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sweet swiss energy research for the energy transition

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Summary

This report presents findings on regional patterns of policy acceptance with a special focus on the Midlands region. The Midlands is one of the three “EDGE regions,” which, in contrast to the alpine and urban areas, encompasses the rural and peri-urban areas of the Midlands, including the Jura region, as a distinct geographical unit. While the EDGE regions differ in terms of essential techno-economic and socio-political characteristics, the report is guided by the question of how these differences are reflected in regional patterns of policy acceptance. The presence and degree of regional polarization in policy acceptance has implications for the political discourse on energy transition policies with and within the population.

The analyses presented are based on two fundamental assumptions. Firstly, political measures are necessary to achieve energy policy goals, particularly the net-zero target. These measures include subsidies to accelerate the expansion of renewable energies, as well as regulatory actions such as bans and requirements. Secondly, such measures can only be implemented if they are accepted at least to some degree by the population. This is evident in Switzerland through referendums, such as the recent one on the Climate Protection Act in June 2023, where Swiss citizens have the final say on the introduction of political measures. Therefore, it is relevant to understand the population's preferences regarding such measures.

The report focuses on policy acceptance, which encompasses support for both *general policy principles*, e.g., the importance of energy independence, the acceptance of cooperation with the EU and compensating CO_2 emissions abroad but also the populations’ preferences regarding the future energy mix, and *more specific policy mixes* targeted at renewable electricity production. The data for these analyses is derived from the EDGE Survey, a representative, regionally stratified population survey designed and implemented as part of the Sweet EDGE project.

The key finding of the analyses is that regional stratifications, as examined in this study, have little impact on policy acceptance concerning renewable energy. While the EDGE regions differ significantly from a techno-economic and socio-political perspective, there are no substantial regional or Midlands-specific divisions in the indicators of policy acceptance examined. Instead, political-ideological values play a more prominent role in shaping acceptance patterns. Across all analyses, support for measures and strategies for the rapid transition of the energy system increases among those with a left-wing political orientation. In contrast, those with a right-wing political orientation show greater support for traditional energy sources, including nuclear energy, and exhibit lower acceptance of more comprehensive policy packages. The largest consensus across all political camps and regions, likely influenced by the timing of the survey in autumn 2022, is regarding support for energy independence. The analyses also suggest that a stronger inclusion of policy goals and the effectiveness of measures can enhance support for ambitious policy mixes across all ideological groups. The analyses support the assertion that Wittenbach, a model municipality within the Sweet EDGE project, can be regarded as a representative case for the Midlands region.

Based on the empirical findings, the report formulates recommendations for a nationally led discussion on policies to support the energy transition, which places emphasis on the goals to be achieved and the effectiveness of policies while also seeking to counteract existing and avoid further political polarization.

Zusammenfassung

Dieser Bericht präsentiert Befunde zu regionalen Mustern von Policy-Akzeptanz mit einem besonderen Fokus auf das Mittelland. Das Mittelland bildet eine der drei «EDGE Regionen», welches in Abgrenzung zum Alpenraum und urbanen Räumen als dritte geographische Einheit die ländlichen und periurbanen Gebiete des Mittelands unter Einbezug der Juraregion umfasst. Während sich die EDGE Regionen hinsichtlich wesentlicher techno-ökonomischer, aber auch sozio-politischer Merkmale unterscheiden, ist der Bericht von der Frage geleitet, inwiefern sich diese Unterschiede in regionalen Mustern der Policy-Akzeptanz spiegeln. Das Ausmass zu dem eine regionale Polarisierung bezüglich politischer Massnahmen besteht, beeinflusst, auf welcher Ebene und wie politische Diskurse über die Energietransition in und mit der Bevölkerung geführt werden sollen.

Die vorgestellten Analysen basieren auf zwei wesentlichen Annahmen. Erstens, dass für die Erreichung der energiepolitischen Ziele, insbesondere das Netto-Null Ziel, politische Massnahmen nötig sind. Dazu gehören beispielsweise Subventionen zur Beschleunigung des Zubaus erneuerbarer Energien, aber auch regulative Massnahmen wie Verbote und Gebote. Zweitens sind solche Massnahmen allerdings nur umsetzbar, wenn sie mindestens zu einem gewissen Grad von der Bevölkerung akzeptiert werden. Dies zeigt sich in der Schweiz offensichtlich bei Volksabstimmungen, wie zuletzt zum Klimaschutzgesetz im Juni 2023, bei denen die Schweizer Bürgerinnen und Bürger ganz offiziell das letzte Wort über die Einführung von politischen Massnahmen hat. Es ist entsprechend relevant, die Präferenzen der Bevölkerung hinsichtlich solcher Massnahmen zu kennen.

Im Zentrum des Berichts steht deshalb die Policy-Akzeptanz, welche breit gefasst wird. Einerseits beinhaltet die Policy-Akzeptanz in diesem Bericht die Unterstützung *von allgemeinen Policy-Leitlinien*, wie beispielsweise die Bedeutung der Energieunabhängigkeit, die Akzeptanz der Zusammenarbeit mit der EU, der Kompensation von CO2-Emissionen im Ausland aber auch die Präferenzen der Bevölkerung hinsichtlich des künftigen Energiemixes, sowie andererseits die Akzeptanz von *konkreteren Policy-Paketen* zur Förderung der erneuerbaren Stromproduktion. Als Datengrundlage dient die EDGE Befragung, eine repräsentative, regional geschichtete Bevölkerungsumfrage, welche im Rahmen von Sweet EDGE konzipiert und umgesetzt wurde.

Der Hauptbefund der Analyse ist, dass die Policy-Akzeptanz im Bereich erneuerbarer Energie nur wenig von regionalen Mustern, wie sie in diesen Analysen im Zentrum standen, gekennzeichnet ist. Während sich die EDGE Regionen aus techno-ökonomischer und sozio-politischer Sicht durchaus wesentlich unterscheiden, gibt es in den untersuchten Indikatoren der Policy-Akzeptanz keine wesentlichen regionalen oder gar Mitteland-spezifische Spaltungen. Vielmehr sind politisch-ideologische Einstellungen viel prägender für die Akzeptanzmuster. Über alle Analysen hinweg steigt die Unterstützung für Massnahmen und Strategien zur raschen Transition des Energiesystems mit einer linken politischen Einstellung, während mit rechter politischer Orientierung der Rückhalt traditioneller Energieträger wie auch der Nuklearenergie grösser und die Akzeptanz weitereichender Policy-Pakete geringer ausfällt. Über alle Lager und Regionen hinweg die grösste Einigkeit herrscht – geprägt auch vom Zeitpunkt der Umfrage im Herbst 2022 – in Bezug auf die Unterstützung der Energie-Unabhängigkeit. Die vorgestellten Analysen weisen ausserdem darauf hin, dass ein stärkerer Einbezug von Politik-Zielen sowie der Effektivität von Massnahmen die Unterstützung von weitreichenden Politikmassnahmen über alle ideologischen Gruppen hinweg stärken kann. Die Analysen bestätigen des Weiteren, dass Wittenbach, eine Modellgemeinde im Rahmen des Sweet EDGE-Projekts, als typischer Fall für das Mittelland betrachtet werden kann.

Basierend auf den empirischen Ergebnissen formuliert der Bericht Empfehlungen für eine national geführte Diskussion über Massnahmen zur Unterstützung der Energietransition, welche Fragen der zu erreichenden Ziele und der Politik-Effektivität ins Zentrum stellt und versucht, der bestehenden politischen Polarisierung entgegenzuwirken und weitere Polarisierung zu vermeiden.

Résumé

Ce rapport présente des résultats sur la fragmentation régionale de l'acceptation des politiques, avec un accent particulier sur la région du Plateau. Le Plateau forme l'une des trois «régions EDGE», qui, contrairement à la région alpine et aux zones urbaines, englobe les zones rurales et périurbaines du plateau central et de la région du Jura. Alors que les régions EDGE diffèrent en termes de caractéristiques techno-économiques et socio-politiques essentielles, le rapport est guidé par la question de savoir dans quelle mesure ces différences se reflètent dans une fragmentation régionale d'acceptation des politiques. L'existence d'une polarisation régionale en matière de mesures politiques influence le niveau et la manière dont le discours politique sur la transition énergétique devrait être mené avec la population.

Les analyses présentées reposent sur deux hypothèses principales. Premièrement, que des mesures politiques sont nécessaires pour atteindre les objectifs de la politique énergétique, notamment l'objectif de neutralité carbone. Il s'agit par exemple de subventions visant à accélérer le développement des énergies renouvelables, ainsi que de réglementations telles que des interdictions et des obligations. Deuxièmement, de telles mesures ne peuvent être mises en œuvre que si elles sont acceptées par la population à un certain degré. Cela est évident en Suisse lors des référendums, comme celui récent sur la loi sur la protection du climat en juin 2023, où les citoyens suisses ont officiellement le dernier mot sur l'introduction de mesures politiques. Il est donc important de connaître les préférences de la population à l'égard de telles mesures.

Le rapport se concentre donc sur l'acceptation des politiques, qui est définie de manière large et comprend le soutien à la fois des *principes politiques généraux*, comme par exemple l'importance de l'indépendance énergétique, l'acceptation de la coopération avec l'UE, la compensation des émissions de CO2 à l'étranger, mais aussi les préférences des populations concernant le futur bouquet énergétique, ainsi que des ensembles de *mesures politiques plus concrètes* visant le déploiement de l'électricité renouvelable. L'enquête EDGE, une enquête représentative de la population stratifiée par région, conçue et mise en œuvre dans le cadre de Sweet EDGE, sert de base de données.

La principale conclusion de l'analyse est que l'acceptation des politiques dans le domaine des énergies renouvelables est peu caractérisée par une fragmentation régionale. Bien que les régions EDGE diffèrent considérablement d'un point de vue techno-économique et socio-politique, il n'y a pas de divisions régionales substantielles ni même spécifiques au Plateau dans les indicateurs d'acceptation des politiques étudiés. Au contraire, les valeurs idéologiques sont beaucoup plus déterminantes pour l'acceptation des politiques. Dans toutes les analyses, le soutien aux mesures et aux stratégies pour une transition rapide du système énergétique augmente avec une orientation politique de gauche, tandis qu'avec une orientation politique de droite, le soutien aux sources d'énergie traditionnelles, y compris l'énergie nucléaire, est plus fort et l'acceptation de politiques plus ambitieuses est plus faible. La plus grande unité, à travers tous les camps et toutes les régions - également influencée par le moment de l'enquête à l'automne 2022 - se trouve en ce qui concerne le support de l'indépendance énergétique. Les analyses présentées indiquent également qu'une meilleure intégration des objectifs politiques et de l'efficacité des mesures peut renforcer le soutien à des mesures politiques ambitieuses, quelles que soient les orientations idéologiques. En outre, les analyses confirment que Wittenbach, une commune modèle dans le cadre du projet Sweet EDGE, peut être considérée comme un cas typique de la région du Plateau.

Sur la base de ces résultats, le rapport formule des recommandations pour une discussion menée au niveau national sur les mesures visant à soutenir la transition énergétique, en mettant l'accent sur les objectifs à atteindre et l'efficacité des politiques, tout en cherchant à contrer la polarisation politique existante et à éviter toute polarisation supplémentaire.

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1 Introduction

The transition of energy systems from fossil and nuclear to renewable energy sources represents a multifaceted challenge for almost all societies, including Switzerland. Besides the technical challenges, the “social side” (Batel, 2018), e.g., the acceptance of policies and projects by the population and political actors, plays a primordial role in these processes, most often acting as an important barrier to the necessary rapid and fundamental changes (Stadelmann-Steffen et al., 2021). For this reason, it has been widely acknowledged that governments need to implement political measures to accelerate the transformation. In democracies, a political system characterized by its responsiveness to the expressed views and will of citizens, public acceptance of policies plays a crucial role in ensuring their legitimacy (Deacon & Shapiro, 1975). Without at least a certain degree of public support, policies are hard to implement successfully, either because their introduction poses electoral risks (Burstein, 2003) or because unpopular measures are likely to be rather ineffective, e.g., because individuals will try to avoid intended behavioral changes (Vanhuysse et al., 2021). In this context, recent research dealing with policy acceptance has emphasized the multidimensional nature of political measures as well as of individual preferences and has, accordingly, focused on how specific policies and their design affect policy support (Hainmueller et al., 2014; Roosma et al., 2013; Truelove, 2012). The main argument of this literature is that policy measures will typically include elements that individuals like, whereas they reject others (Stadelmann-Steffen & Dermont, 2018). This idea indeed reflects many popular debates, e.g., in the context of direct-democratic votes (Dermont & Stadelmann-Steffen, 2020), during which the pros and cons of a certain proposal are extensively discussed.

In this study, we take this literature as a starting point to argue that “policy acceptance” is a multidimensional concept. This multidimensionality needs to be considered to understand better why and under which conditions citizens accept or oppose certain measures. Moreover, we go beyond existing research in two respects.

First, most research on policy acceptance in Switzerland has traditionally focused on a national perspective (Dermont & Stadelmann-Steffen, 2020; Stadelmann-Steffen & Dermont, 2018; Visschers & Siegrist, 2012; Wicki et al., 2020). However, there are important regional differences, e.g., in energy harvesting potentials, economic structures, and prevailing political norms and attitudes. Moreover, institutionally, the Swiss energy system is a typical example of competencies distributed across the different federal levels with an important role of the cantons (Stadelmann-Steffen et al., 2018). Such varying technological, economic and socio-political conditions might be associated with regional patterns of policy acceptance (Kammermann & Ingold, 2018). Therefore, we aim to explore the degree of geographical polarization among Swiss residents regarding energy policy acceptance. For example, do citizens in the Midlands emphasize different policy principles and support other policies than their counterparts in alpine or urban areas? Knowing more about regional acceptance patterns is relevant for two reasons. On the one hand, insights about regional differences in policy acceptance can facilitate the identification of acceptable regional policy approaches in the federalist system. On the other hand, the identification of shared acceptance (or opposition) patterns, i.e., aspects on which consensus across regions exists, can help to define and trigger debates about policies from a national perspective. Hence, we will examine the role of the regional context in policy acceptance, with a particular focus on one of the three EDGE regions, the Midlands.

Second, alongside recognizing the crucial role of policy design in eliciting policy support, this study aims to highlight another fundamental but frequently neglected factor that can shape individuals’ opinion formation and subsequent endorsement of policies: the role of policy goals. We contend that in current scientific and public discussions, policies are often deliberated without sufficient consideration of their efficacy in attaining specific objectives. This oversight is remarkable, considering that the essence of policymaking lies in policy effectiveness (Peters et al., 2018), which entails designing and implementing political measures to realize governmental goals.

Therefore, our investigation focuses on two key aspects of policy acceptance. Firstly, we delve into the *policy principles* that underpin Swiss energy policy and serve as a guide for more concrete policy decisions. Secondly, we examine the acceptance of *more specific policy instruments and mixes*. To analyse the influence of policy goals on the acceptance of ambitious policy mixes, we have developed

a novel survey instrument for experimental analysis. While we present an extended abstract and Midlands-specific results in this Deliverable Report, the comprehensive findings, presented as a scientific article, are provided as a separate document attached to this Deliverable Report.

The data presented in the following has been collected within a large-scale survey conducted in Switzerland from August 26 to October 31, 2022. An invitation to the survey was sent out to a random sample of the Swiss resident population, stratified by nine geographical areas, as depicted in Figure 1. Overall, 4'948 respondents completed the survey, which corresponds to a response rate of 36.6%. 2'361 respondents are based in the Midlands as defined for the present analyses. The sample fits population metrics with respect to gender, age and education quite well, while higher-income individuals (as it is often the case in surveys) are somewhat overrepresented. Regional differences are presented graphically, whereas OLS and logistic regressions have been used (and are presented in the Appendix) to test whether observed differences are statistically significant. In these regression models, we controlled for household income, educational level, age, gender, whether an individual owns the house or flat as well as self-placement on the political left-right scale to account for potential regional composition effects. To analyze the experimental data on policy mix acceptance, we rely on logistic regression models, as they are appropriate for binary dependent variables, such as favoring a certain policy proposal.

This report is structured as follows. First, we define and characterize the Midlands as one of three EDGE regions and formulate two contrasting hypotheses about whether techno-economic (technological and economic conditions) and socio-political (socio-structural and political) differences between the Midlands and other EDGE regions translate into corresponding regionalized patterns of policy acceptance. Section 3 presents survey results on the acceptance of policy principles in Swiss energy policy in the Midlands and elsewhere, including an in-depth analysis of the acceptance of open-space PV. Section 4 delves deeper into policy acceptance among inhabitants of Wittenbach – a model municipality in the EDGE project. In Section 5, we then focus on the acceptance of policy mixes to reach specific renewable electricity goals. The report concludes with Section 6, which summarizes the findings and discusses the implications and recommendations resulting from this study.

2 Who is the Midlands

2.1 Definition of EDGE regions

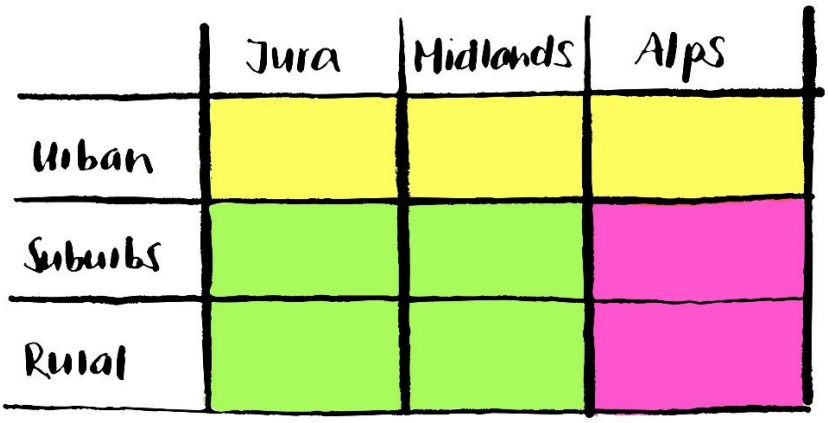
Within the EDGE consortium, three geographical regions have been defined based on two main geographical dimensions, namely the geographical zones[1] (Alps, Midlands, Jura) and the spatial typology of urban, peri-urban and rural areas.[2] As Figure 1 illustrates, the Midlands, as conceptualized in the Sweet EDGE consortium and for the present analyses, contain rural and suburban areas in the geographic Midlands and the Jura zone. To understand this definition of the Midlands, especially the inclusion of the Jura region, it needs to be stated that this region is, to a certain degree, a residual category besides two clearly distinct regions: The alpine and the rural areas. Hence, the Midlands basically refers to those areas of Switzerland that are not urban and not alpine. In the following, whenever we mention the Midlands, we always refer to this definition.

While later reports will focus on urban and alpine areas, the present report concentrates on the Midlands. It aims at identifying this region's peculiarities by distinguishing data from the Midlands from the rest of Switzerland. The subsequent subsections provide an overview of the existing knowledge and EDGE survey results regarding the techno-economic and socio-political characteristics of the Midlands region. While the former capture factors such as the technological potential and availability but also economic aspects of technologies, the latter includes the socio-economic and political composition of the population. The insights on the techno-economic and socio-political characteristics subsequently guide our expectations regarding policy acceptance and empirical analyses.

[1] https://www.eda.admin.ch/aboutswitzerland/de/home/umwelt/geografie/geografie---fakten-und-zahlen.html

[2] https://www.bfs.admin.ch/bfs/de/home/statistiken/querschnittsthemen/raeumliche-analysen/raeumliche-gliederungen/raeumliche-typologien.html

Figure 1: Preferences regarding Swiss energy policy



Note: Yellow = Urban; Pink = Alps, Green = Midlands

2.2 Socio-technical characteristics of the Midlands

From a techno-economic point of view, the Midlands differs from the other two EDGE regions in several respects. Most important, the role of biomass – not least related to the important role of agriculture[3] – has been identified as a crucial resource for electricity and heat (Mohr et al., 2019; Schnorf et al., 2021). While wind power potential is significant, its utilization has been challenging (Cousse et al., 2020; Spielhofer et al., 2023).

Conversely, the region's high proportion of individual and privately-owned houses facilitates the adoption of solar PV and thermal collectors, although older farmhouses may have limitations[4]. The EDGE survey, moreover, suggests that this significantly higher percentage of homeowners compared to alpine or urban Swiss regions likely contributes to a higher proportion of houses and apartments no longer using oil or gas heating (see Table 1). Generally, it has been shown that renewable energy adoption, particularly PV, has been growing faster in the Midlands compared to other parts of Switzerland (Müller & Trutnevyte, 2020; Thormeyer et al., 2020).

The Midlands have denser transport infrastructure compared to the Alps, with individual vehicles remaining important, especially for dispersed settlements. According to the EDGE survey, nearly all households in the Midlands own a car, which distinguishes it from the rest of Switzerland (Table 1).

2.3 Socio-political characteristics of the Midlands

Table 1 presents several socio-political factors that are relevant in the context of the energy transition as well as for the analyses within the EDGE consortium.

The Midlands exhibit a slightly different socio-economic composition. On the one hand, there is a higher proportion of individuals with secondary education compared to tertiary education. On the other hand, the region has a lower percentage of low-income households compared to urban and alpine areas.

Notably, the Midlands stand out from other regions in terms of political ideology, with a higher number of individuals identifying as right-wing and a smaller proportion of individuals who do not align themselves on the left-right scale. These differences are also reflected in individual party affiliations, indicating a slightly more right-wing and conservative orientation. Although these differences may appear minor, it is important to consider that comparing the Midlands with all other regions, i.e., merging

[3] https://www.atlas.bfs.admin.ch/maps/13/de/17367_5882_5872_4801/26902.html

[4] Bundesamt für Energie, 2016. Sonnendach.ch: Berechnung von Potenzialen in Gemeinden. Bundesamt für Energie, Bern.

alpine and urban areas, poses a conservative test to identify Midlands-specific results.[5] The presence of significant differences supports the conclusion, consistent with previous research concentrating on rural-urban divides (Kübler et al., 2013; Mantegazzi, 2021; Maxwell, 2020), that the Midlands can be characterized by relatively traditional economic structures and slightly more conservative political attitudes compared to other regions in Switzerland. Notably, there are no significant differences between the Midlands and other regions regarding trust in science, which is a focal point in our analysis of policy goals and policy support.

2.4 Expectations about policy acceptance in the Midlands

The analyses conducted in the context of Sweet EDGE and this report are guided by two competing expectations.

On the one hand, from a techno-economic perspective, the Midlands region differs from the other Swiss regions concerning energy potentials (Heinisch et al., 2023) and relevant structural conditions such as transport infrastructure, an important agricultural sector, and house ownership, as described in 2.2. Moreover, also at the socio-political level, the Midlands region is distinct from the rest of Switzerland as right-wing conservative values are significantly more prevalent than elsewhere. Compared to urban areas in particular, conservative values and stronger support for right-wing parties are prevalent in Switzerland's rural and peri-urban areas (Kübler et al., 2013). Hence, it can be assumed that in the Midlands, party-political conflicts about the energy transition are most pronounced, which might serve as a barrier to the acceptance of policies to accelerate the energy transition. In the following analyses, we therefore consider political ideology as a crucial mediating factor of policy acceptance. Overall, these considerations lead to the expectation that the techno-economic and socio-political specificities of the Midlands are related to specific challenges and potentials for accelerating the energy transition and thus to distinct energy policy preferences of Midlanders.

On the other hand, however, it can also be argued that the aforementioned distinct characteristics do not necessarily translate into Midlands-specific policy preferences. An argument that speaks for this view is that current debates about the energy transition and, more recently, about energy security are largely national rather than regional. The acceptance of the Energy Strategy 2050 at the ballot can be seen as one of the most important policy decisions in that respect, followed by the rejected CO_2 Act in 2021 and, most recently, by a 59% majority voting yes on the Climate Protection Act. All these ballot votes have been associated with a strong politicization of the climate and energy issue at the national level. Moreover, with its recent decision to more strongly promote and nationally steer renewable energy production, the national parliament has demonstrated the willingness of national political actors to take responsibility for expediting the energy transition, surpassing the existing cantonal, and thus regional, competencies. A second argument for why regional techno-economic and socio-political differences do not necessarily go hand in hand with regionalized policy preferences is the country's small size, which implies that living in one region still means having rather strong links to the others. For example, people may live in the Midlands but still rely on urban infrastructure and spend holidays in the Alps. Based on these arguments, it can be expected that no relevant differences between the Midlands and other regions can be observed.

We test these competing expectations based on the EDGE survey data.

We conceptualize policy acceptance in a broad way and account for the fact that social acceptance is a multifaceted phenomenon, strongly depending on the specific object of acceptance, the actors and their roles in the policymaking process (Dermont et al., 2017). Therefore, we consider two main elements of socio-political acceptance (Wüstenhagen et al., 2007)[6] that are relevant in different phases of the policymaking process (Dermont et al., 2017):

[5] It needs to be mentioned that this difference between the Midlands and the other regions is driven by the difference between urban areas and the Midlands.

[6] While some analyses include questions of project siting that could be interpreted to be closer to community acceptance, we do not study concrete projects and therefore consider these analyses to still capture socio-political acceptance – with a community acceptance nuance.

Table 1: Socio-economic and political characteristics of the Midlands compared

	Midlands		Other		
	N	Percent	N	Percent	
Education	1838		2890		X2=9.015**
Secondary I	94	5%	165	6%	
Secondary II	885	48%	1263	44%	
Tertiary	859	47%	1462	51%	
Income	1864		2921		X2=28.32***
under CHF 5,000	321	17%	594	20%	
CHF 5,001 to CHF 7,000	392	21%	693	24%	
CHF 7,001 to CHF 9,000	391	21%	578	20%	
CHF 9,001 to CHF 13,000	491	26%	599	21%	
over CHF 13,001	269	14%	457	16%	
Housing conditions	1928		3010		X2=149.999***
Tenant	662	34%	1356	45%	
Own house	987	51%	1044	35%	
Own flat	194	10%	426	14%	
Cooperative	4	0%	51	2%	
Other	81	4%	133	4%	
Heating of the house/apartment	2361		3841		X2=10.668***
(Some) Renewables	1488	63%	2259	59%	
Only oil or gas	873	37%	1582	41%	
Household has…	2186		3529		X2=88.042***
a car	2090	96%	3116	88%	
no car	96	4%	413	12%	
Trust in science	1971		2998		F = 1.62
Mean	7.2		7.3		
SD	2.2		2.3		
Left-right placement[7]	2361		3841		X2=14.767***
Center	527	22%	856	22%	
Left	644	27%	1081	28%	
Right	717	30%	1016	26%	
None	473	20%	888	23%	
Preferred political party	2361		3841		X2=16.214**
Swiss People's Party	241	10%	337	9%	
Liberal Party	247	10%	341	9%	
Green Liberal Party	207	9%	318	8%	
The Center	159	7%	269	7%	
Liberal Party	247	10%	341	9%	
Green Party	152	6%	251	7%	
Social Democrats	182	8%	299	8%	
Other	413	17%	710	18%	
None	337	14%	511	13%	

Notes: Calculations based on the EDGE Survey, 2022. *** / ** = Difference between regions is statistically significant at the 1% / 5% - level, respectively.

[7] The left-right scale ranges from 0 to 10, whereby 0-3 is considered as Left, 4-6 as Center and 7-10 as Right.

First, we focus on **general policy principles of Swiss energy policy**, which guide more concrete policy decisions. On the one hand, these concern the goals of energy policy itself, such as the transition from fossil to renewable energy production. On the other hand, the policy principles also include conditions that should underlie the achievement of the goals, i.e., the way in which the goals should be achieved. In Sections 3 and 4, we study different policy principles, namely the importance of energy independence, the acceptance of cooperation with the EU and compensating CO_2 emissions abroad but also the populations' preferences regarding the future energy mix and the role of the energy provider. These aspects are important policy guidelines. The degree to which the public accepts these principles subsequently facilitates or hinders the acceptance of specific instruments.

Second, **the acceptance of policy instruments and mixes** delves deeper into precisely which policy measures people prefer and accept. It is widely accepted that regulative and incentive-based instruments are particularly relevant to accelerating the energy system's transformation and mitigating climate change (Ingold et al., 2018; Schaffrin et al., 2015). Moreover, these policy instruments typically do not occur in isolation but, to be most effective, are combined in policy packages or policy mixes (Ingold et al., 2019; Schmidt & Sewerin, 2018). Section 5 dives deeper into the acceptance of policy mixes targeted at PV deployment relying on a novel survey experiment. In doing so, we investigate more specifically how the policy goals affect the acceptance of concrete policy mixes.

3 Energy policy preferences in the Midlands

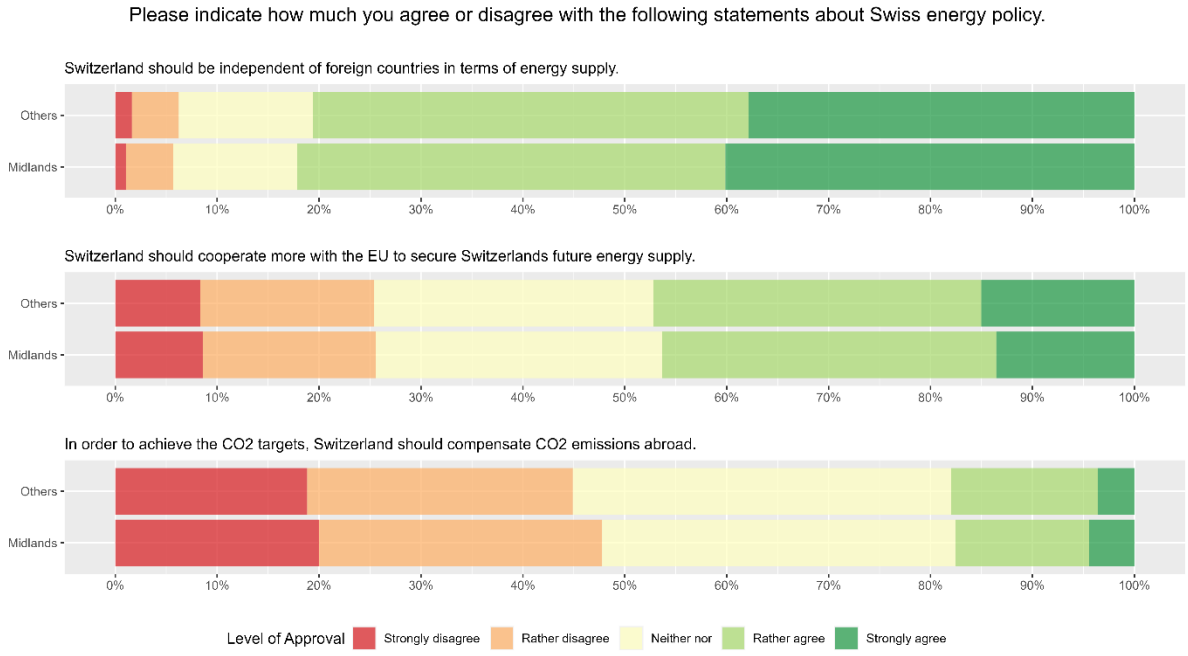
3.1 General principles of Swiss energy policy

Policy principles in the Midlands strongly prioritize energy independence, with over 80% of respondents expressing agreement on Switzerland's need for energy self-sufficiency. While this finding is likely affected by the timing of the survey in the midst of the energy crisis in autumn 2022 (Goldthau & Tagliapietra, 2022), opinions are more divided when it comes to other aspects of Swiss energy policy. Figure 2 illustrates that roughly half of the respondents oppose compensating CO_2 emissions abroad, while the other half either supports or remains open to the idea. Similarly, while only 25% disagree about the need for stronger cooperation with the EU to ensure energy supply, less than 30% are clearly in favor of such collaboration.

Notably, residents of the Midlands support similar policy principles as the broader Swiss population, as indicated in Figure 2. As Table 3 in the Appendix depicts, a certain degree of political polarization about these policy principles can be observed. Whereas energy independence is particularly important to individuals who identify with right-wing political values, cooperation with the EU to secure energy supply is significantly more popular among left-wing individuals. Interestingly, the domestic orientation of right-leaning respondents also covers a more critical view of CO_2 compensation abroad. However, there is no statistically significant difference in policy polarization between the Midlands and other Swiss regions.

When considering the various Swiss energy models, such as the EDGE model intercomparison (Heinisch et al., 2023), it becomes evident that the future energy mix will contain electricity from diverse sources, notably from hydropower and solar energy, but also electricity imports. The specific proportions of these sources are subject to some flexibility and will also be influenced by political decisions that either promote or restrict certain electricity flows. Therefore, public preferences for different energy sources can be considered an important element of the policy principles, influencing the subsequent acceptance of specific policy instruments and mixes.

Figure 2: Preferences for Swiss energy policy



Note: The respective differences between the Midlands and the other Swiss regions is not statistically significant.

Figure 3 illustrates that the Midlands population prefers certain energy sources more strongly than others. Large-scale hydropower already generates over two-thirds of Swiss electricity demand, and photovoltaics (PV) on buildings enjoy significant popularity. Around 90% of Midlands respondents express agreement that PV on buildings should be part of the future energy mix, while over 80% support the inclusion of large-scale hydropower. In contrast, electricity imports are the least favored option, with over 75% rejecting it and only slightly more than 20% agreeing to include gas in the future Swiss energy mix. Other energy sources, including wind power, nuclear energy, and open-space PV, elicit less unified responses from Midlands respondents, with a majority supporting these sources but also significant opposition.

While the Midlands region exhibits high potential for biomass energy from a techno-economic perspective (Mohr et al., 2019; Schnorf et al., 2021), this does not reflect in respondents displaying significantly greater support for this energy source compared to other Swiss regions.[8] Conversely, the Midlands show slightly less enthusiasm for wind energy and open-space PV. No notable differences between the Midlands and the rest of Switzerland are observed concerning the other energy sources.

[8] In fact, theoretically, the link between high energy potential and social acceptance is ambiguous. On the one hand, high potential could be related to greater acceptance because individuals acknowledge that this potential should and likely can be exploited in an economically attractive way. On the other hand, however, if high potential attracts many projects, which become a salient and maybe even conflictual issue in the public discourse, this could also generate negative reactions and hinder subsequent increased deployment of that energy source (Stadelmann-Steffen et al., 2019).

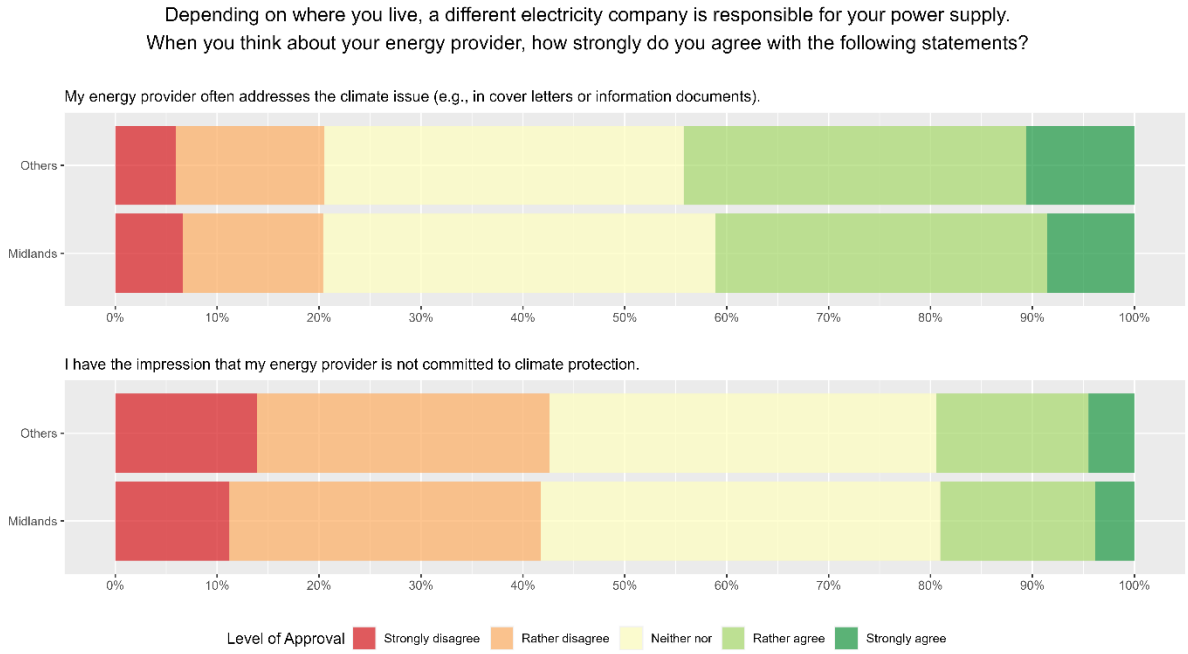
Figure 3: Preferences about the future Swiss energy mix

Note: Based on OLS regressions, only the following differences between the Midlands and the other Swiss areas are statistically significant: Wind turbines and wind farms, open-space PV.

Conversely, as Table 4 in the Appendix depicts, policy mix preferences are ideologically polarized. In the Midlands region, left-wing individuals are more likely to include small-scale and open-space PV, geothermal energy, wind power and biomass into the future energy mix compared to individuals in the political center. In contrast, individuals who place themselves on the political right are more likely to have large hydropower and nuclear energy in their preferred mix. The results also reveal that ideological patterns are consistent among other Swiss regions.

Lastly, an essential aspect of Swiss energy governance is the role of energy providers. While these providers tend to be privately organized companies, many of them are majority- or completely publicly owned. Additionally, they hold regional monopolies for supplying private households. Consequently, electricity providers play a significant role in energy governance from the perspective of citizens. However, as depicted in Figure 4, respondents' perception of energy providers as actors in the energy transition is not particularly positive. Only a minority of respondents agree that energy providers frequently address the climate issue. Moreover, the Midlands region exhibits even greater skepticism in this regard compared to the rest of Switzerland. Only approximately 10% clearly disagree that energy providers are not committed to climate protection.

Figure 4: Perceptions about the local energy provider



Note: The difference in the first item (My energy provider often addresses the climate issue) between the Midlands and the rest of Switzerland is statistically significant.

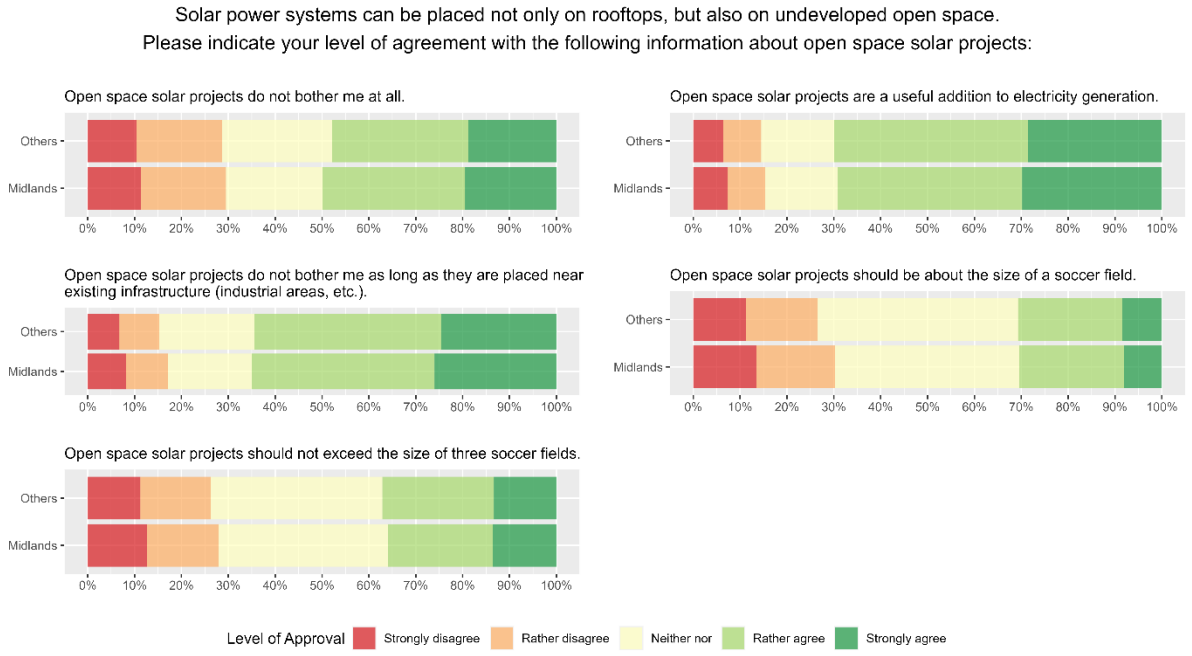
3.2 A focus on open-space PV

Open-space PV, as indicated by the EDGE energy models (Heinisch et al., 2023), plays a significant role in Switzerland's energy transition and has been the subject of intense public discourse, particularly in relation to the recent parliamentary decision to facilitate open-space PV in the Alps.[9] However, Figure 3 above revealed that open-space PV enjoys less support among the population compared to smaller-scale PV on buildings. This subsection delves deeper into citizens' acceptance of open-space PV and the corresponding regulations. First, perceptions of various elements of open-space PV are analyzed, informing about what elements likely should be regulated. Then, the second aspect concerns the typical "Midlands variant" of open-space PV, namely larger PV installations on farmlands, also known as Agri-PV.

Analyzing Figure 5, it can be concluded that a clear majority of respondents consider open-space PV to be a valuable energy source. However, the presented items in the figure also indicate the relevance of regulating the siting of such installations. While slightly less than 50% indicate that open-space PV does not bother them, this percentage increases to over 60% if these installations are located near existing infrastructure. Importantly, both the proportion of clear opponents and the proportion of latent opponents are significantly reduced in the latter case. Although the size of open-space PV installations likely influences their acceptance, the survey results do not provide clear indications on how to regulate their size. In all these dimensions, the Midlands do not exhibit significantly different perspectives than the rest of Switzerland.

[9] AS 2022 543, https://www.fedlex.admin.ch/eli/oc/2022/543/de.

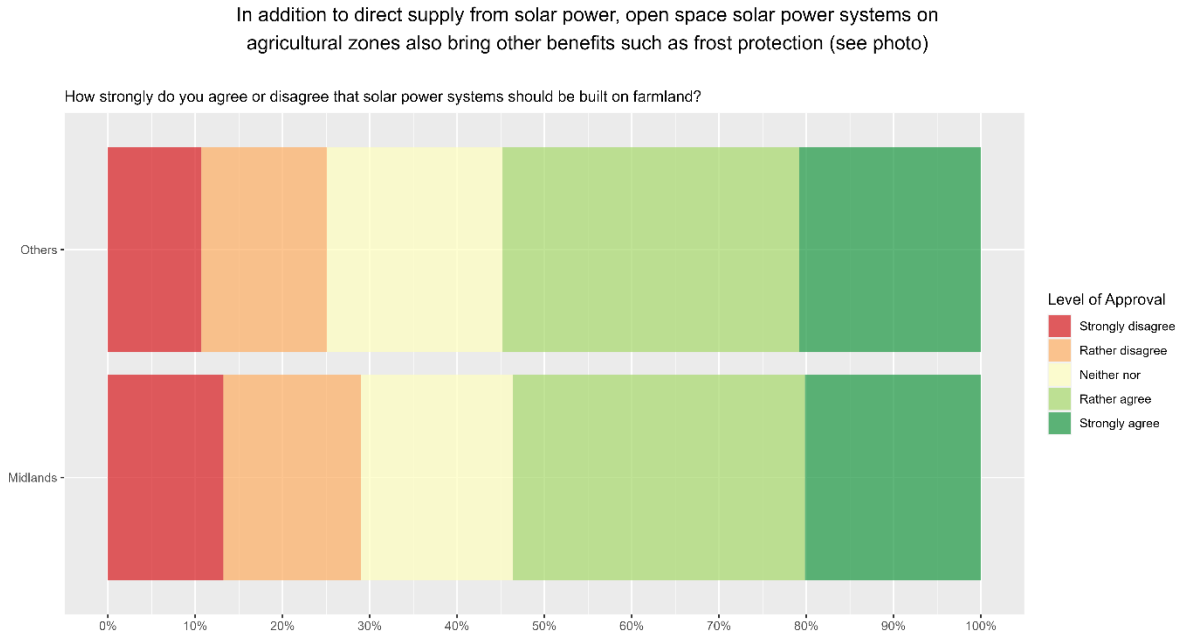
Figure 5: Acceptance of open-space PV promotion in the Midlands



Note: The differences between the Midlands and the rest of Switzerland are not statistically significant.

Figure 6 demonstrates that in the Midlands, as well as in other regions of Switzerland, a slight majority of respondents agree that solar PV should be installed on farmlands. Less than 30% oppose Agri-PV. These numbers show that acceptance of Agri-PV seems to be rather limited. The question wording and framing of these items were very positive, emphasizing the positive side-effects of Agri-PV rather than potential risks and challenges. Against this background, the share of respondents agreeing to Agri-PV can be considered as rather low.

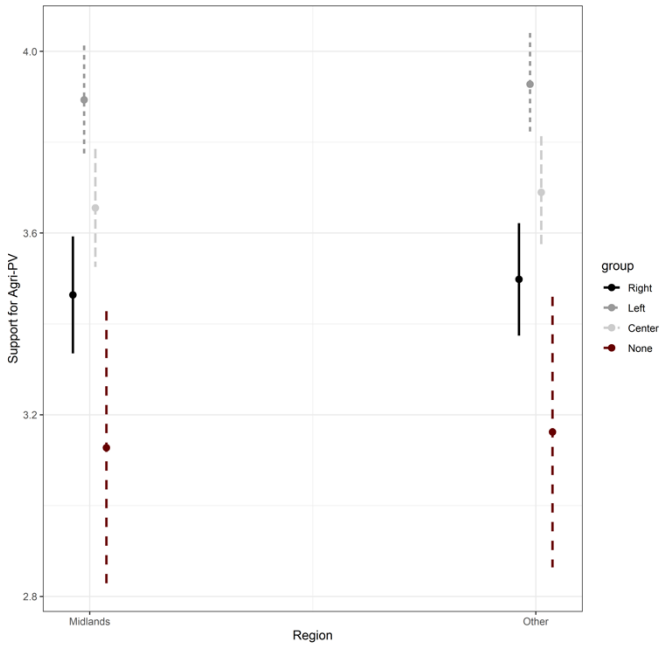
Figure 6: Acceptance of Agri-PV promotion in the Midlands



Note: The difference between the Midlands and the rest of Switzerland is not statistically significant. The photo integrated into the survey question to show what Agri-PV is can be found in Figure 14 in the Appendix.

There are no significant differences between the Midlands and the rest of Switzerland. However, the support for Agri-PV is contingent on political ideology. As Figure 7 shows, agreement with installing PV on farmland is highest among individuals who place themselves on the left side of the political spectrum and decreases with more center and right-wing attitudes. Interestingly, opposition against Agri-PV is strongest among individuals who do not place themselves on the political scale.

Figure 7: Acceptance of Agri-PV contingent on political values



Notes: Predicted agreement to install PV on farmlands based on an OLS regression model controlling for high income, age, gender, and house ownership. The original scale has been inverted, i.e., high values correspond to high agreement to Agri-PV. Differences between ideological groups are significant but the difference between the Midlands and other Swiss regions is not.

4 Wittenbach – a Midlands case study

Besides the main EDGE sample, we also collected data – based on a pretest version of the questionnaire – in the Midlands municipality of Wittenbach (SG).

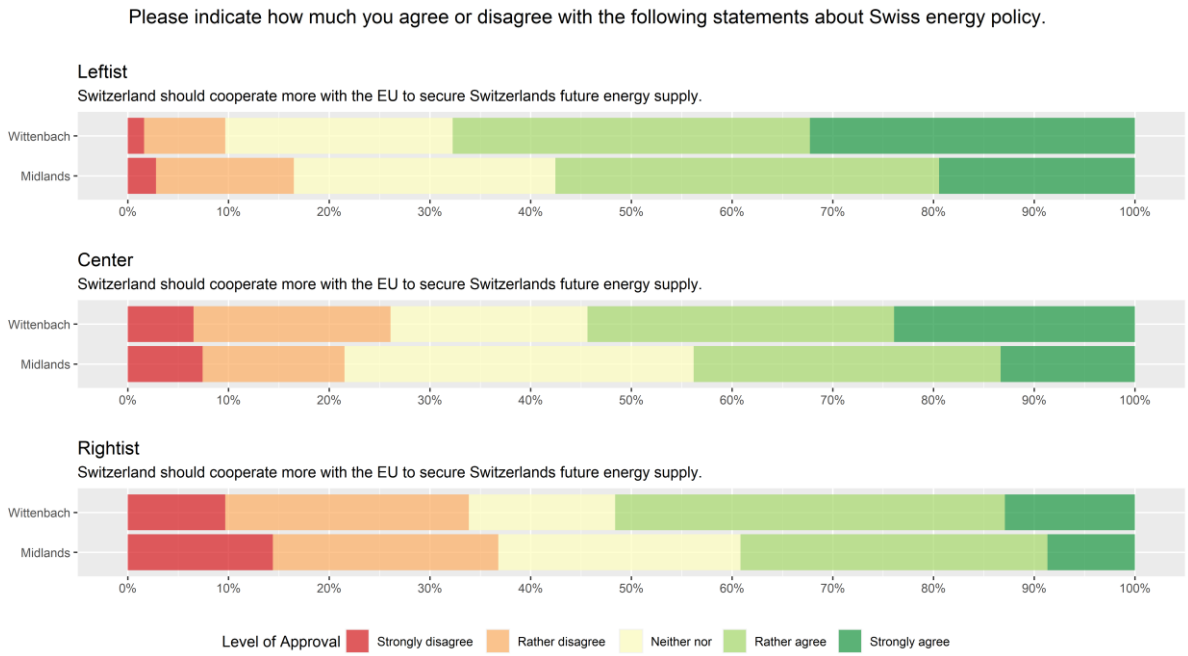
As mentioned above, the Midlands is characterized by a much higher potential for biomass than the other two EDGE regions (Mohr et al., 2019; Schnorf et al., 2021). Biomass can be used for energy production either by burning woody biomass (heat and possibly electricity production) or by fermenting wet biomass in a biogas plant (biomethane or electricity production). For this reason, a model municipality was sought in which a biomass plant could be built in the near future. This municipality should also be typical of the Midlands region in terms of the barriers to energy system transformation. It should therefore be neither particularly progressive nor particularly backward. Based on studying this model municipality, the EDGE project should identify and, if possible, solve typical barriers and problems in the implementation of the energy transition. In addition to the use of biomass, the accelerated expansion of photovoltaics, the construction of decentralized electricity storage systems and the possible production of negative emissions with plant charcoal were to be examined on the basis of this model municipality. In the end, Wittenbach was chosen because it already had a wood-fired heating system for the district heating network, combined with electricity generation, and the possibility of building a biogas plant. Despite its proximity to the city of St. Gallen, Wittenbach has a rural feel. In addition, Laveba, an experienced EDGE partner, was already in contact with the authorities.

This subsection aims to examine whether Wittenbach is indeed a typical Swiss Midlands municipality, and thus whether conclusions can be drawn about the energy transition from Wittenbach to the rest of the Midlands. More specifically, the comparison between the Wittenbach sample collected in the context of the EDGE survey and the Midlands sample provides insights into how "typical" the Midlands case study municipality is. In that context, it needs to be mentioned that survey recruitment in Wittenbach was different from the main EDGE sample. Initially, the municipality informed about the survey and invited inhabitants to participate on its webpage on June 28, 2022, and in the communal newsletter. As turnout was low (less than 100 respondents), the municipality decided to send out 800 invitation letters to a random sample of inhabitants. These letters were sent out in mid-August 2022. In total, 399 respondents participated in the survey, but only 184 completed it.[10]

Overall, it must be assumed that the Wittenbach sample is not representative of the municipal population. In fact, as Table 5 in the Appendix documents, while there is no significant difference between Wittenbach and the Midlands respondents regarding education and income, the Wittenbach sample is more left-green oriented than the Midlands sample. Moreover, survey participants in Wittenbach are slightly more trustful in science. This composition is most likely an effect of self-selection into the survey, i.e., interested and concerned individuals being more likely to participate. This conclusion is corroborated by the fact that Wittenbach repeatedly showed below-average (not above-average as the ideological composition of the sample would suggest) support for recent national ballot measures related to the energy transition.[11]

Against this background, it is interesting to note that in most policy acceptance items, we do not find statistically significant differences between Wittenbach and the Midlands sample. This is particularly the case concerning the strong preference for energy independence and the rejection of compensating CO_2 emissions abroad. This conclusion of similarity, more specifically, also applies to the perception and preference for open-space PV. This can be considered a robustness test for the findings reported in Section 3.

Figure 8: EU-Cooperation to secure energy supply and political ideology



[10] Note that in Wittenbach the rate of "non-finishers" is with 46% much higher in Wittenbach than in the main EDGE main sample, where roughly 80% of respondents finished the survey.

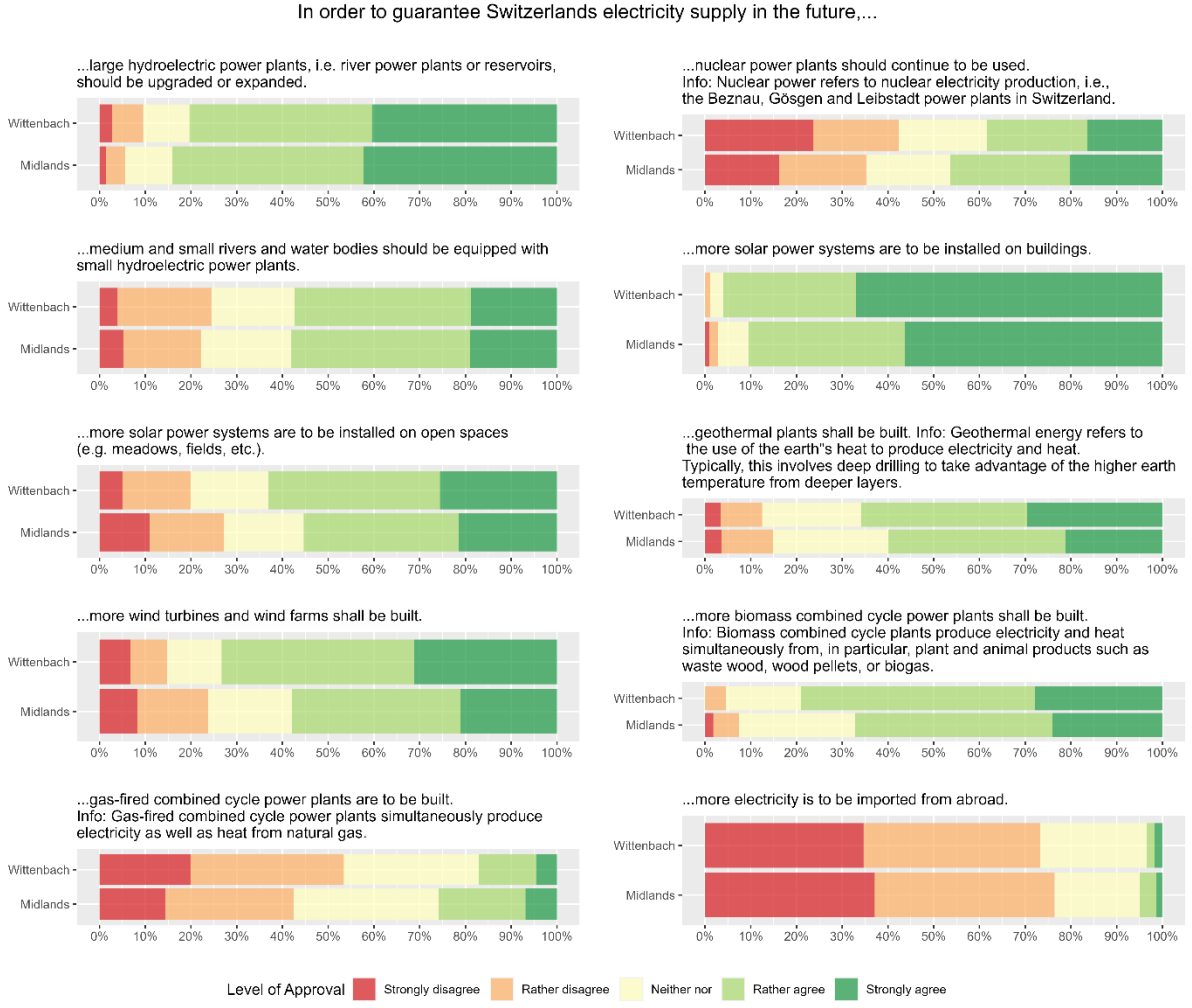
[11] In 2021, Wittenbach exhibited a yes-share for the rejected CO2 law of 43.8% (Swiss share: 48.4%, and most recently 52.7% (compared to 59.1% at the national level), **https://www.tagblatt.ch/ostschweiz/gemeinde/wittenbach-entscheidet-sich-knapp-fur-das-klimaschutzgesetz-ld.2475556?reduced=true** (visited on 22 June 2023).

Note: The difference between Wittenbach and the Midlands sample is statistically significant, independent of ideological group.

However, there are also some noteworthy differences between Wittenbach and the other Midlands respondents, which are likely not sample-driven. An indication for the latter is provided by the differences that can be observed for different ideological groups. For example, we find that independent of political ideology, respondents from Wittenbach more strongly agree that Switzerland should collaborate more strongly with the EU to secure energy supply compared to the average Midlands (Figure 8). As this pattern applies not only to the over-represented left-green participants but also to those at the political center and right, it can be concluded that this could be a general pattern in Wittenbach.

Second, respondents in Wittenbach are somewhat more supportive of PV on buildings, wind, and biomass than respondents in other Midland municipalities, while they are less likely to include gas into a future energy mix (see Figure 9). However, when controlling for political ideology, only the difference with respect to wind energy remains significant.

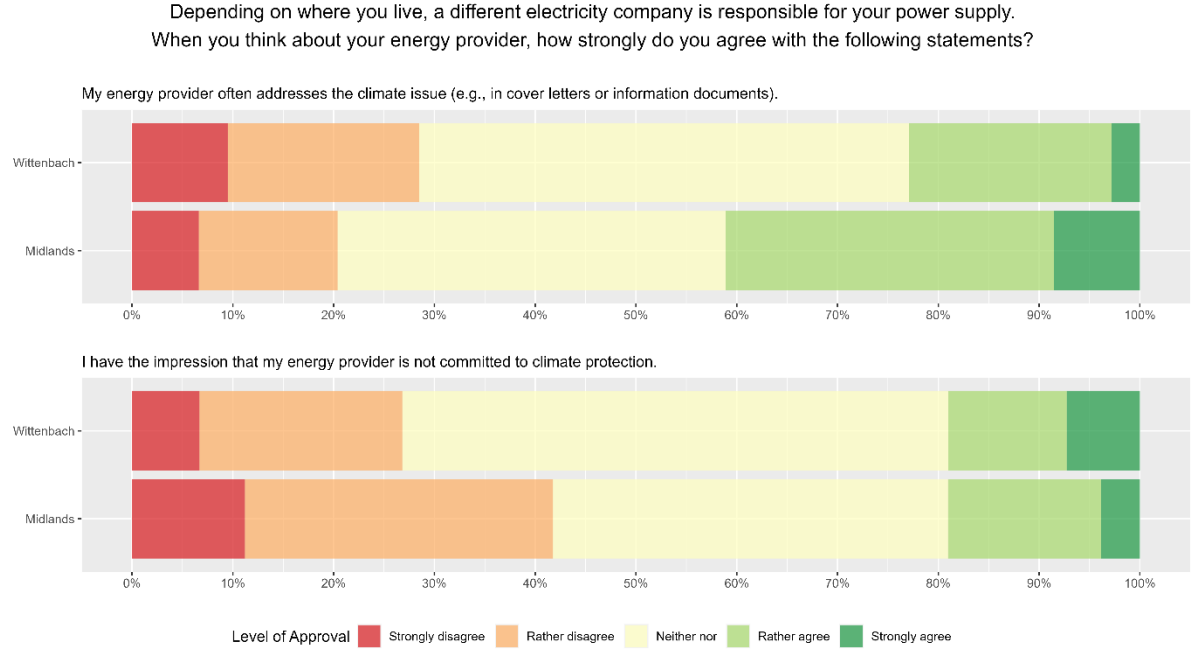
Figure 9: Energy mix preferences in Wittenbach and the Midlands compared



Note: The difference between Wittenbach and the Midlands is statistically significant (based on chi-squared tests) for the following energy sources: PV on buildings, wind power, biomass, and gas.

Lastly, as shown in Figure 10, Wittenbach survey respondents are more skeptical about their energy provider than the average Midlands. This finding, again, is likely not a consequence of the left-green sample but can be observed across the whole range of the political spectrum. This is documented in the models in Table 6 in the Appendix, including an interaction effect between left-right orientation and the Wittenbach-Dummy.

Figure 10: Perceptions of the energy provider – Wittenbach and the Midlands compared



Note: The difference between Wittenbach and the other Midlands respondents is statistically significant.

5 Policy acceptance and policy goals

Whereas the previous sections analyzed the policy principles that, according to the population, should guide the formulation of energy policies more specifically, this section delves deeper into such concrete measures. Hence, the following analyses inform about how individuals form their opinion about specific policy mixes to promote solar electricity production in Switzerland and more specifically, how information about policy goals affects support for ambitious policies. The full analyses on policy acceptance in the context of policy goals can be found in the draft article attached to this Deliverable report:

Brückmann, Gracia & Isabelle Stadelmann-Steffen (2023): Energy policy support increases through policy goal communication, article draft under review at European Journal of Political Research.

Section 5.1. presents an extended abstract and the main findings of this article, whereas Section 5.2. tests in how far the results can be generalized to the Midlands.

5.1 How the communication and deliberation about policy goals affect policy acceptance

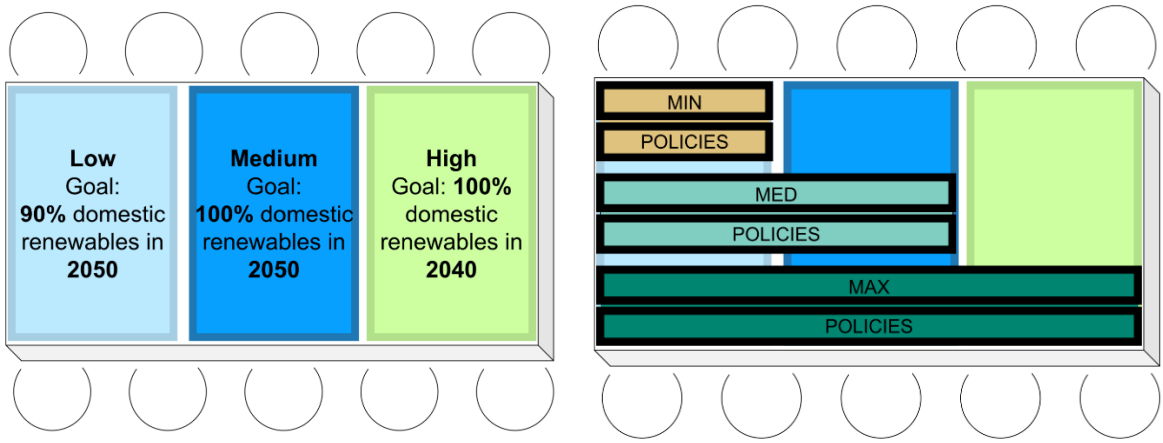
Given the pressing need to decarbonize various aspects of human life while ensuring dignified lives, also through universal access to energy, policymakers are actively exploring policy options to accelerate the deployment of renewable energy generation. However, the current discourse surrounding potential policies often prioritizes maximizing immediate public support, often at the expense of considering the alignment of policies with specific goals. In the context of the EDGE survey, we therefore developed a novel approach to examining public support for energy policies by focusing on their alignment with predefined goals.

In collaboration with energy modeling experts, mostly from the EDGE consortium, we first defined three policy goals in the field of renewable electricity production (Figure 11, left panel). Whereas the medium goal referred to the official Swiss goal as stated in the Energieperspektiven 2050+[12], i.e., 100% net

[12] «Die Stromproduktion aus inländischen erneuerbaren Energien wird so schnell ausgebaut, dass bis 2050 eine ausgeglichene Jahresbilanz erreicht wird (Variante «ausgeglichene Jahresbilanz 2050», Energieperspektiven 2050+, p. 7).

renewable energy production by 2050, we defined a less ambitious goal (only 90% instead of 100%) and a more ambitious goal (target to be reached already in 2040 instead of 2050).

Figure 11: Expert elicitation – three policy goals and aligned policy mixed at different levels of ambition



Note: Schematic illustration of the three goals and the six policy mixes defined and developed through expert elicitation.

Afterwards, based on an expert survey and a subsequent expert workshop, we have developed six different policy proposals that specifically align with distinct goals in the field of renewable electricity production. For each level of policy goal ambition, we eventually defined two policy mixes that, based on today's knowledge and assumptions, are likely to reach a specific goal (including the less ambitious ones) but is likely not enough to reach the more ambitious goal (see illustration in Figure 11, right panel).

Through a novel and preregistered survey experiment, we use this information about goals and policy mixes to investigate the influence of information about policy goals and policy effectiveness, which refers to the extent to which policies align with specific goals, on individual opinion formation regarding energy policy mixes. Most important, we compare the likelihood of supporting more ambitious policy mixes between the control and three treatment groups. The experimental groups receive different types of goal information before they see a set of three policy proposals, out of which they have to choose their preferred one:

1) Control Group "No Goal": No goal information is displayed, only three randomly assigned policy mixes (out of six policy mixes). Each respondent can choose the preferred policy mix without any goal-related information.

2) Group "Policy + Goal": The three randomly assigned policy mixes are presented alongside the policy goal these mixes are likely to reach. Respondents choose their preferred policy mix.

3) Group "Goal Assigned": Before choosing the preferred policy mix, respondents are randomly assigned to and informed about one of the three policy goals.

4) Group "Goal Selected": Before choosing the preferred policy mix, respondents have to select their preferred policy goal out of three predefined goals at different levels of ambition (low, medium, high).

Moreover, individuals of groups 3 and 4 whose preferred policy mix does not align with the reference policy goal are informed about this mismatch and subsequently have the opportunity to either alter their

preferred policy mix or their reference policy goal – but they also can just accept the mismatch. The EDGE survey sample used in these analyses amounts to n = 5,655 individuals.[13]

The main findings from this study suggest two main paths to increased support for ambitious energy policies through policy goal communication. The first path is to make policy goal alignment readily available and explicit to citizens and voters, whenever a policy is capable of achieving a specific goal. Hence, to provide information at the same time about how the policies look like and the goals they can achieve. This follows from our finding of a positive association between ambitious policy goals and ambitious policy choices across all groups, but most notably among respondents who had to choose from policy mixes that were described together with the goal these mixes are likely to achieve (See an example in Table 2). This implies that communicating not only the policies and their designs (Brückmann & Bernauer, 2020; Howlett & Ramesh, 2003; Huber et al., 2020; Stadelmann-Steffen & Dermont, 2018; Stadelmann-Steffen & Thalmann, 2021) but explicitly also emphasizing their effectiveness, i.e., the goals they are likely to reach, has the potential to increase policy support for ambitious measures.

Table 2: Example of a policy description along with policy goal information – Path 1 to higher acceptance for more ambitious policy mixes

In order to promote the production of domestic renewable electricity, the construction of such plants is supported with an investment contribution amounting to 40 % of the investment costs. This support is financed through the taxation of electricity consumption (via a surcharge on grid usage). In addition, there are requirements in the area of renewable electricity: From 2040, there will be a solar obligation on new buildings and renovations. *Based on the assessment of various researchers in this area, this combination of policy measures is sufficient to achieve the goal of" 90 % of electricity consumption in one year is covered by domestic renewable production from 2050 onward".*

Note: The text in italic describes the policy effectiveness information, which was only displayed to respondents in the second experimental group. In our experiment, this text was not put in italic, i.e., it did not visually differ from the policy mix information.

The second path to increased support for ambitious policy goals is via deliberation. If respondents deliberately choose highly ambitious goals, they are more likely to support ambitious policies, reaching these goals. However, the latter also means that people must be willing to indeed support high policy goals. Currently, those who choose high goals tend to be ideologically aligned with left-leaning and green views.

We show that our conclusions also hold when we consider individuals' general propensity to choose high-ambition policies. More specifically, we observe treatment effects in the same direction for respondents with different educational background and ideological attitudes. Nevertheless, the empirical results of our study also point to two main caveats: First, the findings demonstrate that a considerable group of individuals do not want any policy proposal nor achieve any renewable energy policy goal. We observe a significant share of people among those who had to pick their own goal who did not support any policy mix. Second, when respondents are made aware of a mismatch between the goals to achieve and the policies they prefer, quite some respondents willingly accept a reduction in goal ambition rather than accept a more ambitious policy mix. This pattern is particularly frequent in the group that was assigned (rather than could choose) a goal. This shows the limits of goal deliberation as a lever to increase policy support.

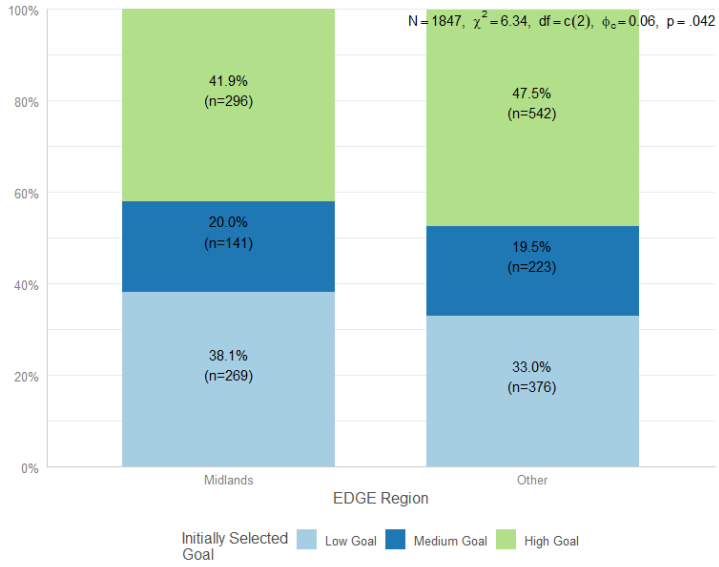
The main implication drawn from this study for policymakers seeking to increase support for ambitious policies is combining the discussion about ambitious policies with their ability to reach their respective goals. If one seeks to gather support for policies that reach ambitious targets, the targets should be clearly communicated to the electorate. The goal should be diffused together with the policy information or, even better, in a way that it is internalized as a supported reference point in advance to deliberating the policies designed to reach it.

[13] In order to maximize the number of observations for these analyses, we also include respondents who filled in this part of the survey, which was placed quite at the beginning, but did not get to the end of the survey.

5.2 Focus Midlands

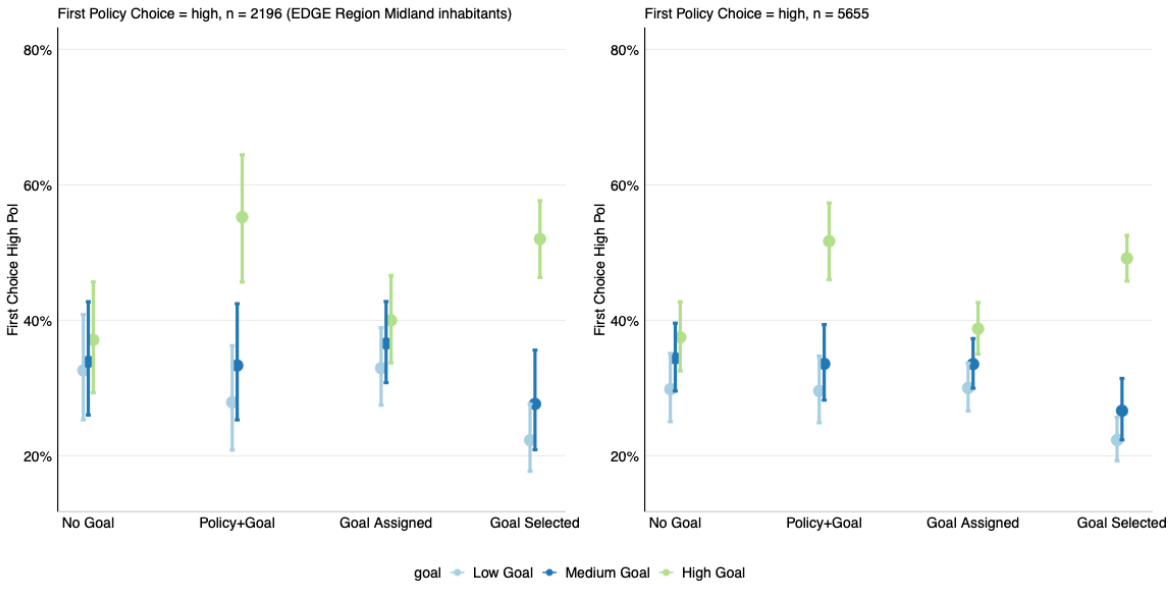
When more closely examining the Midlands region, it becomes evident that it significantly diverges from other areas in Switzerland in terms of goal preferences (Figure 12). Specifically, among the treatment group that had the option to choose their own renewable energy goal (Group 4), a smaller proportion of individuals in the Midlands opted for the most ambitious goal compared to other Swiss regions. Conversely, a larger number of people in the Midlands selected the low ambition goal, which is lower than the official Swiss goal outlined in the Energieperspektiven 2050+. These disparities between the Midlands and the rest of Switzerland are statistically significant. This pattern is in accordance with the stronger prevalence of right-wing political preferences in the Midlands population.

Figure 12: Preferences for different levels of goal ambition in the Midlands and other Swiss regions



Note: Share of respondents in the "Goal Selected" group per policy goals.

Figure 13: Support for ambitious policy mixes contingent on goal communication – Midlands compared



Note: The figures depict the probability that individuals chose one of the most ambitious policy mixes in their first policy choice (i.e., before potentially being informed about a mismatch) based on logistic regressions.

As a result, it is worth exploring whether this lower goal ambition observed among respondents in the Midlands translates into reduced acceptance for high-ambition policies or impacts the role of goal communication. Figure 13 compares the main results for the Midlands sample and the results based on the full sample and demonstrates that the observed patterns are largely the same. Most importantly, the region-specific analyses provide evidence that the two paths to higher acceptance for ambitious policy mixes can also be found in the Midlands: Individuals are significantly more likely to choose one of the most ambitious policy mixes if they either see the policy information together with the goal information ("Policy + Goal") or if they have themselves chosen a high ambition policy goal as "mental anchor". This is an important finding as it corroborates that the treatment effects found can be observed beyond left-green citizens and contexts.

6 Conclusion and policy implications

The aim of this study was to examine regional policy acceptance, with a specific focus on the Midlands. Both existing knowledge and the insights gained from the EDGE survey highlighted relevant techno-economic and socio-political distinctions between respondents from the Midlands and other Swiss regions, such as the Alps and urban areas. This prompted the question of whether a tailored approach to policymaking for the Midlands would be necessary or if a national discourse could effectively incorporate the region's specific characteristics.

The main finding of our analysis reveals limited regional variation in terms of different aspects of policy acceptance. On many fronts, Midlands respondents align with their counterparts in other regions. There is a strong preference for energy independence and a clear inclination towards renewable energy over fossil and nuclear sources. Importing electricity is widely unpopular. However, when it comes to aspects such as EU cooperation or the utilization of energy sources like open-space PV, wind energy, or nuclear energy, both the Midlands and other regions exhibit notable divisions in public opinion. This division, which is structured along political ideologies, is evident in the Midlands as well as in other areas.

Overall, the results of this study align with the second expectation outlined in the report, which suggests that existing techno-economic and socio-political differences do not necessarily manifest as geographical patterns of policy acceptance. This finding is in line with previous research that emphasizes how contextual differences in place of residence do not determine geographical divides in attitudes (Maxwell, 2020). In other words, while the EDGE regions exhibit relevant techno-economic distinctions that may require tailored technological solutions, the regional divide is not the most influential factor in terms of social acceptance, particularly when focusing on the Midlands. This implies that individuals residing in the Midlands still maintain close links to the other two regions, facilitated by Switzerland's small size. They rely on urban infrastructure and may choose the Alpine region for leisure activities or vacations. Consequently, there are no strong regionalized patterns of policy acceptance when considering the broader socio-political dimensions. Using the well-known NIMBY framework (Wolsink, 2000), when focusing on policy acceptance, individuals' "backyard" seems to encompass Switzerland as a whole rather than being limited to the Midlands alone. However, it is important to note that this dynamic may differ when examining specific renewable energy projects (community acceptance) or market acceptance (Wüstenhagen et al., 2007).

In contrast, significant ideological patterns of policy acceptance emerge from the study. While this finding is not surprising and aligns with earlier research (Kübler et al., 2013; Mantegazzi, 2021; Maxwell, 2020) as well as recent ballot results, this study demonstrates that these ideological differences are associated with consistent patterns of policy acceptance. Left-green individuals are more inclined to support cooperation with the EU in energy policy and exhibit a stronger preference for renewables such as wind power, open-space PV, and, specifically, Agri-PV. On the other hand, individuals with right-wing orientations lean towards a more substantial reliance on large-scale hydropower and nuclear energy. Moreover, these ideological disparities in policy principles seem to influence preferences for different policy instruments. Left-wing individuals are likelier to opt for ambitious policy mixes to promote

renewable electricity production. Importantly, this polarization of policy acceptance elements remains consistent across the different regional contexts and does not vary between the EDGE regions.

One of the notable findings specific to the Midlands, likely linked to ideological differences, relates to the preference for renewable electricity goals. We discovered that Midlanders are less inclined to choose the most ambitious policy goal and are more likely to favor the low-ambition goal than respondents from other Swiss regions. These differences are significant and may have noteworthy implications. Unlike many other attitudinal indicators used in the analyses, where respondents indicate their level of agreement with statements, the policy goal preference requires individuals to actively select one of three goals. This indicator includes a behavioral component, which is particularly intriguing when considering potential real-world behavior.

Furthermore, the analyses highlight the presence of trade-offs that warrant further examination. While large-scale hydro and small-scale PV enjoy broad acceptance across the board, Switzerland will require additional energy sources in the future (Heinisch et al., 2023). However, many of these alternatives appear to be unpopular or, at the very least, generate a societal divide. Examples include wind energy and open-space PV, which are essential elements in Swiss energy models, as well as nuclear energy, electricity import, and cooperation with the EU. This raises the question of how individuals make decisions when confronted with explicit trade-offs, i.e., when they become aware that rejecting all unpopular energy sources is likely unrealistic. In other words, which options would citizens choose among the less popular alternatives?

Based on the results and implications discussed in this report, the following policy recommendations are formulated:

1) **Making policy goals and policy effectiveness more prominent in the debate**. Current public discourses about energy policies often revolve around the costs of these measures. An illustrative example was the campaign in the context of the rejected CO_2 act in June 2021, where the opponents used claims such as “car driving only for the rich”[14], while the government advertised the act based on calculations and arguments showing that the measures would not cost much for households and the economy.[15] The analyses presented in this report and in more detail in the scientific article imply that public debates and campaigns about (ambitious) policy measures should more strongly include the overarching goals. Three aspects deserve particular attention.

   First, the most promising way is to communicate explicitly what policy goals the planned measures are intended and able to achieve. Describing and presenting policy measures along with such goal information can increase the likelihood that citizens support ambitious measures. A second strategy, more indirect, is to increase the population’s sensitization for high ambition energy goals. Quite ideally, the Swiss population has already “chosen their own goal” several times on the ballot. In 2017 by accepting the Energy Strategy 2050, and most recently, in June 2023, by explicitly approving the net zero goal. It seems important to remind the population of these democratically defined goals. At least for those citizens who personally approve of these goals – and this should be a majority – this reminder may activate the overarching goal and help to make it a mental anchor for their future policy decisions.

   Second, generally, it must be expected that many “official goals” Switzerland has defined, such as those described in the Energieperspektiven 2050+, are unknown to substantial parts of the population. This might be one reason why a majority of our respondents did not prefer the governmental renewable electricity goal. Making such goals more visible is important to make citizens know and understand why certain measures are needed.

   Finally, it is important to recognize that a considerable minority in the Swiss population – across all regions – does not share the overarching goal, i.e., the energy transition or net zero. Hence,

[14] https://www.nau.ch/news/wirtschaft/co2-gesetz-so-viel-mussten-autofahrer-mehr-zahlen-65925102

[15] https://www.bafu.admin.ch/dam/bafu/de/dokumente/klima/dossiers/faktenblatt-07-kosten-fuer-eine-durchschnittsfamilie.pdf.download.pdf/faktenblatt-07-kosten-des-neuen-co2-gesetzes.pdf

sensitization about the multidimensional nature of the energy transition seems essential. Emphasizing the climate crisis and framing the discussion around energy security and supply may attract a broader public, especially on the right side of the political spectrum.

2. **Facilitating a national policy discourse about steering the energy transition:** While regional differences play a significant role in Swiss politics, this report demonstrates that many overarching policy principles and patterns of policy acceptance are not strongly stratified along regional lines. Emphasizing the energy transition as a national endeavor and having a national debate on infrastructures, technologies, and regulations can help find solutions considering regional distributive effects. This approach can also counteract regional polarization and prevent it from being politically exploited.
3. **Avoiding/decreasing political polarization:** Ideological differences are a significant dividing force in energy policy acceptance, as evidenced by this report. Addressing and decreasing political polarization surrounding the energy issue among political elites and the population is crucial. Encouraging activities that work towards reducing polarization can foster a constructive and factual public discourse about the energy transition and related measures.

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Appendix

Table 3: Regional policy preference – Regression results

Regional policy preferences - Midlands

	M1a Independence	M2a Cooperation	M3a Compensation	M1b Independence	M2b Cooperation	M3b Compensation
Region (Ref. Midlands)						
Other regions	0.008	-0.023	-0.002	-0.028	-0.004	-0.072
	(0.027)	(0.034)	(0.033)	(0.052)	(0.065)	(0.063)
Lower income (Ref.: High income)	0.037	0.037	-0.038	0.038	0.037	-0.039
	(0.031)	(0.039)	(0.038)	(0.031)	(0.039)	(0.038)
Education (Ref.: Sec. I)						
Secondary II	-0.129**	0.082	0.238***	-0.133**	0.081	0.234***
	(0.061)	(0.077)	(0.074)	(0.061)	(0.077)	(0.074)
Tertiary	-0.093	-0.171**	0.298***	-0.097	-0.171**	0.294***
	(0.061)	(0.077)	(0.074)	(0.061)	(0.077)	(0.074)
Age	-0.0002	-0.013***	0.004***	-0.0002	-0.013***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender (Ref.: Female)						
Male	-0.064**	-0.062*	0.170***	-0.064**	-0.062*	0.170***
	(0.027)	(0.033)	(0.032)	(0.027)	(0.033)	(0.032)
Non-binary	-0.067	0.742**	0.822***	-0.075	0.741**	0.816***
	(0.236)	(0.307)	(0.284)	(0.236)	(0.308)	(0.284)
Owns house/flat	-0.086***	-0.041	0.167***	-0.085***	-0.042	0.167***
	(0.029)	(0.036)	(0.035)	(0.029)	(0.036)	(0.035)
Other regions*Left				0.104	-0.034	0.025
				(0.069)	(0.087)	(0.083)
Other regions*Right				0.010	-0.012	0.170**
				(0.068)	(0.086)	(0.082)
Other regions*None				-0.262	-0.182	-0.066
				(0.225)	(0.284)	(0.276)
Political ideology (Ref.: Centre)						
Left	0.125***	-0.304***	0.014	0.060	-0.283***	-0.001
	(0.034)	(0.043)	(0.041)	(0.055)	(0.069)	(0.066)
Right	-0.122***	0.331***	0.216***	-0.129**	0.339***	0.114*
	(0.034)	(0.042)	(0.041)	(0.053)	(0.067)	(0.064)
None	0.092	0.192	0.194	0.253	0.304	0.234
	(0.109)	(0.139)	(0.134)	(0.177)	(0.223)	(0.218)
Constant	2.013***	3.388***	2.772***	2.038***	3.377***	2.823***
	(0.079)	(0.100)	(0.096)	(0.085)	(0.107)	(0.102)
Observations	4,517	4,511	4,502	4,517	4,511	4,502
R^2	0.023	0.093	0.037	0.024	0.093	0.038
Adjusted R^2	0.020	0.091	0.034	0.021	0.090	0.035

Note: OLS regression results. Likert scale treated as metric.

*p**p***p<0.01

Table 4: Regional policy mix preferences

	Large Hydro	Nuclear	Small Hydro	OS-PV	Small PV	Geothermal	Wind	Biomass	Gas	Imports
Other regions (Ref.: Midlands)	0.045	0.107	0.027	-0.032	0.077*	-0.024	-0.144**	-0.047	0.022	0.026
	(0.051)	(0.074)	(0.067)	(0.074)	(0.045)	(0.060)	(0.069)	(0.054)	(0.066)	(0.052)
Political ideology (Ref.: Centre)										
Left	0.102*	0.774***	0.223***	-0.158**	-0.114**	-0.126**	-0.180**	-0.162***	0.221***	0.160***
	(0.053)	(0.078)	(0.070)	(0.078)	(0.047)	(0.063)	(0.073)	(0.057)	(0.069)	(0.055)
Right	-0.103**	-0.555***	0.016	0.244***	0.061	-0.034	0.142**	-0.090	0.013	0.097*
	(0.052)	(0.076)	(0.068)	(0.076)	(0.046)	(0.062)	(0.071)	(0.055)	(0.067)	(0.054)
None	0.426***	0.485**	0.188	0.384	0.198	-0.037	0.072	0.100	0.105	-0.154
	(0.164)	(0.241)	(0.216)	(0.239)	(0.145)	(0.205)	(0.228)	(0.180)	(0.219)	(0.175)
Lower income (Ref.: High income)	0.015	-0.028	0.0001	0.092**	0.132***	0.150***	0.047	0.115***	0.014	-0.041
	(0.030)	(0.045)	(0.040)	(0.044)	(0.027)	(0.036)	(0.042)	(0.032)	(0.039)	(0.031)
Education (Ref.: Sec. I)										
Secondary II	-0.051	0.034	0.016	0.016	-0.069	0.119*	-0.012	-0.074	0.178**	0.261***
	(0.059)	(0.087)	(0.078)	(0.087)	(0.052)	(0.071)	(0.081)	(0.064)	(0.077)	(0.061)
Tertiary	-0.079	0.095	0.004	-0.165*	-0.237***	-0.180**	-0.008	-0.208***	0.214***	0.348***
	(0.059)	(0.087)	(0.078)	(0.086)	(0.052)	(0.071)	(0.081)	(0.063)	(0.077)	(0.061)
Age	-0.004***	0.003**	0.001	-0.004***	-0.003***	0.001	0.003**	-0.006***	0.001	-0.0003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender (Ref.: Female)										
Male	-0.188***	-0.240***	-0.129***	-0.092**	-0.086***	-0.270***	-0.018	-0.081***	0.212***	0.046*
	(0.026)	(0.038)	(0.034)	(0.038)	(0.023)	(0.031)	(0.035)	(0.028)	(0.034)	(0.027)
Non-binary (as an umbrella term)	-0.345	-0.370	0.048	0.630*	0.332	0.635**	0.579*	-0.074	0.365	0.108
	(0.239)	(0.338)	(0.302)	(0.334)	(0.203)	(0.272)	(0.315)	(0.244)	(0.297)	(0.237)
Owns house	-0.133***	0.037	-0.110***	0.123***	-0.096***	-0.018	-0.071*	-0.118***	0.185***	0.069**
	(0.028)	(0.041)	(0.037)	(0.041)	(0.025)	(0.033)	(0.038)	(0.030)	(0.036)	(0.029)
Other regions*Left	-0.036	-0.125	-0.033	-0.043	-0.114*	0.022	-0.047	0.014	-0.028	-0.072
	(0.067)	(0.099)	(0.088)	(0.098)	(0.059)	(0.080)	(0.092)	(0.071)	(0.087)	(0.069)
Other regions*Right	-0.042	-0.033	-0.106	-0.083	-0.062	-0.008	0.107	0.134*	0.009	0.009
	(0.066)	(0.098)	(0.087)	(0.097)	(0.059)	(0.079)	(0.091)	(0.071)	(0.086)	(0.069)
Other regions*None	-0.343	-0.097	-0.066	0.360	-0.125	0.314	0.249	0.054	-0.106	0.237
	(0.213)	(0.314)	(0.280)	(0.309)	(0.187)	(0.260)	(0.293)	(0.232)	(0.281)	(0.224)
Constant	2.237***	2.723***	2.485***	2.727***	1.834***	2.408***	2.404***	2.716***	2.699***	3.700***
	(0.083)	(0.121)	(0.109)	(0.120)	(0.073)	(0.098)	(0.113)	(0.088)	(0.107)	(0.085)
Observations	4,518	4,519	4,521	4,516	4,521	4,506	4,522	4,509	4,509	4,514
R^2	0.047	0.172	0.017	0.034	0.050	0.050	0.028	0.038	0.025	0.017
Adjusted R^2	0.044	0.170	0.014	0.031	0.047	0.047	0.025	0.035	0.022	0.013

Note: Logit-Coefficients for the likelihood to support the inclusion of an energy sources in the future Swiss energy mix

*p**p***p<0.01

Figure 14: Picture of Agri-PV integrated in the EDGE survey next to the question on Agri-PV

Table 5: The Wittenbach and Midlands sample compared

	Midlands		Wittenbach		
	N	***Share***	***N***	***Share***	
Education	4728		173		X2=3.295
Secondary I	259	5%	4	2%	
Secondary II	2148	45%	81	47%	
Tertiary	2321	49%	88	51%	
income	4785		171		X2=5.747
under CHF 5,000	915	19%	31	18%	
CHF 5,001 to CHF 7,000	1085	23%	38	22%	
CHF 7,001 to CHF 9,000	969	20%	25	15%	
CHF9,001 to CHF 13,000	1090	23%	50	29%	
over CHF 13,001	726	15%	27	16%	
Left-right placement	6202		184		X2=33.272***
Left	1725	28%	63	34%	
Center	1383	22%	47	26%	
Right	1733	28%	66	36%	
None	1361	22%	8	4%	
Party affiliation	6202		184		X2=63.47***
Social Democrats	481	8%	22	12%	
Green Party	403	6%	12	7%	
Green Liberal Party	525	8%	33	18%	
The Center	428	7%	19	10%	
Liberal Party	588	9%	24	13%	
Swiss People's Party	578	9%	15	8%	
Other	1123	18%	37	20%	
None	848	14%	21	11%	
NA	1228	20%	1	1%	
Living situation	4938		183		X2=17.739***
Tenant	2018	41%	61	33%	
Own house	2031	41%	83	45%	
Own flat	620	13%	37	20%	
Cooperative	55	1%	0	0%	
Other	214	4%	2	1%	
Heating systems	6202		184		X2=0.002
(Some) Renewables	3747	60%	112	61%	
Only oil or gas	2455	40%	72	39%	
Household has…	5715		183		X2=0.002
a car	5206	91%	166	91%	
no car	509	9%	17	9%	
Trust in Science	4915		180		F=3.064*
Mean	7.2		7.5		
SD	2.2		2.0		

Figure 15: Energy mix preferences among left-wing individuals

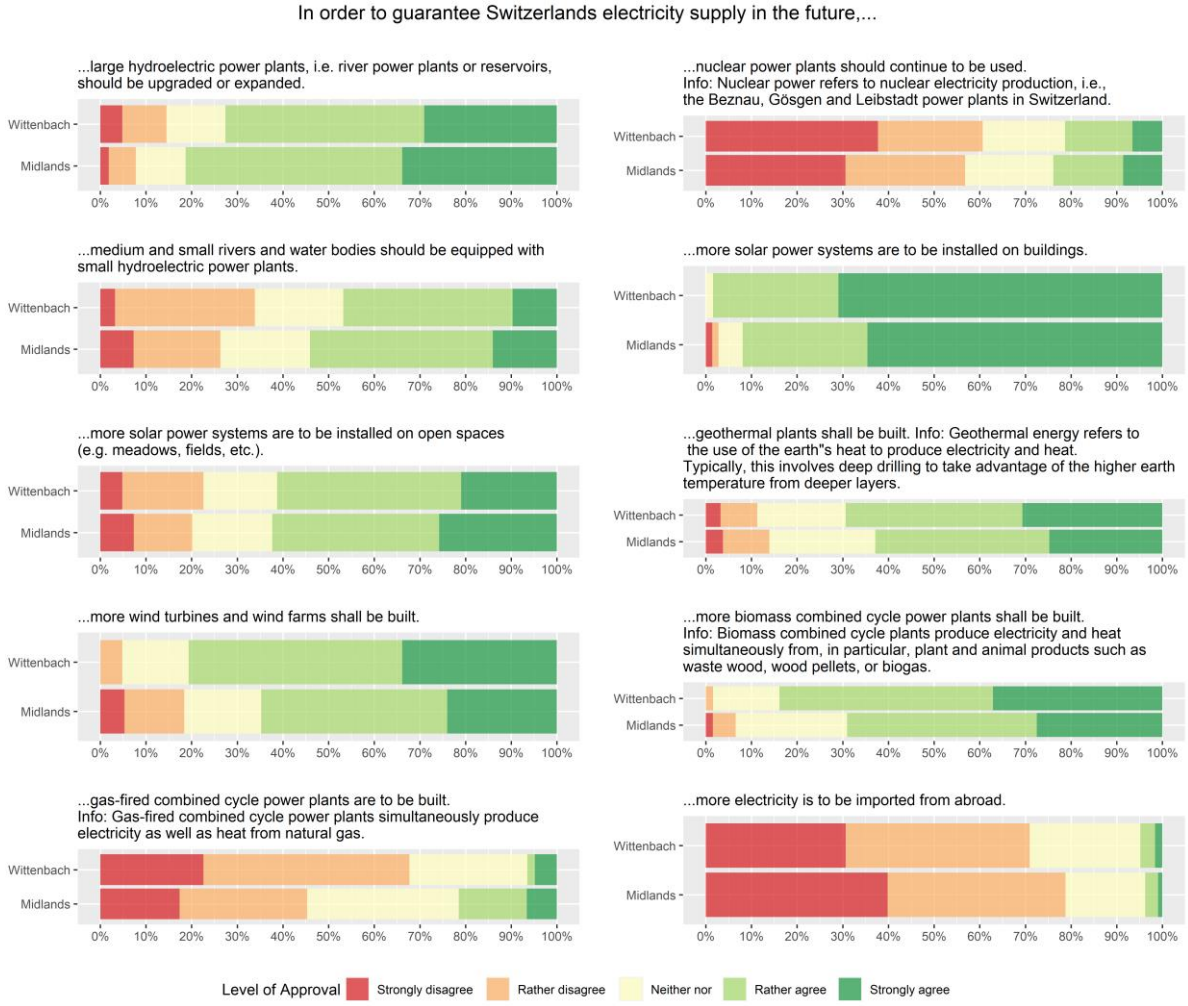

Figure 16: Energy mix preferences among individuals in the political center

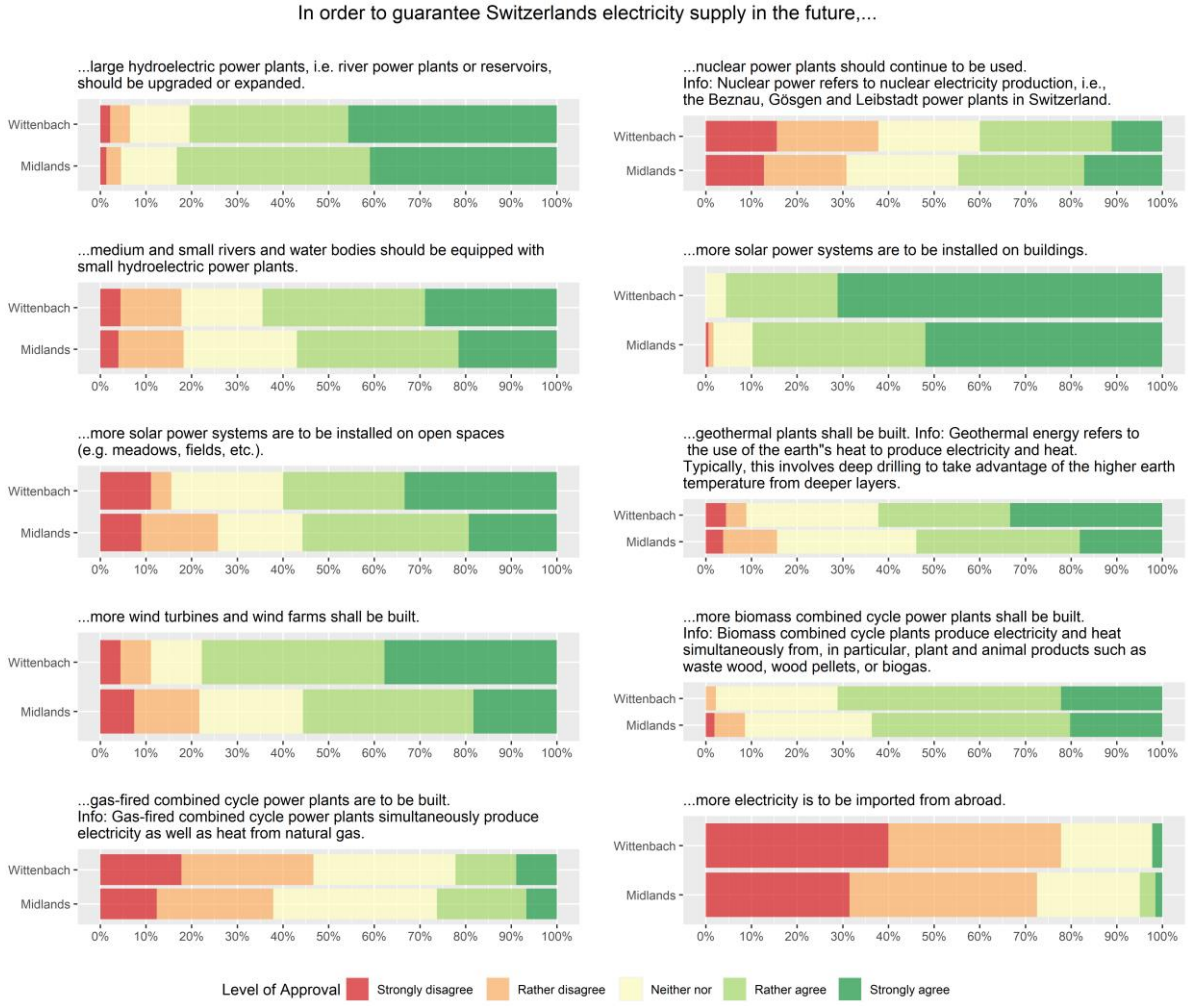

Figure 17: Energy mix preferences among right-wing individuals

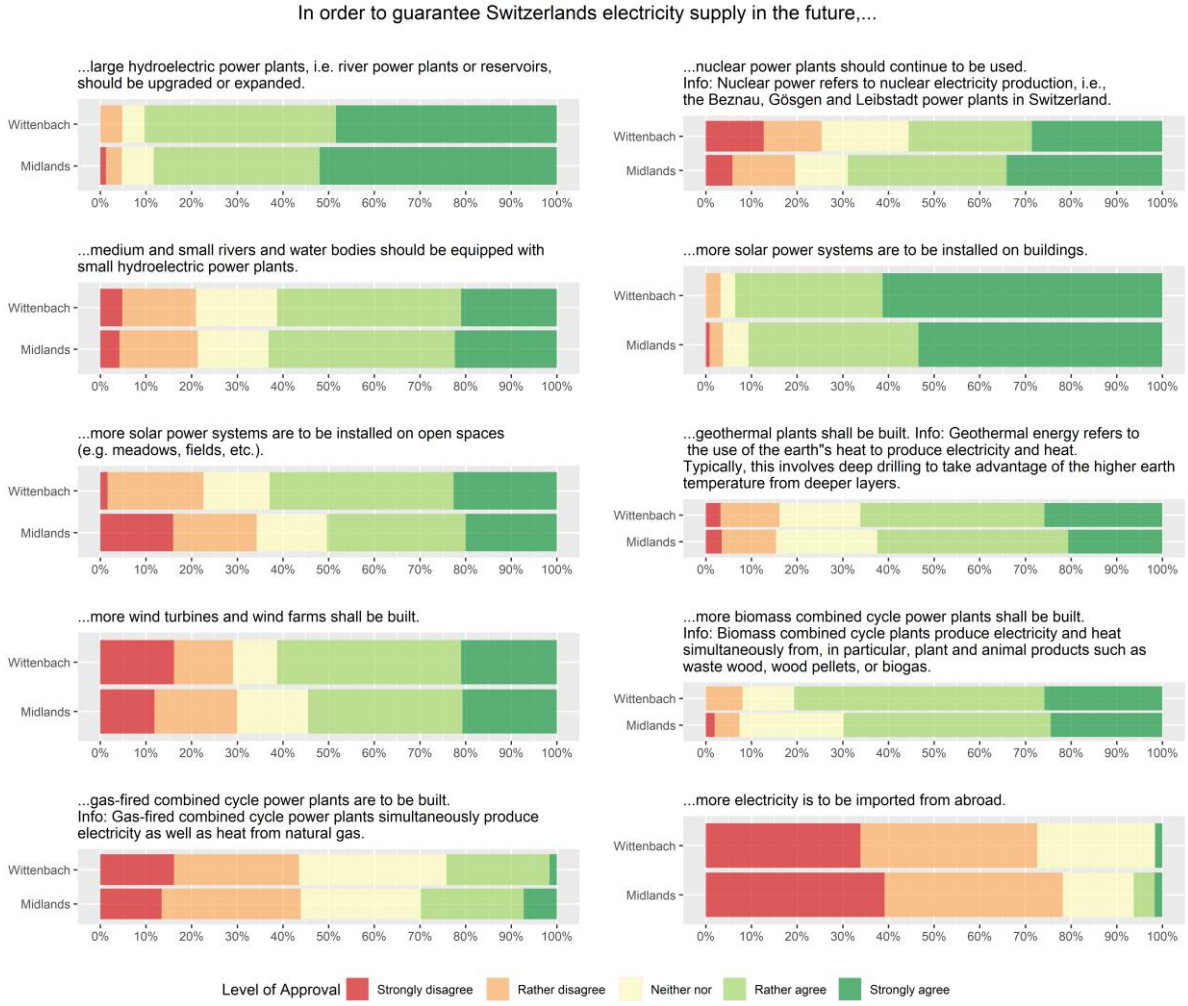

Table 6: Regional perception of the energy provider in the Midlands and Wittenbach

	Active Provider	Committed Provider	Active Provider (Interaction model)
Wittenbach	0.421***	-0.290***	0.290*
	(0.081)	(0.081)	(0.154)
Lower income (Ref.: High income)	0.001	-0.072**	-0.0002
	(0.035)	(0.035)	(0.035)
Education (Ref.: Sec I.)			
Secondary II	-0.028	0.127*	-0.029
	(0.069)	(0.069)	(0.069)
Tertiary	-0.048	0.155**	-0.049
	(0.069)	(0.069)	(0.069)
Age	-0.012***	0.008***	-0.012***
	(0.001)	(0.001)	(0.001)
Gender (Ref.: Female)			
Male	-0.066**	0.064**	-0.066**
	(0.030)	(0.030)	(0.030)
Non-binary	0.178	-0.204	0.178
	(0.270)	(0.270)	(0.270)
Own flat/house	0.009	0.021	0.010
	(0.032)	(0.032)	(0.032)
Political ideology (Ref.: Centre)			
Left	0.020	0.061	0.016
	(0.038)	(0.038)	(0.039)
Right	-0.045	0.156***	-0.054
	(0.038)	(0.038)	(0.039)
None	0.050	-0.064	0.036
	(0.117)	(0.118)	(0.122)
Wittenbach*Left			0.096
			(0.206)
Wittenbach*Right			0.260
			(0.208)
Wittenbach*None			0.255
			(0.454)
Constant	3.403***	2.745***	3.410***
	(0.087)	(0.088)	(0.088)
Observations	4,681	4,662	4,681
R^2	0.041	0.025	0.041
Adjusted R^2	0.039	0.023	0.039

Note: Based on OLS-Regression. High values on the DV means low agreement that the energy provider is active and that the provider is not committed to climate change mitigation.

*p**p***p<0.01
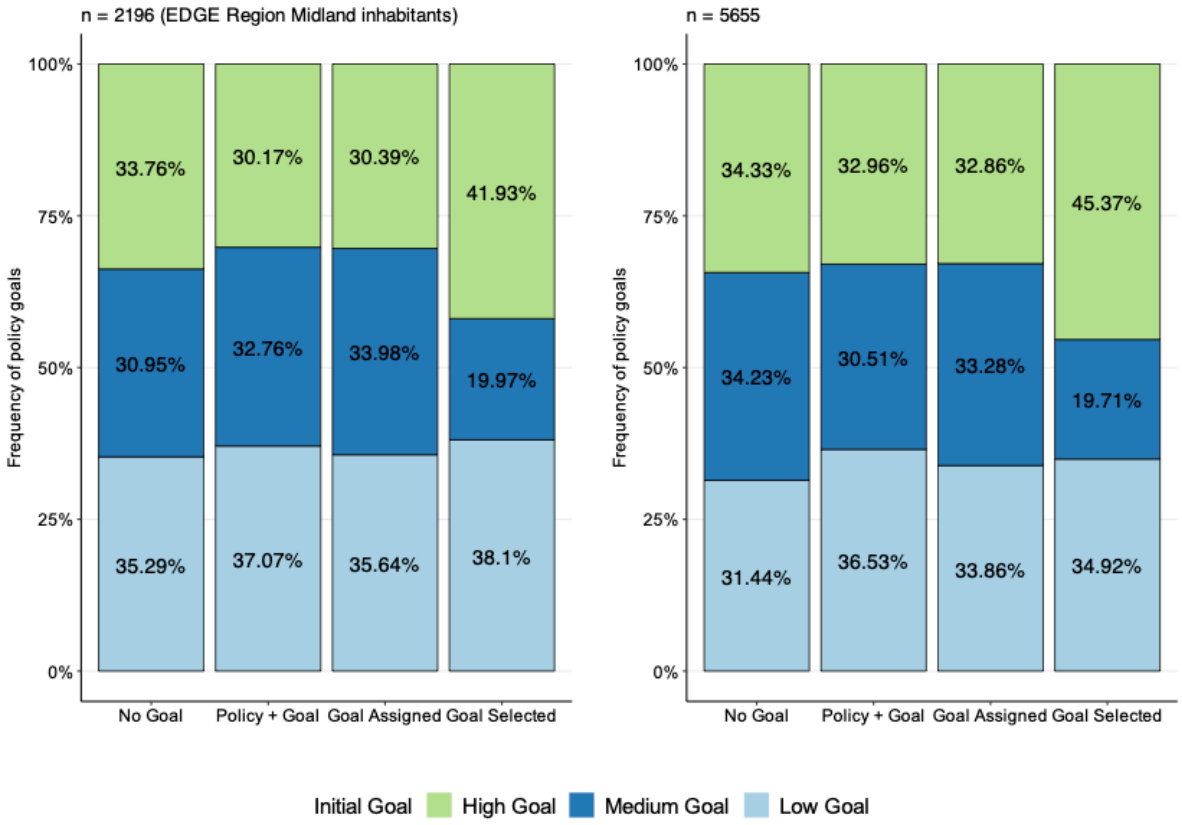
Figure 18: Goal ambition in the different treatment groups – the Midlands compared