respondents across the political spectrum, including relatively apolitical individuals, those with left-leaning political orientations are somewhat overrepresented.

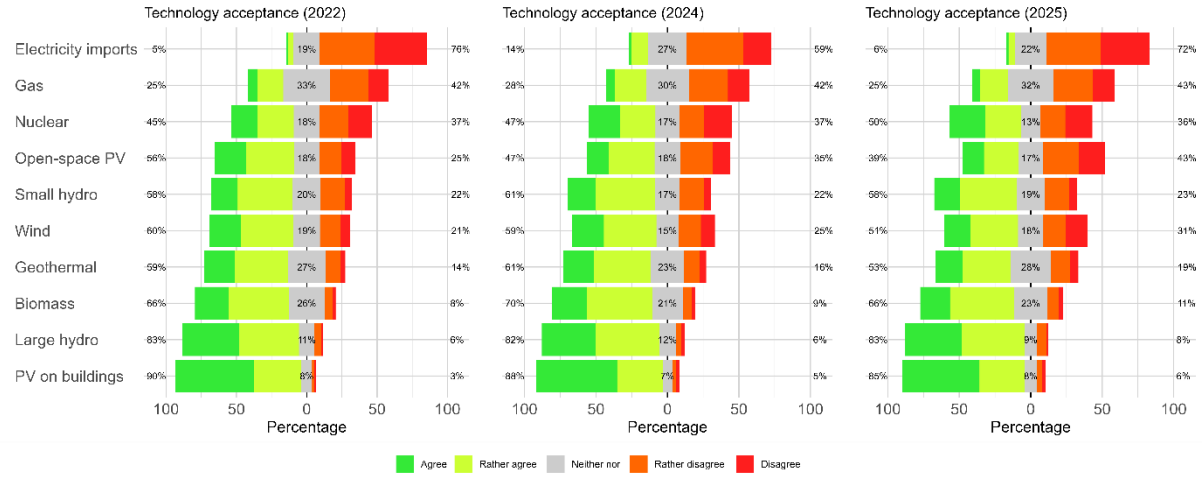
3 Monitoring public opinion

With the data from the 2nd EDGE survey, we have now data on technology acceptance and the social acceptance of policy principles for three points in time. This data has been discussed in more detail in the Second policy white paper on social acceptance:

Stadelmann-Steffen, I., C. R., Binder, C. Bucher, M. Duygan, M. A. Hecher, D. Joss, J. Feller, S. Montfort, J. Schmid, and R. Wüstenhagen (2026). **Second Policy White Paper on Socio-Political, Community and Market Acceptance**, https://doi.org/10.48620/96056.

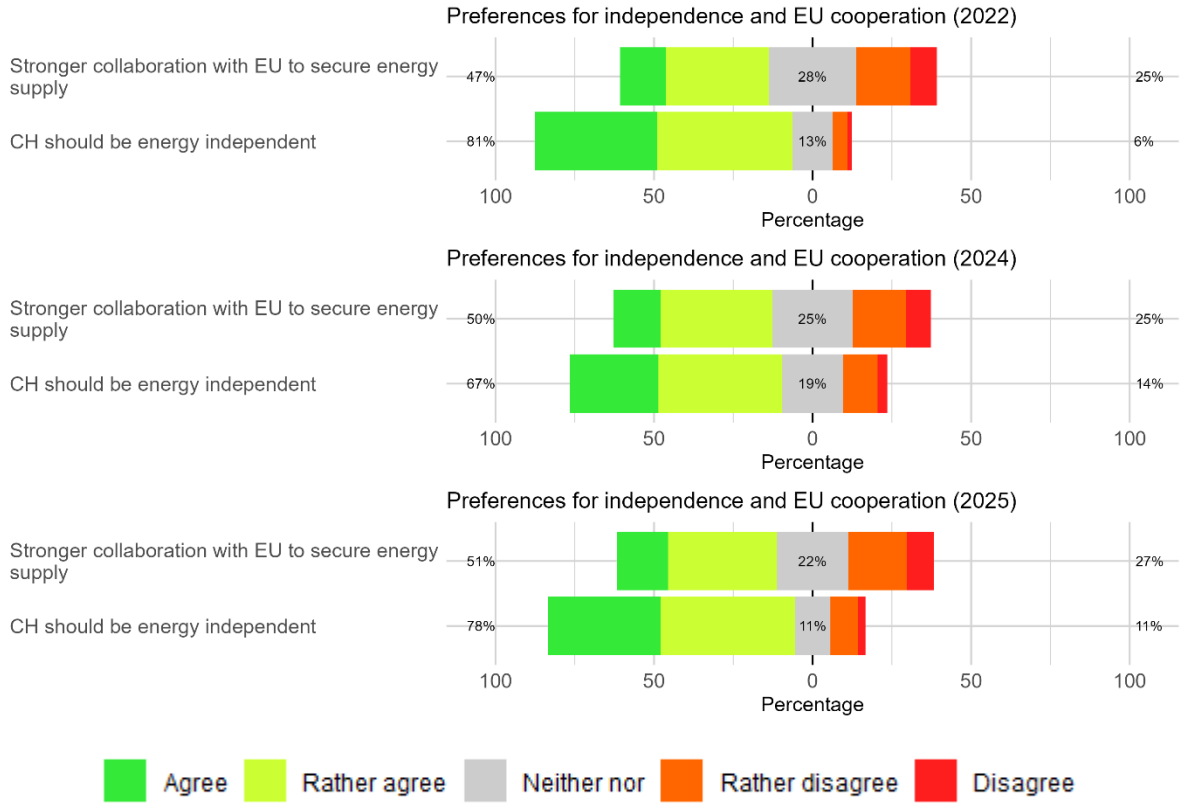
In what concerns technology acceptance (see Figure 1), the data documents high stability overall. The ranking of technologies is very similar across time with PV on buildings and large-scale hydro being most popular and electricity imports and gas as most unpopular energy sources. It is noteworthy, however, that open-space PV is the only technology that faces a consistent and statistically significant negative trend over the three surveys. One likely explanation is that the debate about alpine PV projects in the context of the Solarexpress has made this energy source “more concrete”, meaning that not only its benefits but also potential challenges have become more visible.

Figure 1: Technology acceptance 2022-2025



Similarly, there is not much dynamic with regard to the acceptance of policy principles (Figure 2). There is very high support for energy independence. In 2025, still almost 4 out of 5 respondents indicate that they (strongly) agree with the notion that Switzerland should be energy independent. The approval of a stronger collaboration with the EU to secure energy supply is also highly stable. Roughly half of respondents agree with a stronger collaboration but an important minority of about 25% (strongly) disagrees with it. It is noteworthy that around a quarter of respondents are unsure about this question.

Figure 2: Acceptance of policy principles 2022-2025



A topic that will receive heightened attention in the near future is how Swiss citizens evaluate the bilateral treaties with the EU, particularly the electricity agreement. In the 2nd EDGE survey, we therefore assessed early public opinion on these issues, which may serve as a baseline for tracking future developments as the popular votes approach.

As shown in Figure 3, the Swiss population is deeply divided on the electricity agreement. While a relative majority of respondents are (rather) concerned that securing Switzerland's electricity supply without such an agreement would be difficult and costly, another relative majority believes Switzerland would manage well without it. Additionally, a significant minority opposes the new bilateral agreements altogether, even if the electricity agreement might be advantageous.

Figure 4 reveals that attitudes toward the electricity agreement are strongly structured along party lines. A majority of Social Democratic (SP) and Green Liberal (GLP) voters express concern about Switzerland lacking an agreement. Notably, Green Party (Grüne) voters align more closely with Center Party (Mitte) and Liberal (FDP) voters on this issue, with fewer expressing such concerns. In contrast, only around 20 percent of Swiss People's Party (SVP) voters worry about the absence of an agreement. These party-political patterns reverse when considering the belief that Switzerland can do without the electricity agreement. Finally, the lower panel of Figure 4 highlights that SVP voters again stand out: nearly two-thirds reject the bilateral agreements even if the electricity agreement was advantageous. While this rejection of the EU treaties regardless of the potential advantages of the electricity agreement remains a minority position among other parties, still more than 20% of FDP and Center Party voters also share this view.

Figure 3: Acceptance of the Swiss-EU electricity agreement

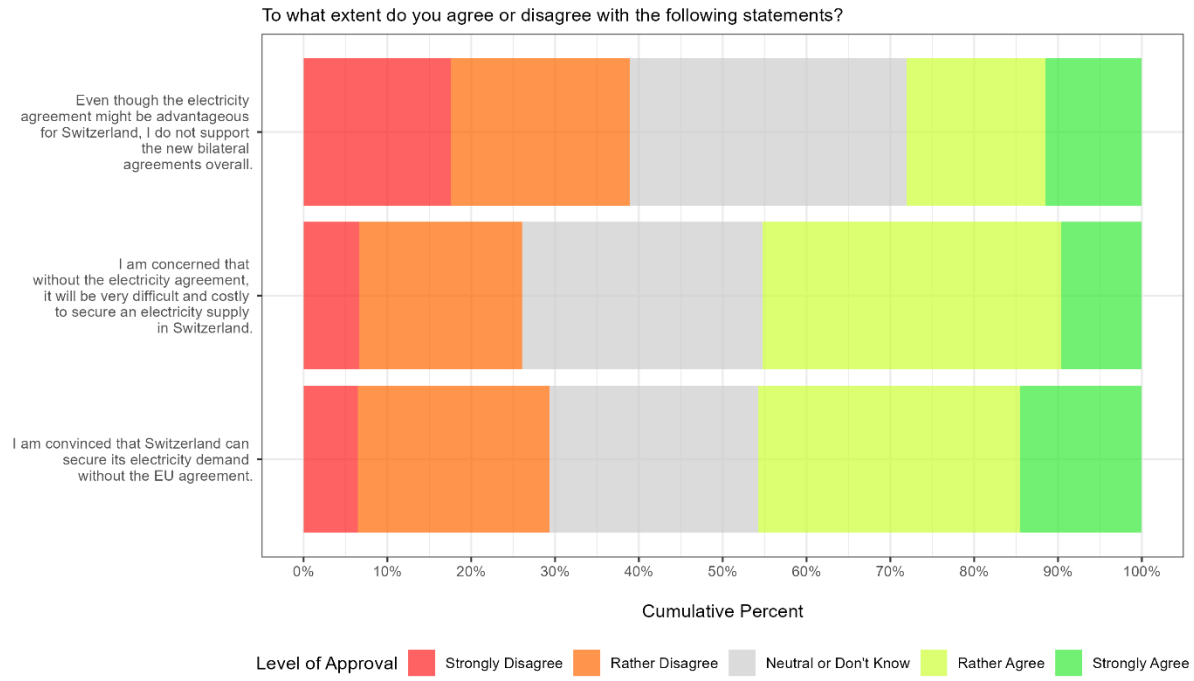


Figure 4: Party-political polarization in the acceptance of the Swiss-EU electricity agreement



4 Trade-off and synergy beliefs and the role of “what others think”

Speaking to the first and second research question, namely how individuals form their opinions about different (contested) energy options in situations of trade-offs, this section investigates how trade-off and synergy beliefs affect the support of renewable energy infrastructure. A particular focus is thereby laid on the role of so-called “second-order beliefs”, that is of beliefs about what other people think. In terms of technologies, the study not only includes alpine PV and wind energy but also considers nuclear technologies that have re-entered the political arena. The study has already been published, and more details can be found in:

Montfort, S., Schmid, J., Campfens, J., Stadelmann-Steffen, I., & Binder, C. R. (2026). **Own trade-off and synergy beliefs, not others’, drive public acceptance of energy technologies.** *Environmental Research Letters*, *21*(4), 044024.

4.1 Motivation

Existing research on renewable energy acceptance has focused predominantly on objective, physical trade-offs rather than how trade-offs are perceived by the public, even though these perceptions shape preferences of citizens and interest groups in political debates. Moreover, most research focuses on what people themselves think (so-called first-order beliefs), while what people think others think (i.e., second-order beliefs) is rarely incorporated into technology acceptance research. The paper addresses these research gaps through a population-representative belief-updating experiment embedded in the 2nd EDGE survey. It is argued that Switzerland is a hard test case given the country's direct-democratic system and highly politicised debates over alpine PV, wind, and nuclear energy.

4.2 Key findings

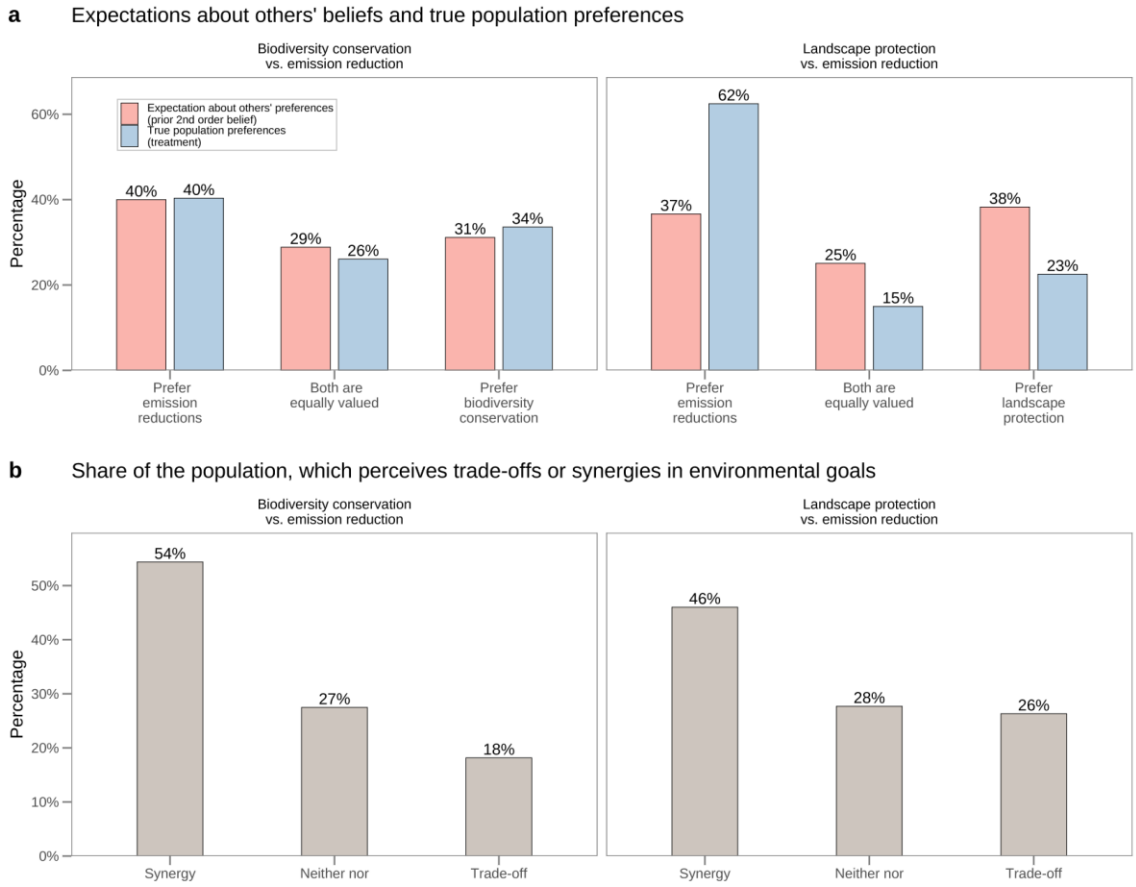
Most respondents perceived biodiversity protection and emission reduction as synergistic rather than competing. However, misperceptions existed around landscape protection: while 62% of the Swiss population actually prioritises emission reductions, respondents systematically underestimated this, expecting roughly equal public support for both (see Figure 5). Rural residents and ideologically conservative respondents were most likely to hold this biased expectation. People's own trade-off beliefs were primarily shaped by left-right ideology, climate salience, and income, while expectations about others' views were shaped by belief confidence, trust in science, and urban-rural residence.

Critically, providing respondents with accurate information about true societal preferences had no significant effect on their own trade-off evaluations or technology acceptance, i.e., preferences were highly stable and resistant to social influence (see Figure 6). Acceptance of alpine PV and wind was broadly positive; new nuclear drew modest support; prolonging existing nuclear plants was viewed negatively. Across all technologies, individual first-order beliefs and perceptions of synergies were more strongly associated with technology acceptance than second-order beliefs.

4.3 Implications

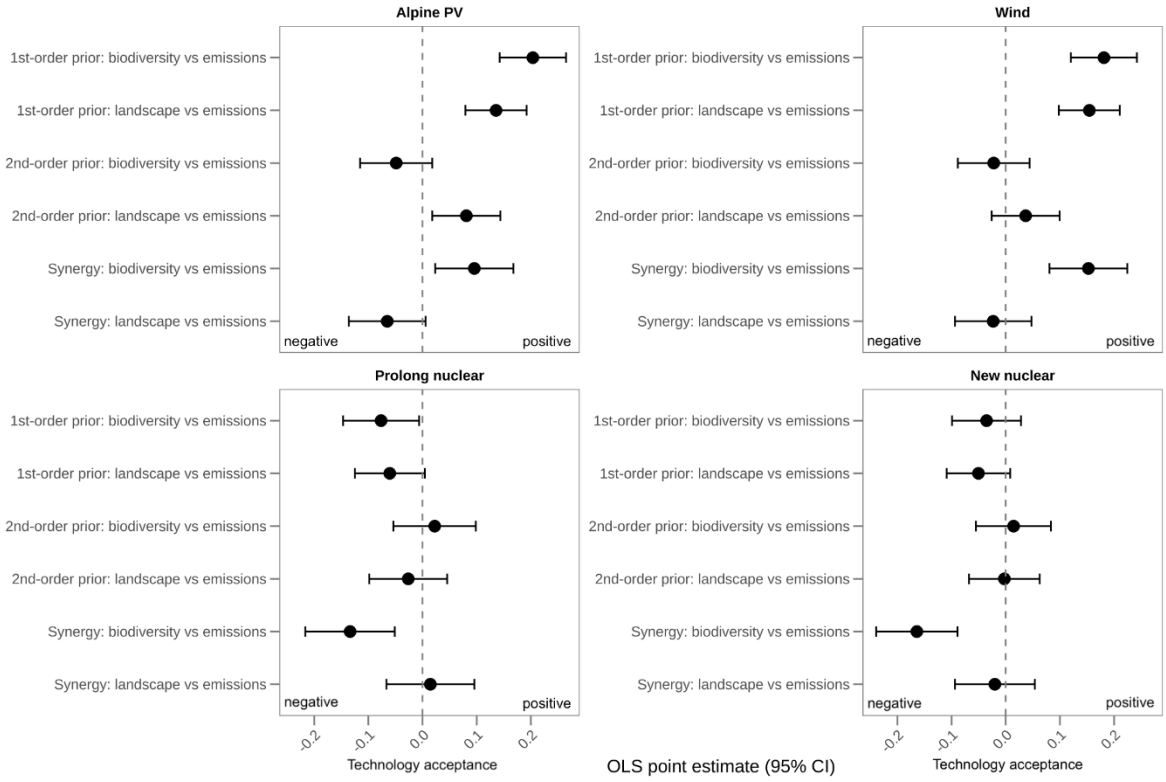
Because preferences are stable and resistant to information-based correction, communication campaigns alone are unlikely to shift entrenched attitudes toward renewable energy. In polarised contexts where trade-off narratives are politically salient, a well-informed public tends to hold largely predetermined and hard-to-change opinions. Misperceptions about others' views may therefore persist and be strategically amplified by opposing actors, reinforcing local resistance even when a clear societal majority favours emission reductions. Participatory processes, benefit-sharing, and procedural fairness are needed to address the substantive sources of opposition rather than relying on persuasion.

Figure 5: Trade-off and synergy beliefs



Notes: For the trade-offs between biodiversity conservation vs. emission reduction and landscape protection vs. emission reduction (in Panel a), the figure shows the share of respondents who expected others to (red) prefer emission reductions, value both aspects equally, or prefer biodiversity/landscape protection. These expectations are compared to the true population distribution from the Sweet SURE survey. For both dimensions (biodiversity conservation vs. emission reduction and landscape protection vs. emission reduction) we asked whether respondents perceived them as trade-offs or as synergies (in b). The slider response categories were collapsed into three bins: preference for emission reductions (values 1 to 4), equal importance (0), and preference for biodiversity/landscape protection (-4 to -1) (in a and b).

Figure 6: The role of first- and second-order beliefs for technology acceptance



Notes: Explaining technology acceptance with first- and second-order trade-offs and first-order synergies. Points indicate estimated coefficients, and whiskers show 95% confidence intervals from OLS regressions. The vertical axis lists the explanatory variables, and the horizontal axis represents marginal means, holding constant the control variables left-right, trust in science, climate salience, urban-rural residence, gender, whether the respondents are coping on their current income, and their confidence in the prior beliefs.

5 Beliefs about other's beliefs matter for PV adoption

This study builds on previous research on PV adoption based on the first EDGE survey by delving deeper into the role of beliefs – again not only own personal attitudes but also what other people think. In so doing, this study contributes to the second research question and complements the study presented in in the previous section by adding a stronger market acceptance dimension. The full results are presented in:

Hecher, M.A., Montfort, S., Binder, C.R. **Beliefs about other's beliefs matter: From socio-political technology support of rooftop PV to individual adoption behaviour. Working Paper.**

5.1 Motivation

The transition toward renewable energy systems requires the alignment of ambitious policy targets with local implementation. Despite consistently high public support, deployment frequently encounters delays, resistance and stalled market diffusion. As observed by the case of PV in Switzerland in Section 3, its deployment on buildings is among the most popular and socially accepted energy technologies (see Figure 1), yet the technical potential of rooftop PV remains far from fully exploited. Social ac-

ceptance research conceptualizes this phenomenon through the 'social-individual gap', where high general support for certain technologies contrasts with resistance or inaction within one's own living environment. As shown by recent research, a potential reason for this gap could be that climate policy support and individual energy-related behaviour is not only shaped by first-order beliefs (personal attitudes), but also by second-order beliefs, defined as what individuals believe others in their social environment think and do.

In this study, we investigate how these first- and second-order beliefs influence rooftop PV adoption among Swiss homeowners (N=716). We hypothesized that adoption is influenced not only by socio-technical context (e.g., income, age, infrastructure) and personal attitudes, but also by social norms - specifically, homeowners' perceptions of what others believe or do. Furthermore, we anticipated that the influence of these beliefs varies depending on the adoption stage, as the psychological mechanisms may differ between those who have already developed an intention to adopt (potential adopters) and those who have not yet done so (unlikely adopters).

5.2 Survey design

To test this, we conceptualized first-order beliefs as general environmental attitudes, trust in public authorities and science, the perceived economic viability of PV, and socio-political support for PV deployment in Switzerland. Second-order beliefs were defined as social norms encompassing both the immediate social network (family, friends, neighbours) and the general Swiss population. This includes descriptive norms (perceived prevalence of PV) and prescriptive norms (perceived expectations from peers). Notably, the study was designed to mimic first-order beliefs at the second-order level. We therefore also captured homeowners' perceptions of the Swiss population's trust, perceived economic viability, and socio-political support for PV.

5.3 Key findings

Our findings reveal a distinct hierarchy of influencing factors across different adoption stages. For developing an initial intention to adopt solar PV, the primary drivers - beyond household income - are the personal perception of economic viability and socio-political support of PV, alongside prescriptive norms (expectations from significant others). The transition from an unlikely adopter to a potential adopter is therefore primarily driven by personal attitudes and the influence of the inner social circle. In contrast, the transition from intention to actual adoption is driven by descriptive norms and second-order beliefs about the Swiss population. While existing technical infrastructure (i.e., electric vehicles and heat pumps) is a significant predictor, the final step toward adoption is also influenced by the homeowners' perceptions of how widely PV is supported across Switzerland. Essentially, the visibility of the technology and the perceived 'societal standard' act as the final push for implementation.

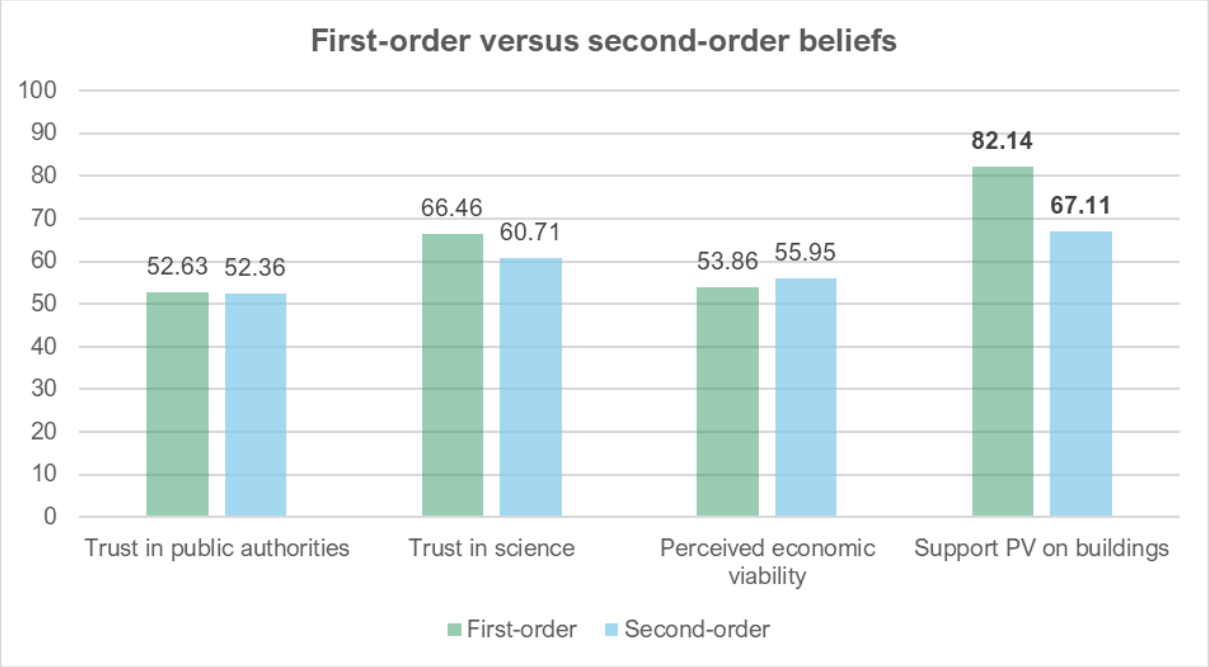
Furthermore, the study highlights a significant belief gap. While personal socio-political support for building-integrated PV is very high (82%), homeowners clearly underestimate collective support (Figure 7). This reveals that while Swiss homeowners are personally convinced of the technology's value, they do not realize that the vast majority of their fellow citizens share this view. Conversely, perceptions of economic returns and institutional trust remain well-aligned between personal and perceived societal beliefs.

5.4 Implications

These results suggest that a promising avenue for fostering PV adoption and closing the 'social-individual' gap may lie in addressing belief structures and social norms at different scales. Personal convictions and high-level socio-political support are necessary to spark initial interest, but the perception of a broad societal consensus is what drives the final decision to install. For unlikely adopters, interventions should leverage interpersonal networks to activate prescriptive norms, such as through community-based peer learning events. To facilitate implementation among potential adopters, communication strategies should aim to correct the systematic underestimation of societal support. By highlighting the broad socio-

political consensus and reframing solar PV as a normative societal standard, policymakers can help bridge the gap between intention and action.

Figure 7: Comparison of Swiss homeowners' first- and second-order beliefs related to institutional trust, perceived economic viability, and socio-political support of PV



Notes: S**tandardized values 0-100; original Likert scales.**

6 Distributional effects

In this study, we answer the research question, how does information about distributional effects influence public support for regulatory climate policy instruments? And, can additional redistributive measures increase support?

Brückmann, G., Torné, A., Trutnevyte, E. and Stadelmann-Steffen, I. (2026). **Redistribution is unlikely to overcome distributional concerns about regulatory climate policies in the residential sector.** *Working Paper.*

6.1 Motivation

While climate scientists largely agree that we are in a severe climate crisis, political leaders around the world struggle with the necessary drastic reductions in greenhouse gas emissions. The academic literature attributes this to low public support for ambitious climate policies often due to domestic distributive conflicts over short-term policy costs, especially for market-based policies. Unlike most previous research, this study focuses on two regulation-based policy measures that target the residential sector. Given that the residential building sector is a major source of GHG emissions in many developed countries, more ambitious emission reduction measures are indispensable for achieving climate goals. While both policies studied target the same level of GHG emissions reductions in the Swiss residential sector, the distribution of costs between tenants and houseowners (in flats and in houses, respectively) differs).

6.2 Experimental Design

In this experiment, all respondents were informed (in random order) about the two regulatory policy measures (an obligation to retrofit building envelopes and a ban on the installation of fossil-fuelled boilers) and their effectiveness in terms of GHG emissions reductions.

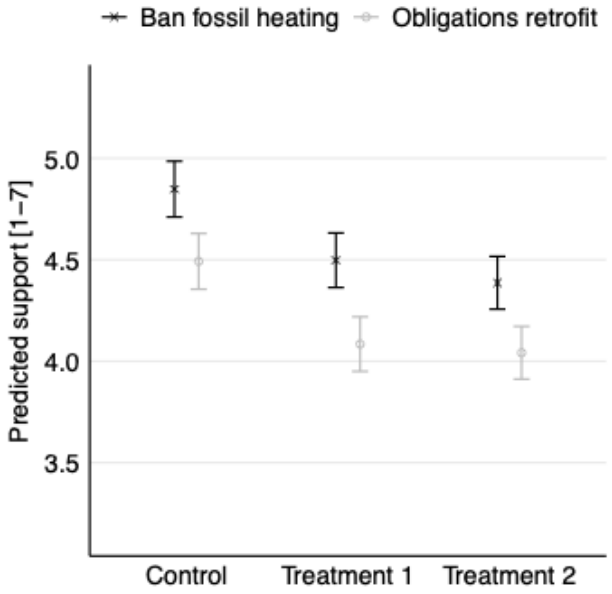
Additionally, the first experimental group also received information on the distributive impacts for both tenants and owners, i.e., how many would pay more or less because of the policy. This information was grounded in techno-economic modelling. In the second experimental group, the policy was enhanced with an element of social protection for financially vulnerable households (either policy exemptions that reduce effectiveness by 5 percentage points or targeted subsidies, which keep policy effectiveness constant). Members of this second treatment group were informed about the respective distributive impacts of this combined policy, displayed in the same disaggregated style as in the first experimental group.

6.3 Key findings

Overall, our analyses indicate that individuals tend to evaluate regulatory climate policies in the residential building sector positively, especially the ban on fossil-fuel heating systems, which enjoys greater public support than the obligation to retrofit the least insulated building envelopes. This pattern corresponds to the policies' distributional effects: the ban imposes negative financial consequences on fewer people than the retrofit obligation does, and it is slightly cheaper. In addition, the (relative) popularity of the ban is likely reinforced by the fact that it applies only when a new heating system is installed.

Despite the overall favourable attitude toward regulatory policies, our central result (see Figure 8) shows that support for these policy measures declines markedly once individuals are informed about their distributional implications. This is in line with the distributive information, which indicates that with both policies, a majority of households are likely to see their costs increase, while only a comparatively small share can expect to benefit financially.

Figure 8: Policy support contingent on treatment group



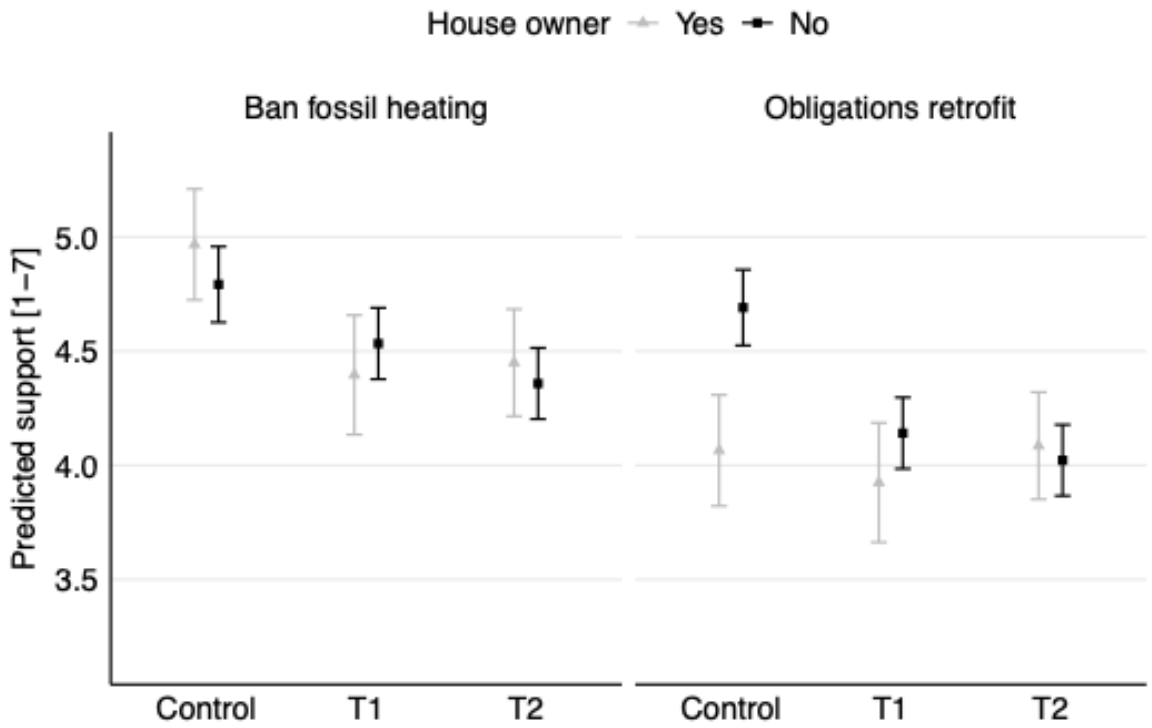
Note: Predictions for policy support [measured on a 7-point Likert-scale, from "completely oppose" (1) to "completely support" (7)] based on a linear random intercept model, using n=1831 respondents, split by policy.

Moreover, the redistributive measures we tested, targeted exceptions and additional subsidies for financially vulnerable households, are unable to fundamentally change the socially undesired distributive impacts of the studied policy measures, nor do they positively affect public opinion. Based on our analysis, we cannot determine whether individuals fail to notice the attempts to address distributional concerns (via the additional measures introduced in the second treatment group), or whether they simply do not value them sufficiently to increase their support for the policies combined with a redistributive measure. Even with redistributive adjustments, all policy designs remain slightly regressive, and the provided distributive information is likely to continue to signal that these policy mixes will impose costs on most people.

Subgroup analysis informs us that house owners and tenants react similar to the experimental treatment, except that for house owners, see Figure 9, the obligation to retrofit building envelopes does not drop in support when distributional information is mentioned, they likely already knew that it would be costly.

Our study is not without limitations. First and foremost, we cannot know whether the negative effect of distributive consequences results from their perceived unfairness or from self-interest. There might be cases we have not considered, such as people who live in rented housing but own housing (such as a holiday home) elsewhere, or who expect to soon be homeowners.

Figure 9: Treatment effects by policy instrument and house owner vs. tenant status



Note: Predictions for policy support [measured on a 7-point Likert-scale, from “completely oppose” (1) to “completely support” (7)] based on a linear random intercept model, using n=1831 respondents, by house owners and tenants as well as flat owners, split by policy.

6.4 Implications

Our analysis, presented in Figure 7 highlights that the moment the distributional costs of residential decarbonization policies become visible, they strongly shape public opinion. The redistributive measures we tested, targeted exceptions and subsidies for financially vulnerable households, failed to improve

public opinion, likely because they failed to be clearly perceived as to produce favourable distributional impacts. Thus, to increase public support for the policies once distributional impacts are mentioned, one might need stronger protection policies or better communicate the distributional impacts of the additional protection measures (for example, by using other metrics). Moreover, such policies likely need to compensate for the adverse effects on both vulnerable homeowners and tenants. Due to the high number of tenants in Switzerland, their protection (e.g., by limiting and controlling the pass-through of costs of regulation-induced retrofitting) will be particularly relevant to win political majorities. For financially vulnerable homeowners, in addition to targeted exemptions and subsidies, pay-as-you-save financing mechanisms and zero- or low-interest loans could be considered. Future research should test different policy mixes and strategies to communicate their (more favourable) distributive impacts.

7 Conclusions

The **second EDGE surv**ey sought to address three key research questions:

1. How has social acceptance of Swiss energy policy evolved since 2022, particularly amid shifting boundary conditions?

2. What are the drivers and barriers influencing public acceptance of open-field/alpine PV and wind energy?

3. How do citizens perceive the distributional effects of energy policies, and how do these perceptions shape acceptance of specific measures?

While analysis of the survey data remains ongoing, this Deliverable Report presents initial findings that offer preliminary answers to these questions.

First, descriptive analyses reveal remarkable stability in both technology acceptance and support for core policy principles. Despite changing circumstances, Swiss citizens continue to strongly back renewable energy, especially building-level PV and large-scale hydropower, while expressing significant scepticism toward electricity imports and gas as part of Switzerland's future energy mix. However, notable shifts have emerged, likely tied to evolving public debates. For instance, the emotionally charged discussions surrounding alpine PV projects in the context of the *Solarexpress*, likely amplified by rather repeated media coverage, appear to have negatively influenced perceptions of open-space PV. This pattern aligns with insights from social acceptance research, which show that citizens often support (more abstract) technologies but are more reluctant to endorse concrete projects (Dermont et al. 2007; Wüstenhagen et al. 2007). Put differently, the public debate has concretized open-space PV in Switzerland, making its benefits but importantly also its challenges more visible and accessible to citizens.

Second, still speaking to the first research question, the survey provides timely insights into Swiss attitudes toward EU collaboration in securing electricity supply, at a critical juncture ahead of the referendum on new bilateral agreements. The results reaffirm the population's strong preference for energy independence. Moreover, early data on the electricity agreement reveal a polarized public, with substantial undecided voters, suggesting high uncertainty in the referendum's outcome. Notably, for some voters, particularly those aligned with the SVP, the electricity agreement may be secondary to broader opposition to bilateral EU treaties, risking rejection for reasons unrelated to energy policy itself.

Thirdly, the study on trade-off and synergy beliefs and on the role of second-order beliefs provide insights on the second research question. It identifies own beliefs about trade-offs and synergies related to renewable energy infrastructure as crucial for public opinion on infrastructure projects. In accordance with the descriptive findings discussed before, own trade-off beliefs are heavily shaped by left-right ideology, climate salience, and income. The findings further suggest that "true information" about what



others think does barely lead to a reconsideration of own beliefs. The results suggest that in polarized contexts, where trade-off narratives dominate political discourse, even a well-informed public tends to hold predetermined and hard-to-change opinions. Misperceptions about others' views may persist, and opposing actors could strategically amplify these misperceptions, reinforcing local resistance despite broad societal support for emission reductions. To address the root causes of opposition, policymakers should prioritize participatory processes, benefit-sharing mechanisms, and procedural fairness, rather than relying solely on persuasive messaging. These approaches offer a more effective path to overcoming resistance and fostering acceptance.

Fourth, the study on first and second-order beliefs for houseowners PV adoption reveals that what other beliefs also affects individual action. More specifically, particularly the difference between being a potential adopter and those who do the last step and actually do adopt PV is significantly related to homeowners' perception of how other support PV. Importantly, however, the study also reveals a belief gap, namely that homeowners underestimate the collectives support for PV. This can be consequential as these second-order beliefs set what is considered the "societal standard" and acts as final push for adoption. To encourage wider adoption, communication strategies should address the common misperception of limited societal support. Emphasizing the broad socio-political consensus and positioning solar PV as a societal norm can help policymakers turn public intention into concrete action.

Fifth, the results presented in this report provide (partial) answers to the third research question: Individuals tend to strongly perceive distributional cost effects of decarbonization policies if they become visible and accessible. The experimental analysis of two residential decarbonization policies reveals that support for these policies dropped significantly once people became aware of their distributional consequences for both homeowners and tenants. These findings suggest that ambitious decarbonization policies may face substantial public resistance as soon as their distributional effects become part of the public debate. Additionally, the redistributive measures tested, such as targeted exemptions and extra subsidies for financially vulnerable households, failed to increase public support, likely because they did not clearly demonstrate improved distributional impacts. To address the negative impacts on vulnerable homeowners and tenants, stronger support measures may be necessary.

Based on the in-depth analyses of the presented studies, policy implications have been formulated, which are elaborated and explained in detail in the respective full papers and not repeated here. Instead, we formulate three implications and recommendations with respect to the role of population surveys in the Swiss energy transition:

1) Monitoring public opinion

Survey research is essential for **tracking the evolution of public attitudes** toward renewable energy policies and technologies. As demonstrated by the EDGE survey, public opinion can remain stable on broad principles (e.g., support for building-level PV and hydropower) while shifting in response to specific debates (e.g., alpine PV projects). Regular surveys enable policymakers to **identify emerging trends, anticipate resistance, and adapt communication strategies** to get the population on board. Without this real-time feedback, policies risk losing alignment with societal priorities, especially in dynamic contexts like the energy transition.

2) Assessing the mechanisms behind social acceptance

Surveys provide critical insights into **the drivers and barriers shaping acceptance** of renewable energy projects. The EDGE surveys revealed how factors like ideology, climate salience, income, information and perceptions of distributional effects influence public opinion. By uncovering these mechanisms, surveys help policymakers **design targeted interventions** such as participatory processes, governance structures, communication strategies, or policy design to address root causes of opposition.

They also highlight the limitations of persuasive messaging alone, emphasizing the need for **evidence-based strategies** to bridge the gap between abstract support and concrete project acceptance.

3) Surveys in the context of interdisciplinarity

The EDGE surveys have been, as likely almost no other large-scale population survey, a largely interdisciplinary endeavor. This interdisciplinary approach was not limited to the survey team, comprising experts from various social science disciplines, but also extended to the integration of technical expertise from the broader EDGE consortium. By bridging the gap between technological and modeling advancements and social science research, the surveys demonstrated how collaboration across disciplines can enhance the relevance and impact of survey-based insights. In this regard, the EDGE surveys can serve as a model for future interdisciplinary survey development, offering a blueprint for how energy policies and technological solutions can be designed to be both technically robust and socially viable.

8 References

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