Hydropower attitudes of elected representatives: a conflict between protecting nature and providing renewable energy

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Abstract. Expanding on renewable energy is essential to mitigating climate change, but also ridden with political conflict. There are especially difficult trade-offs between area usage and protecting valuable nature. We have some knowledge on how citizens approach this, but little is known about democratically elected representatives' views. This quantitative study improves our understanding by investigating hydropower attitudes among Norwegian politicians (N$\sim$1000). We find that personal characteristics impact the decision making in accordance with established citizens' attitudes. Strikingly, economic factors are found to be less important than nature protection. Furthermore, representatives with an environmental profile oppose further expansion of hydropower. We attribute this to that nature costs become unacceptable. Building hydropower is therefore not perceived as a green policy. The study illuminates some of the challenges with providing clean, renewable energy and underlines the importance of protecting valuable nature when such expansions are proposed.

Keywords: Renewable energy; nature protection; hydropower; Norway

Word count: 7430

1 Introduction

Climate change presents an unprecedented threat to individuals and to societal, economic, and political structures. All future scenarios where climate change is mitigated rely on increasing the supply of renewable energy (IPCC, 2023). However, the vast area this demands can contribute to land-use change and be harmful to both biodiversity and important green house gas sinks (IPBES, 2019). In addition to these valid environmental concerns, arguments against renewable energy expansion range from "not in my backyard", to unfair responsibility distributions, to too high building costs. These arguments are often backed up with some form of expression of political dissatisfaction. This can, coupled with nationalist political dynamics, result in a conflict between protecting nature and mitigating climate change (Forchtner and Kølvraa, 2015). With the protests against wind turbines built on Indigenous land in Norway (The Guardian, 2023) and demonstrations against solar farms in rural parts of the US (Reuters, 2022), it becomes clear that energy policies are contested political issues.

However, the benefits of building renewable energy are also manyfold. In addition to aiding the green transition, clean energy power plants can be a source of economic revenue on both local and national scales (Blazejczak et al., 2014; Keček et al., 2019). This is certainly the case for hydropower, which has an additional benefit due to its capacity for storing massive amounts of water. As climate change causes the frequency and impact of extreme weather events to increase in the future, hydropower dams can protect local communities against floods where geography allows for it. This makes building renewable hydropower a case of both climate mitigation and adaptation – and an example of political action that governments can implement to adjust to and combat climate change. In fact, it is estimated that hydropower needs to increase to around 150% compared to current levels by 2050 to limit global warming to the goals set by the Paris Agreement (IRENA, 2020).

In order for renewable energy expansion to be feasible, it needs sufficient support from both citizens and political elites. In the realm of climate governance, however, decision making tends to weaken the voices of those most in favor of action. This is illustrated by Helliesen (2022) who finds that young and female citizens tend to be underrepresented when it comes to climate policies–the very same demographics which are likely to be the most concerned about climate change (Poortinga et al., 2019). In other words, representatives may have a more hesitant stance toward taking action than the general public, but fairly little is known about politicians' perceptions and motivations regarding climate policies.

In this study, we examine the political dynamics of pursuing the building of hydropower dams in order to understand what hinders or encourages these efforts. We investigate climate and energy policy support among politically elected representatives in Norway to discern what drives their attitudes. We examine whether information about climate change, energy earmarking (where the energy is consumed), and pro/contra arguments affect politicians' stance, and whether these effects are dependent on their personal and political background. We find that economic concerns (or gains) do not depress (or boost) support, but that concerns about nature changes tend to affect support negatively. In line with this, we find that representatives who are considered to be more concerned about climate change are the least in favor of building new hydropower projects. We attribute this to their concern and care for nature and biodiversity–trumping potential climate change mitigation. The study exemplifies political limits to building renewable energy and highlights the importance of finding solutions for energy expansion that do not damage precious nature.

2 Theoretical framework

2.1 Understanding support for climate and energy policies

Research has shown that people's attitudes and preferences regarding climate change largely depend on one's political values and own background. Poortinga et al. (2019) find that people who prioritise self-transcendence over self-enhancement, as well as those having more left-leaning political values tend to be more concerned about climate change and tend to believe that it is ongoing and man-made. They also find that gender, education, and age affect these beliefs, although they observe important country variation in these associations. Hornsey et al. (2016) report on their meta-analysis across 56 nations in order to draw conclusions from the body of literature investigating climate change attitudes. They find that socio-economic characteristics tend to be overshadowed by various values and political orientations. Furthermore, in an attempt to combine findings from research to understand citizens' support for various climate policies, Bumann (2021) highlights that political orientation and values are important determinants for this support – in addition to citizens' background. In sum, the literature has identified values and political orientations, as well as–to some extent–personal characteristics, as some of the main drivers for climate beliefs and policies.

Findings from Norway, our case in this study, align with this literature (Aasen, 2017; Aasen and Vatn, 2018). Research here has also shown that the way people experience the costs of mitigating climate change can heavily affect their stance on a climate-political issue (Tatham and Peters, 2023). Moreover, in comparing climate-political positions between citizens and representatives, Helliesen (2022) shows that these populations are fairly congruent on a number of climate issues despite important systematic differences. Even though elected political representatives, whether national or local, tend to be somewhat different from the average citizen, this finding suggests that citizens and representatives may not be so different when it comes to climate-related political issues. Nonetheless, politicians will generally be more politically interested and knowledgeable, and tend to represent a political party. They are connected with various civil society organizations, and local representatives tend to know the local environment better. We therefore assume that representatives have a fairly good understanding of the climate change debate, the national and international need for renewable energy, as well as the overall potential for hydropower in Norway.

Our hypotheses in this study are based on that representatives belonging to established climate concerned groups will support building hydropower for the sake of climate mitigation. However, as mentioned, there are nature costs associated with renewable energy expansions which might complicate such a plain positive correlation. Gullberg and Aardal (2019) highlights this complexity by finding that Norwegian voters can be split into four groups concerning climate issues where 1) a third of the population is unlikely to support climate policies, 2) another third is willing to sacrifice economic growth to protect the climate and environment, 3) a sixth is only concerned with climate change, while 4) a final sixth is only concerned with environmental protection. They suggest that this makes it challenging to gather support for climate policies in Norway. Adding to this, Karlstrøm and Ryghaug (2014) find that Norwegian women are less positive to building hydropower than men and hypothesise that this is because women care more about environmental protection. As we expect representatives to be affected by similar dynamics as citizens, it is apparent that environmental protection concerns might play a role in how they approach

hydropower expansions. Following the literature, we argue that politicians' background and political values matter in their support for climate policies; and that they will also interact to some extent with our explanatory factors outlined below.

2.2 Expectations

In the survey presented in this work, we ask respondents whether they support or oppose building a hydropower dam close to a melting glacier for the benefit of generating more renewable energy. We find it useful to distinguish between representatives that belong to *green* profile parties and other, here called *grey* profile parties. Ownership to climate and environmental issues is fragmented between several political parties in Norway (Farstad and Aasen, 2023). Traditionally the Green party, the Socialist Left party, and the Liberal party are classified as environmental parties (Farstad and Aasen, 2023). In this study we also include the Red party within the green profile party group because its representatives exhibit similar attitudes as the other three in the survey. More details on this division can be found in Appendix A. Political representatives who are concerned about climate change and are members of a green party, would naturally be more in favor of renewable energy and climate policies. Overall, we expect green, female, higher educated, urban, and young politicians to be more supportive. We further add information about building the dam, and expect this information to affect people's views of our proposition. We focus here on three direct explanations of support for a climate policy, namely 1) information about climate change, 2) the geographical earmarking of the renewable energy that is produced , and 3) the use of different arguments for or against the policy. We detail our expectations here.

First, research has shown that policy support can increase when more information is provided (Diamond et al., 2020). People process information in part using some structure of values that is built over time though various experiences, knowledge, and socialization. This structure can be fairly coherent or much less so, and can form the basis for people's opinions on political issues (Feldman, 2013). Expressions of opinion can fluctuate because of a probabilistic memory-search triggered by context (Taber and Young, 2013; Zaller and Feldman, 1992); and they can simply be conflicted about many issues. When people are offered (new) information, they may update their collection of information on that topic and evaluate the information on the basis of their underlying value structure. As such, information can affect people's attitudes. We test whether some information regarding the inevitability of the melting of the glacier where the dam would be built affects support for building that dam. The underlying idea is that there is a gap between the scientific knowledge and the knowledge people possess, and that if this gap is made smaller, they will be more prone to support climate action. Similar effects have been shown when it comes to countering income inequalities (e.g., Cruces et al. (2013); Kuziemko et al. (2015)). We thus expect that giving information will affect support positively. Moreover, we expect that this information will have a larger effect on people that may be less concerned about, or have less knowledge about, the climate, i.e., politicians affiliated with a grey party.

Secondly, we are interested in finding out whether representatives are more or less supportive of climate policies when the generated energy is earmarked for Norway or for wider Europe. This could reveal either how responsible representatives feel for aiding the renewable energy transition or who the representatives think needs additional electricity. This dimension may also tap a nationalistic-versus-climate concern dimension. Considering the worldwide need for renewable energy (IRENA, 2020), as well as the large capacity for hydropower and that nearly all energy use is from a renewable source in Norway, we expect that

politicians may be more supportive of expanding energy from hydropower when the market is Europe rather than only Norway. They may view it as a responsibility to support the energy market beyond Norway in terms of mitigating climate change. We expect that this effect is conditional on politicians views of both climate policies and internationalization/protectionism; members of greener and more pro-Europe parties are likely to support climate policy more when the energy is earmarked for Europe. Furthermore, we think that there is a difference between representatives on the municipal and national levels with the municipal being more in favor of energy to Norway, and the national more concerned with European supply.

Lastly, we expect arguments for or against to matter in the level of support. Economic benefits and, in particular, economic costs have been found to affect support for climate policies (Bumann, 2021). When policies are costly there tends to be less support for them, especially when the benefits are not immediately observable (as can be seen as being the case for climate change mitigation and adaptation). Increasing hydropower energy also offsets some of Norway's dependence on oil, which is beneficial for reaching international climate agreements, but might gain little in voter support. Furthermore, there can be costs in terms of nature and flora and fauna that people perceive as too high costs for climate policies, and there can be benefits in terms of offering protection against some of the potential consequences of climate change (e.g., floods and extreme weather). We expect the arguments in favor or against building the dam to be highly dependent of political ideology: politicians from a grey party may be more convinced by economic arguments, while those from greener parties might be swayed by nature arguments, in line with findings from Gullberg and Aardal (2019). Preventing natural disasters may encourage support overall, though.

2.3 Case Selection: Hydropower in Norway

Similarly to other countries in North America and most of Europe, Norway is a stable representative democracy (Østerud, 2005). Its main environmental political divides are attributed to cleavages in education and rural-urban living (Orderud and Kelman, 2011; Knudsen, 2018). Thus, we can expect that Norwegian representatives make considerations and are influenced by their own background similarly to those in other representative democracies. Like other Nordic countries, Norway is an egalitarian society where politicians and public institutions benefit from a high level of trust from the population (Dalton, 2005; Torcal, 2014).

However, in terms of energy supply, Norway is a peculiar country. It is a major petroleum exporter while domestically relying on renewable energy sources (Boasson and Jevnaker, 2022). Norway has been identified as a possible driver of the EU energy transition, which would be made possible by hydropower expansion (Egging and Tomasgard, 2018). The country currently has the most hydropower installed in all of Europe (Wagner et al., 2019) which supplies most (typically 90%-100%) of its energy needs (SSB, 2024). In the future, due to climate change, hydropower potential in Norway is projected to further increase caused by accelerated glacier melt and increased precipitation (Chernet et al., 2013). With its energy system already decarbonised, producing more renewable energy gives a possibility of either consuming or exporting more clean energy to other countries. As climate change mitigation needs to be a global effort, it can be argued that it does not matter where emissions are cut nor where renewable energy is sourced (Hovden and Lindseth, 2004).

With Norway established as a possible aid in Europe's energy transition, a natural next question is: Does Norway want to take on this role? Gullberg (2013) finds that it is politically feasible through incremental changes in the energy system, but that radical changes in the energy system is unlikely. Hydropower expansion often appears in the country's public debate. On the protectionist side there is a focus on that hydropower turbines are documented to be harmful to aquaculture (Williams et al., 2012). Furthermore, many hold the position that existing hydropower facilities should be refurbished or upgraded before building any new ones. This could lead to an estimated 4-6% increase in electricity generated from hydropower in Norway (NVE, 2020). On the other side of the spectrum it is often suggested that one should reconsider protected statuses for several rivers and basins to assess them for future hydropower expansion (Qvenild et al., 2015).

At a higher level of abstraction, Beheim et al. (2010) argues that both free-flowing water and water as a source of electricity are important for the Norwegian national identity. When Norway became an independent country in 1905, a cultural identity had been built by national romantic artists often portraying waterfalls, rivers and lakes as main elements in their art. Meanwhile, from the early 1900s, hydroelectric power became the most important factor in establishing industry and modernizing the country. The tug-of-war between these two ideals caused the largest case of civil disobedience in Norwegian history. It was, in fact, a protest against the building of hydropower dams conflicting with the interests of both nature conservation advocates and the Indigenous Sámi population. This political conflict is known as the "Alta case" and lasted from 1968 to 1982. The aftermath saw a reform of Sámi politics in Norway resulting in increased representation by the opening of the Sámi parliament in 1989 (Broderstad, 2014). In recent years, history has repeated itself with wind turbines built on Sámi land which has ignited similar protests (The Guardian, 2023). Building renewable energy is, both currently and historically, a salient issue in Norway. Extraordinarily so at the time the survey was fielded, due to a global energy crisis (IEA, 2024) which caused record high electricity prices. However, it should be noted that the Russian invasion of Ukraine caused even higher prices (due to a European shortage of natural gas) and happened *after* the survey was fielded. This could affect how the representatives relate to energy independence and especially the national/international dimension, but will not have influenced the survey results presented in this study.

In summary, Norway's political history, as well as the physical potential for building more hydropower makes it an interesting case to study to better understand how protection of nature is in conflict with producing renewable energy. The complexity of the matter further increases when accounting for global values (mitigating climate change) and national responsibilities (building industry and providing affordable electricity). By understanding how these trade-offs are made by Norwegian representatives, we can better understand how the European renewable energy transition might unfold.

3 Hydropower experiment

3.1 Research design

Data presented in this work stems from a survey infrastructure called the Panel of Elected Representatives (PER). All elected representatives in Norway are invited to participate. This survey is the seventh round of PER (PER7) and was fielded between 21st of January to the 1st of March, 2022. A total of 8954 representatives were invited, with 2335 participating, giving a response rate of 26.4%. Our design was fielded to half of these, a group containing half of all municipal representatives and all those in the national and Sámi governments with a total of 1163 respondents. There were only five responses from the Sámi parliament which from now on are included in the national group to enable meaningful statistical analyses.

3.2 Survey experiment on hydropower expansion

We designed an multifactorial experiment to investigate what drives the approach to decision-making on hydropower expansion. We prime the representatives to think about a scenario of an imaginary municipality near a melting glacier. To exploit the increased melt, it is suggested to build a hydropower dam to produce renewable energy. The representatives are asked whether they support the building of such a dam and give their opinion on a 7-point scale from "Oppose very strongly" to "Support very strongly". The full survey experiment can be found in Table 1.

By creating a setting of an imaginary municipality with a melting glacier we mean to compel the representatives to not picture the municipality in which they live and represent. Furthermore, it introduces the idea that hydropower potential is not a constant, but will increase with climate change. All policies are made for the future, but usually limited by the periods in which representatives are elected for. It is evident that good climate policies demand a longer temporal perspective, and we therefore find the case of glacier melt as a driver for increased hydropower potential especially interesting.

The experimental part is introduced by a series of treatments given in a randomised fashion to all respondents. There are four treatments and these are related to *climate information, earmarking of energy, costs,* and *benefits* of building a dam. Each treatment contains between two and four options (see Table 1). One of the options is always a *null treatment*, that is no additional information. Our interest lays in figuring out how each dimension affects the response, as well as how they act together. The four topics and our hypotheses concerning each are outlined in the following.

1. *Scientific facts.* Half of the respondents were given a fact on the future of Norwegian glaciers. Here, the information that we offer is that the majority of Norway's ice mass will disappear within the next 70-100 years. We believe that this information resonates fairly well with the knowledge that political representatives in Norway have: They tend to know about climate change and that this implies that temperatures are rising. To that extent, we believe that the information mostly primes our respondents to think about melting glaciers before we ask them about it, and with that, expect that respondents will be more open to climate policies than if they were not given this information. We thought that the severe consequences of climate change would nudge them towards more support for building renewable energy to mitigate these

changes. However, considering that many Norwegian representatives will have a fair amount of knowledge about climate change and their local environments, there may be little effect of information.

2. *Interests and responsibilities in Norway versus Europe.* Here we thought that municipal representatives might be more concerned with supplying energy to the Norwegian market, while representatives on the national level might have more interest in exporting to Europe. This might also be a partisan issue, with parties that are more globally minded being in favor of exporting energy. Parties that are in favor of membership in the European Union may for example be more positive toward generating energy for Europe, while those against may be more in favor of generating energy for Norway.

   Notice that the treatment options differ in that the energy is either earmarked for Norwegian *industry* of the European *energy supply*. We chose this wording because Norway's energy system is already mostly comprised of renewable energy. Producing more energy for Norway can possibly lead to building more industry or cheaper electricity.

3. *Costs and benefits.* By giving arguments in favor and against building the dam, we want to unveil what is important to consider when making a proposition to build renewable energy. We pitch one pro (benefit) and one contra argument (cost) against each other (or offer no arguments at all) and investigate which arguments are most powerful. We have no theoretical expectation on which of the various arguments are most convincing. The arguments touched on different topics we were interested in:

   (a) *Economic arguments.* Here the benefit was the creation of jobs, while the cost was the economic expense of building a dam. We thought economic arguments would be important for the decision-making of the representatives.

   (b) *Human impact.* We suggested the dam would be beneficial as flood protection, and the cost was that it changed the landscape available to people. Both are impacts that would be experienced by people living close to the dam.

   (c) *Nature/climate arguments.* The benefit was that we can reduce Norway's reliance on oil income. This does not hint at earning more or less, but simply at earning the same from another, renewable source. The cost suggested was that flora and fauna would be damaged. None of these directly affect people living close by or have any clear economic impacts, but are generally discussed as main reasons for building renewable energy to aid climate mitigation or rather protecting nature.

The treatment options were assigned randomly. For example, some would be presented with an economic benefit and a human impact cost. Another may get both an economic cost and benefit. In this way, we hoped to disentangle which are most important for their support and what values are present when making a decision on building a hydropower dam.

Table 1. The full survey experiment. The original text was written in Norwegian, but has been translated here.

Survey experiment (PER7)	
As a consequence of climate change, glaciers throughout the world are melting, including in Norway. *Treatment 1*. Imagine a municipality with such a glacier. When it melts, new water reservoirs become available. It has therefore been proposed that a new hydroelectric power plant is built to produce renewable energy *Treatment 2*. *Treatment 3* *Treatment 4* To what degree do you support or oppose building such a hydroelectric power plant?	
Treatment 1	*Null* It has been reported that two thirds of Norway's ice mass will disappear within the next 70-100 years.
Treatment 2	*Null* which can supply Norwegian industry which can supplement energy supply in Europe
Treatment 3	*Null (Treatment 4 is also null)* One argument in favor of this is that it creates more jobs in local government. One argument in favor of this is that it helps protect against floods that occur because of extreme weather. One argument in favor of this is that it helps reduce Norway's reliance on oil income.
Treatment 4	*Null (Treatment 3 is also null)* One argument against this is the significant expense of building a hydroelectric power plant. One argument against this is that developments will change the landscape. One argument against this is that flora and fauna will be irreparably damaged.

3.3 Results

In the following, we present the results of the survey experiment. First, we have a look at the overall response in section 3.4 before we dive into sub-groups and conditional effects of the treatments in section 3.5.

The seven-point scale is represented as 0-6 with 0 being "Oppose very strongly" and 6 being "Support very strongly". A support level of 3 shows neutrality. We determine whether a trend is significant based on whether confidence intervals overlap. As the data generally do not follow normal distributions, we find statistical bootstrapping useful. The method allows us to find confidence intervals without making prior assumptions about the shape of the distributions. Details on bootstrapping can be found in e.g. Rousselet et al. (2023). In the following we present direct means of the dataset, with confidence intervals that stems from 10 000 resampled distributions. This allows us to obtain asymmetric confidence intervals and fairly represent

how the distributions are skewed. For evaluating statistically significant differences between distributions, we have chosen to work with confidence intervals of 84%. This is in agreement with a body of literature (Julious, 2004; Greenland et al., 2016; Cumming, 2009; MacGregor-Fors and Payton, 2013) when working with subgroups within the same dataset. This indicates that intervals that do not overlap are significant at the 0.05 level.

3.4 Overall response

The mean of all responses is 4.07, indicating overall support for building hydropower in the imagined municipality. The distribution can be seen as a histogram in Figure 1.

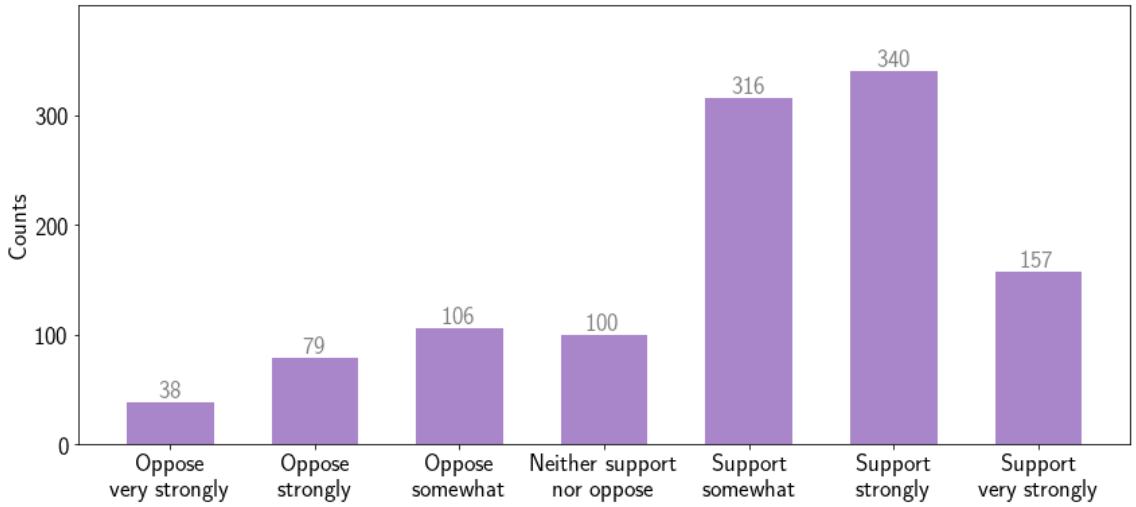

Figure 1. Distribution of overall support/opposition to building a hydropower dam. Counts are indicated at top of each bar.

We find that different sub-groups within the elected representatives respond differently to building hydropower. The largest discrepancy is found when splitting the representatives into the aforementioned green and grey party groups. Here the green party group is opposed, while the grey is supportive. There are also significant differences for gender, education and rurality, though the response is positive (> 3) for all. Mean support of each subgroup can be found in Table 2 along with whether the difference is significant. Details on how the groups are defined can be found in Appendix B. Furthermore, we find that a lower income or age is associated with less support than a higher income and age. It was reasonable to split these dimensions into three, subsequently smaller groups, leading to larger confidence intervals. Here the low/young and high/old groups are significantly different from each other, while the middle groups are not distinguishable from either.

Furthermore, we ran several tests on administrative level of the representatives, without finding any incoherence between the national and the municipal group. Therefore, we have not corrected for administrative level of the respondents. We also investigated whether the representatives' support might be driven by if and how much hydropower is produced in the municipality they represent. We found no indication that this had an impact on the support.

Table 2. Mean support of subgroups within different characteristics as well as whether the differences are significantly different (with 84% confidence intervals).

Characteristic	Subgroup	Support	Significant?
Adm. level	National & Sámi	3.79	No
	Municipal	3.97	
Party group	Green	2.68	Yes
	Gray	4.22	
Gender	Women	3.67	Yes
	Men	4.12	
Education	University	3.81	Yes
	No university	4.30	
Rurality	Urban	3.82	Yes
	Rural	4.07	
Income	Low	3.80	Low and high
	Middle	3.91	
	High	4.07	
Age	Young	3.82	Young and old
	Middle	3.94	
	Old	4.01	

3.5 Effect of treatments

The support depends on which treatment options the representatives are presented with. In Figure 2, the mean of the responses to each treatment is plotted with vertical lines indicating null treatments and shaded areas showing confidence intervals. A few notable observations are:

1. Providing information on the future of glaciers does not shift the support.
2. Earmarking the energy for Norway or Europe changes the response. There is a significant difference between earmarking for Europe and Norway, with more support when the energy is produced for national purposes. However, neither is significantly different from the null treatment.
3. The proposed costs and benefits are important for the representatives' attitudes. Notice that all the benefits shift the response negatively compared to the null treatment, indicating that costs dominate the benefits. The support for any benefit is therefore conditional on which cost it is paired with.
    (a) The economic arguments ("creation of jobs" and "building expenses") seem especially weak. "Building expenses" is the only one of the contra arguments that enhances the support.

(b) The "landscape changes" cost shifts support negatively, while "flood protection" is the benefit that induces the most support. This is the only benefit not significantly different than the null.

(c) The nature cost ("flora/fauna damages") induces the most opposition. The "replace oil income" benefit seems of as little importance as the economic benefit.

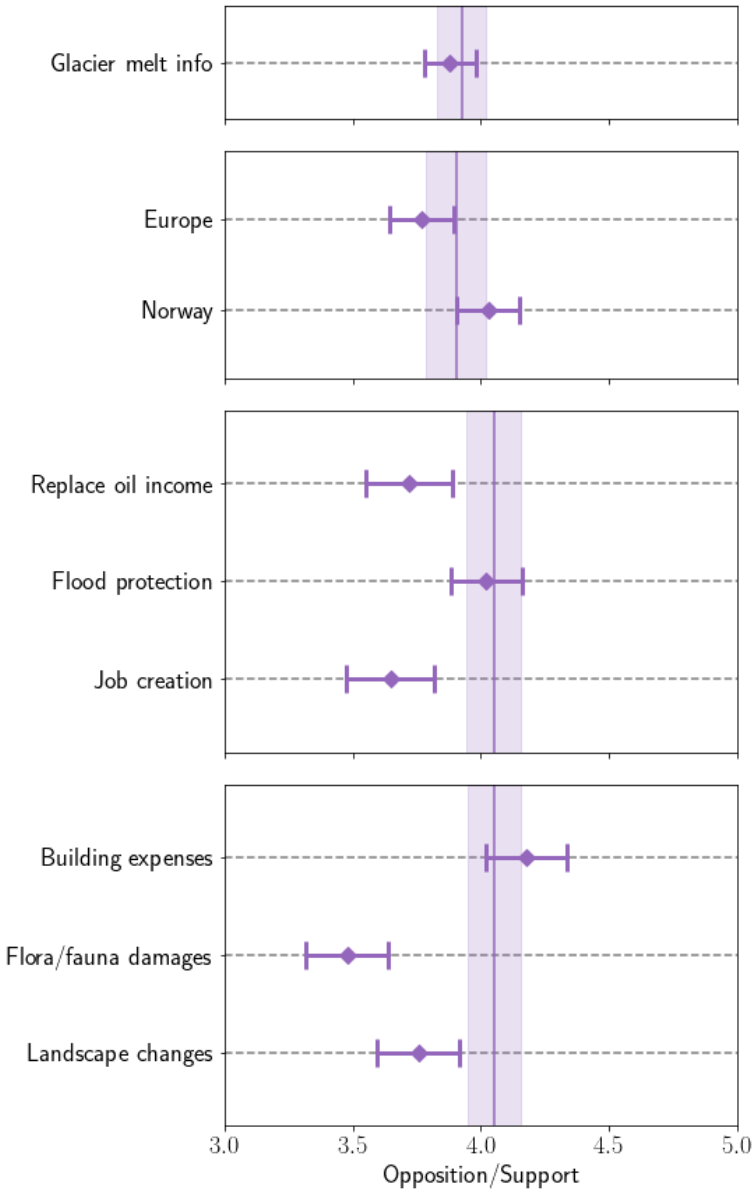

Figure 2. Displayed is the mean of response to each of the treatments concerning: 1) Scientific facts, 2) Export to Norway vs Europe, 3) Costs, and 4) Benefits. Error bars indicate confidence intervals of 84% found by bootstrapping. Vertical lines show response to null treatment and shaded lines indicate its confidence interval.

To investigate further, we have a look at how the different costs and benefits interact with each other. We find that all combinations containing "flora/fauna damage" are less supported than those with "landscape change", which again have lower support than any combination with "building expenses". The support of each combination can be found in Table 3. There does not seem to be any interaction between a benefit and a cost that is causing the trends we see for the costs. For benefits, the story is a little different. "Flood protection" always incites more support than the other benefits, independent of which cost they are placed together with. Otherwise, the support of benefits changes greatly depending on which cost they are combined with. This underlines how the costs dominate the support.

Table 3. The mean support of each combination of cost and benefit. Null treatment gives 4.11 in support.

	Building expenses	Landscape change	Flora/fauna damage
Job creation	4.17	3.55	3.51
Flood protection	4.51	4.00	3.57
Oil independence	4.15	3.84	3.44

3.5.1 Green and grey party groups

As mentioned, the green parties are generally opposing building the dam (see Fig. 3). This holds true for all treatment options except for when the building expenses argument is invoked. In Figure 3, the two groups' responses to the treatments are shown. Following the trend of the full dataset, the treatment option that incites the most opposition is the consequence of damage to flora and fauna. For the most part, the treatment options shift the attitude of the green and grey parties in the same direction. There is one notable exception, which is that earmarking energy affects the groups in opposite directions. The greens become more supportive when the energy is produced for the European market, and more opposed when it is earmarked to Norway. For the grey parties, the effect is reversed.

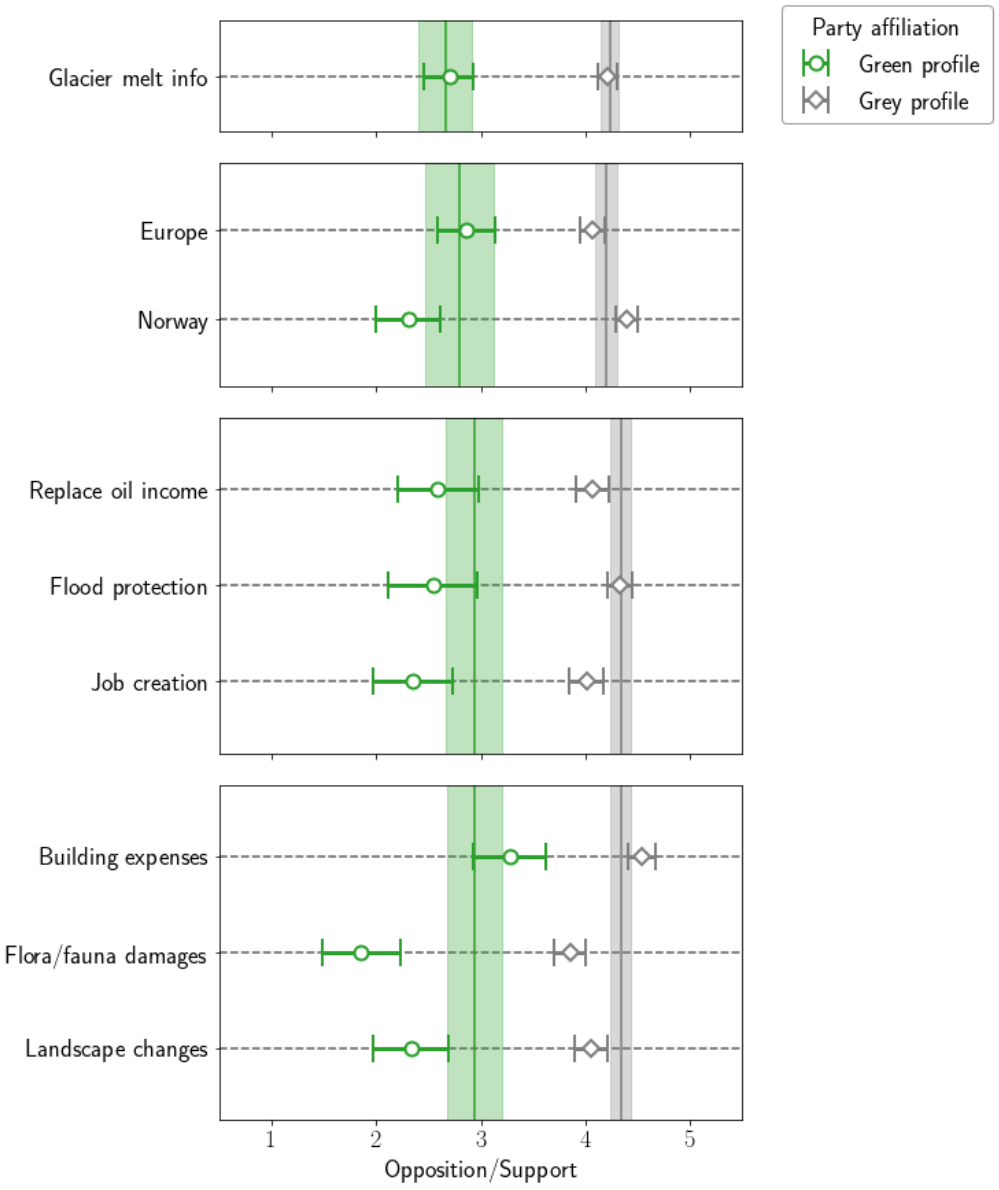

Figure 3. This figure is identical to Fig. 2, but shows the response of the green and grey party groups.

4 Nature protection

4.1 Research design

From the hydropower experiment, we find that trading valuable nature for renewable energy is the cost that is hardest for representatives to accept. To further investigate trade-offs between building renewable energy and protecting nature, we followed up with two questions in round 8 of PER (PER8). These were fielded between the 1st of November and 5th of December 2022 using the same seven-point scale of support as PER7. The questions are written in their entirety in Table 4. Here, our target group of half the municipal and all national and Sámi representatives was 1040 respondents.

The first question (QA) concerns possible political actions in response to nature that is altered due to climate change. We asked whether they would reconsider the national park status of an area that has changed so much that the original reason for it being protected does not exist anymore. Here we expected that the stronger protectionist values the representatives have, the more opposed they will be to reconsidering national park statuses. The question is a practical one that is often a part of Norwegian public debate. A recent example is the government's decision in 2023 to reduce the size of the Lågendeltaet nature reserve in order to build a highway (NRK, 2023) which met opposition from several parties and environmental organisations.

The second question (QB) is more abstract and asks if they think protecting local nature is more important than mitigating global climate change. We prime the respondents by pointing out the paradox that some climate actions (building renewable energy) can harm the local environment. The question presses them to weigh local protectionism against global climate mitigation. Again, we expect that representatives with strong protectionist values will oppose the statement. The exact same question has previously been fielded to Norwegian citizens in the Norwegian Citizen Panel (M. Tatham, personal communication).

Table 4. The two questions posed in PER8 on nature and climate. The original text was written in Norwegian, but has been translated here.

Survey questions (PER8)
QA) Several Norwegian national parks protect nature that is changing due to climate change. These are for example rivers that alter their paths, glaciers that melt or ecosystems that are changed. To what degree do you support that such a national park status should be reconsidered, if the reason for its existence disappears?
QB) Climate change poses a threat towards people, animals and plants. Some climate actions can, however, harm the local environment. For example, dams or wind parks that produce renewable energy might also harm nature and animal life. To what degree do you support or oppose the statement: "Limiting climate change globally is more important than protecting nature locally"?

4.2 Results

Similarly to the hydropower case, we find significant differences in how the green and grey party groups approach these. Greys are mildly in favor of reconsidering national park statuses, while greens are mildly opposed (see Figure 4a). In a similar fashion, greys mildly favor mitigating global climate change, while the greens mildly favor nature protection.

For the PER8 questions, merely 357 respondents of the sample also answered the hydropower question in PER7. Out of these, only 60 are part of the green profile groups. In Figure 4b, the support of hydropower in PER7 is plotted against the questions in PER8. A positive, but weak, correlation is seen between support for hydropower support of QA and QB. This holds true for both the green and grey profile party groups with correlation coefficients are 0.27 (0.12) for QA and 0.27 (0.34) for QB for the grey (green) group. QB gives a steeper incline for hydropower support. That is, more the more the greens sees global climate change as the bigger problem, the more willing they are to build hydropower. However, notice that the greens' general support for QA and QB is much lower than the greys'.

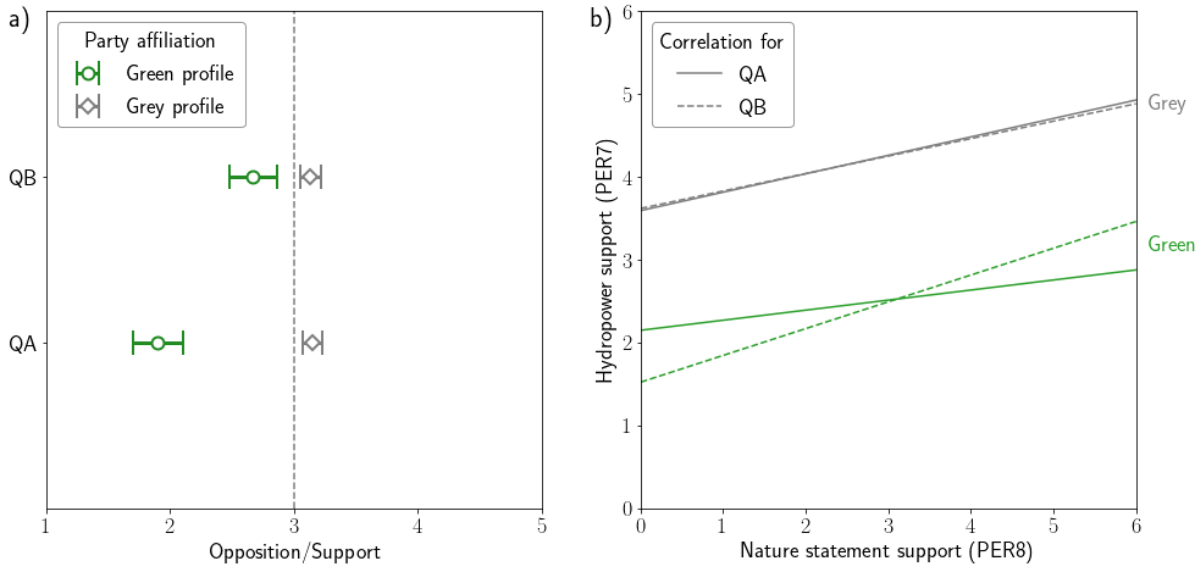

Figure 4. Response to the nature statement questions in PER8. In a) the two party groups' support for QA and QB is shown with the dotted line indicating neutrality. In b) the linear correlation between support for hydropower in PER7 and support for statements in PER8 is plotted. Green lines show the fit for the green profile party group, while grey indicate the grey party profile group.

5 Discussion

The most striking result of this study is that the sub-groups that are most negative towards building a hydropower dam are the same that are associated with having more concern for the climate. As building renewables and phasing out fossil fuels are key in mitigating climate change, this might seem puzzling. We show with our follow-up investigations that the explanation likely lies in their simultaneous concern for nature. This echoes the complexity in citizens' approaches to climate policies as unveiled by e.g. Gullberg and Aardal (2019). It should be noted that green parties are known to attract women, urbanites and highly educated – the very same groups that we see are more negative towards building hydropower. Party affiliation and personal characteristics might therefore be entangled. However, a correlation between valuing nature and opposing the building of hydropower can be found both within the green and the grey party groups. This is supported by the "flora/fauna" cost inciting the most opposition – be it for greens or grays. We conclude that nature protection values are the real drivers for hydropower opposition, and are merely masked by that representatives with strong protectionist values often represent green profile parties. Thus, ambitions to preserve nature clashes with ambitions to produce more energy and confines a very small space for political action on expanding on renewable energy.

A possible weakness with this study is that the survey experiment did not test for other types of renewable energy nor address which other opinions the respondents have on hydropower. Representatives might prefer other renewable alternatives such as wind or solar power to hydropower. As mentioned in Section 2.3, concerns for aquaculture might be especially prevalent with representatives with protectionist values, as they would be inclined to go further to avoid trading nature for more power generation. They might therefore see refurbishment as the next logical step to providing more renewable energy, rather than building new dams.

In addition to nature protectionist values, global and national interests play a role in the representatives' support. The green party group is seen to be more positive towards building hydropower when the energy is earmarked for Europe, while the grey group shows higher support when it is earmarked for Norway. Following previous argumentation, this can point to which trade-offs the representatives are prepared to make. For the grey party groups, nature may be sacrificed for the benefit of the Norwegian people and industry. However, for the green party groups, Norwegian earmarking drives the support towards opposition. This could be explained by the green parties considering Norway's (renewable) energy needs to be met, and that producing more would only drive an increase in consumption. Instead, the greens are more inclined to support hydropower expansion if it helps cover Europe's energy demand. Though they value local nature protection over mitigating global climate change (as found in QB), the greens are more inclined to sacrifice local nature to mitigate climate change than supply energy for Norwegian industry.

Do these findings indicate that the green parties are more Europe-centered than the grey ones? Not necessarily. As an example, we can consider their attitudes toward membership of the European Union (EU). As of today, Norway is not a member, and the green parties have different stances on whether this should change. Of the four parties, two are against (R and SV), one is undecided (MdG) and one is in favor (V) of membership. The parties' stance on EU membership is a possible proxy for how Europe-centered their political ideologies are. Therefore, we divided all parties into these three groups (against/undecided/for)

and investigated whether this affected the Norway/Europe treatment in the hydropower experiment. Surprisingly, there was not significantly more support among the supporting parties when the energy was earmarked for Europe. Likewise, there was not significantly more opposition among the opposing parties. This leads us back to that the main importance lays in whether the representatives belong to the green or grey party groups. The greens might have a more altruistic view on climate change mitigation in accordance with what literature finds on who supports climate change policies (Poortinga et al., 2019). Furthermore, they might think it is Norway's responsibility to export more renewable energy and aid the European renewable energy transition.

As mentioned, providing benefits to building the dam did not incite the expected support. Only when combined with the "building expenses" argument, the benefits dominated the cost. At the same time, the benefit that allowed for most opposition was "job creation". It is striking that both the economic cost and benefit are affecting the attitudes toward the opposite direction of what we intended in the survey design. Economic arguments seem unimportant compared to those concerning the daily lives of citizens and nature/climate when it comes to building a hydro-electric power plant. We expected the grey party group to favour economic growth over nature protection, however, we find that economic arguments sway both party groups in the same directions. A key result of this study is that when expanding on hydropower, nature concerns triumph economic benefits.

Since Norway's parliamentary system is similar to most democracies, tendencies that are seen in Norwegian representatives' attitudes may also be prevalent in politicians in other democracies. However, we know that poorer countries are more likely to sacrifice the environment for economical gain than richer ones (Arrow et al., 1995). Norway certainly is a wealthy country (World Bank, 2024). Economic arguments might therefore be more important e.g. in regions with higher rates of unemployment. However, Norway is a country that has much of its income from natural resources (oil, fishery, hydropower), making it similar to many resource-rich countries with untapped hydropower potential. Therefore, these findings can still be instructive for policy makers that wish to expand on renewable energy in such countries. To avoid political dissatisfaction and conflict, it is essential to evaluate what nature one is sacrificing to build renewable energy. Most importantly – does it damage ecosystems or change the way of life for people living close to the dam? If so, it is preferable to rather identify nature that does not contain vulnerable ecosystems. Though this might be associated with higher building expenses, our study shows that this is deemed as less important than nature costs and not an obstacle for building more renewable energy.

6 Conclusions

Our research has shown that the representatives we expect to be most concerned about the climate are the ones that are most opposed to expanding on hydropower. Thus, the space for political action in the green transition is decreased by actors that are concerned for nature and the environment. We attribute this opposition to that the nature cost in such expansions is too high. Strikingly, economic arguments are seen to be less important than nature arguments when building renewable energy. The study helps illuminate some of the challenges with providing clean, renewable energy.

An important contribution of this paper is to expand our understanding of how democratically elected representatives approach challenges in nature trade-offs that must be made in order to build renewable energy. Citizens' views have previously been studied in greater detail and we unveil that representatives are driven by factors aligning with their attitudes.

On a practical note, our results demonstrate the importance of considering possible damages to nature when proposing to build renewable energy projects. Norway is a rich country where much of the hydropower potential is already exploited. We might see opposition from green profile politicians because they think that one should rather refurbish existing hydropower plants to generate more energy, than building new ones. Furthermore, other countries with untouched hydropower potential might have vastly different economic and social challenges. Here it is entirely possible that these would dominate the discourse over nature concerns. Despite this, we think our research is valuable for understanding what political potential there is for Norway to expand upon hydropower and aid Europe's green energy transition. Overall, the representatives were supportive of building more hydropower and our study shows which considerations are important for succeeding with this.

Future studies on the subject should include investigations on whether other arguments are playing a role. Representatives could e.g. be positive towards building wind power instead or refurbishing the hydropower plants. In addition, we propose that research should focus on other countries with untapped hydropower potential to investigate whether the same drivers are present. Lastly, our dataset did not contain enough responses from the Sámi parliament for a robust analysis. We urge researchers to consider Indigenous people's viewpoints when evaluating the political feasibility of energy expansions. This can help to identify possible political actions to achieve a fair renewable energy transition and mitigate climate change.

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Declaration of interests

We declare that we have no known financial or other interests that could influence the research in this article.

Ethical declaration

PER is a part of the Digital Social Science Core Facility (DIGISSCORE) at the University of Bergen (UiB) and follows the EU General Data Protection Regulation (GDPR). Data Protection Impact Assessments (DPIA) have been conducted and approved by UiB. This was done in cooperation with Sikt - Norwegian Agency for Shared Services in Education and Research. DIGISSCORE adheres to national and university-level ethical standards.

All surveys in PER have been reviewed based on ethical issues by its Scientific Committee. Ideas2Evidence executes the survey, and are responsible for recruiting participants. The data is stored encrypted in UiBs infrastructure for safe processing, "SAFE". More details on ethics and personal data protection can be found here: https://www.uib.no/en/digsscore/169546/note-ethics-and-personal-data-protection-digsscore-panels.

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Appendix A: Green and grey profile party groups

The representatives have been split into green- and grey profile party groups mainly on the basis that the groups show different properties in the data. In addition, the division is supported by these four parties are also the ones that were approved for their climate and environmental policies in the previous general election (2021) by Norway's oldest environmental organisation, Naturvernforbundet (Naturvernforbundet, 2021). The parties in the two groups can be found in Table A1 along with their English names and ideologies. In Figure A1, the means of support of all parties are shown. It becomes clear that there is a significant difference between the parties with a green and grey profile. Not only are the means of the party groups different from each other, also the mean of every single party is significantly different from all those in the other group. In Fig A2, the normalised distribution of each party is also plotted. Here, it is seen that the distributions of the two groups are also different. The green profile distributions have two peaks, one smaller around "Oppose strongly", while their largest peak is around "Support somewhat". The grey profile parties have one visible peak at "Support strongly" which tapers off towards opposition. Of the four green profile parties, R, SV and MDG are traditionally associated with the left side, though R and MDG has never been part of a governing coalition.

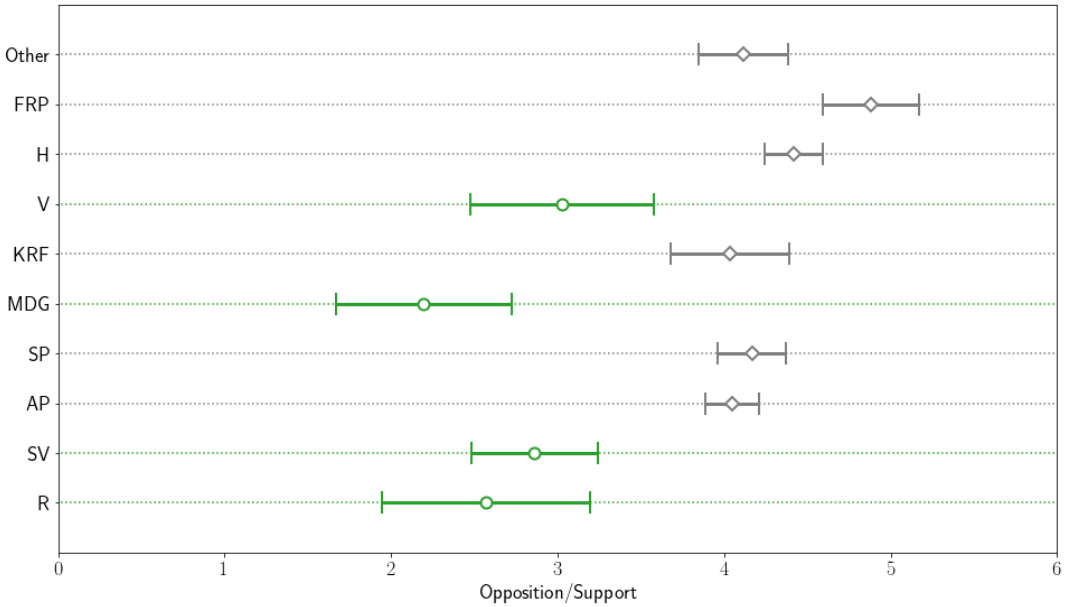

Figure A1. Means of support of all major parties, with smaller ones grouped together as "other".

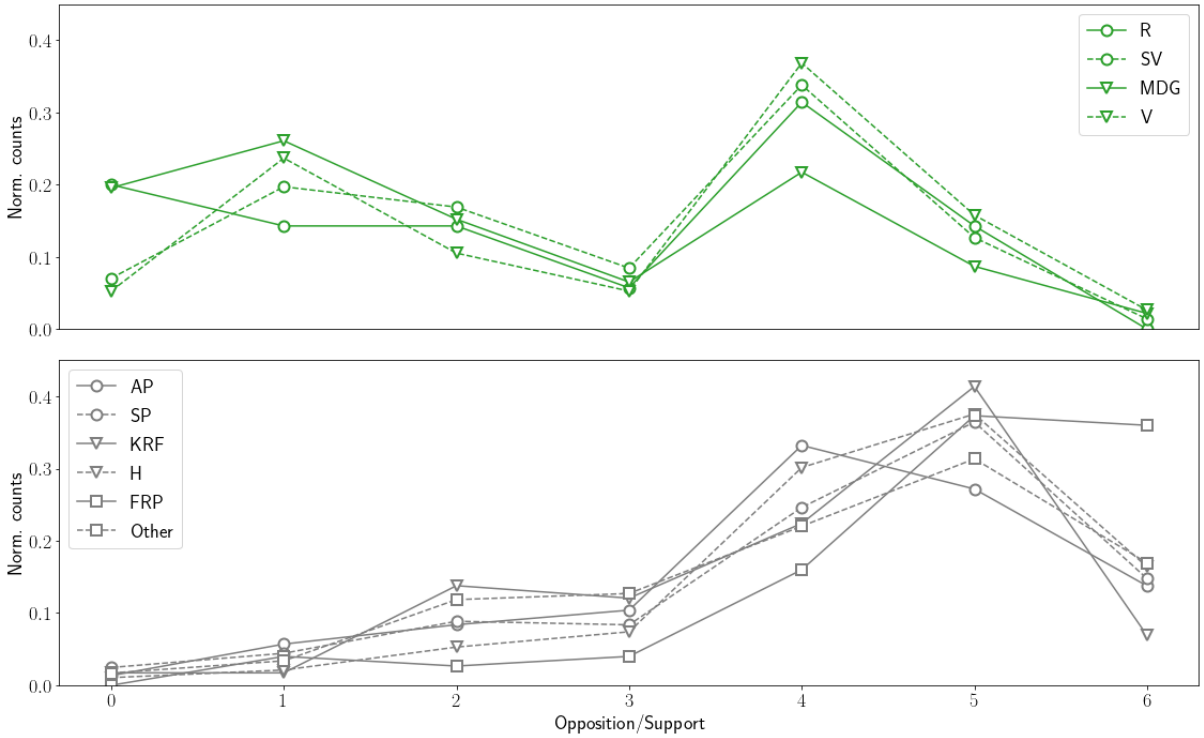

Figure A2. Distributions of support for each party, normalised to easier see the trends.

Table A1. Overview of political parties in Norway, with their ideologies. The upper part contains the green parties, while below the division line, the grey parties are found.

Abbreviation	Norwegian name	English name	Ideology
R	Rødt	Red party	Socialism
SV	Sosialistisk Venstreparti	Socialist Left Party	Democratic socialism
MDG	Miljøpartiet De Grønne	Green Party	Green politics
V	Venstre	Liberal Party	Social liberalism
AP	Arbeiderpartiet	Labour Party	Social democracy
SP	Senterpartiet	Centre Party	Nordic agrarianism
KRF	Kristelig Folkeparti	Christian Democratic Party	Christian democracy
H	Høyre	Conservative Party	Liberal conservatism
FRP	Fremskrittspartiet	Progress Party	Right-wing populism

Appendix B: Subgroups in data

The respondents self report on gender, age, education, rurality and income.

- Gender here allows for choosing between *female* and *male*.
- Age is split as *old* meaning a birth year in 1959 or earlier, *middle* between 1960-1989,and *young* meaning those born in 1990 or later.
- Education is split into those who have attended university or university college, called *university* in Table 2 and *no university* meaning those with no higher education.
- The *urban* respondents encompasses all those who report that they live either in "a large city", "suburbs or the outskirts of a big city", and "a small or medium-sized city". The *rural* respondents live either in "a village" or "a sparsely populated area"
- Income is split into *low* being below 550 000 NOK per year, *middle* means earning between 550 000 and 1 million NOK, while *high* means earning above 1 million NOK.

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