

Public attitudes towards renewable energy technologies in Norway. The role of party preferences

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Abstract

Transition to a sustainable society requires large-scale conversion of the energy system to new, renewable, non-fossil sources of energy. This presupposes public support for new technologies, which means the public must deal with challenges in terms of placement, area requirements, ecological degradation and price developments. This paper discusses how citizens view renewable energy technologies. It analyses responses to representative surveys of the Norwegian population on the desirability of various energy technologies such as hydroelectric dams, onshore and offshore wind energy, bioenergy plants and, for contrast, gas plants with and without carbon capture and storage. Our main focus is on the influence of party political preference on views of renewable energy. We find that the sometimes lukewarm enthusiasm for renewable energy technologies cannot be fully explained by existing theories and that political party preference has a larger impact on energy technology attitudes than previously believed.

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Keywords

Renewable energy opposition, political preference, environmental attitudes

Introduction

Increasingly, there is scientific and political agreement that the world's consumption of fossil fuels must be phased out due both to the threat of destructive climate change and the future shortage of available fuels. This has profound consequences for the global energy system, which must move towards more sustainable modes of production and consumption. While more efficient energy use can substantially contribute to alleviating the problem, a successful transition to a sustainable society requires the large-scale conversion of the energy system to new, renewable, non-fossil sources of energy. This transition brings with it a host of new challenges, including issues such as local area planning and requirements, environmental degradation, and price developments. It also requires acceptance and a positive public perception of the new technologies, which in turn relies on the public's evaluation of the positive and negative aspects of new renewable construction. In other words, positive attitude is an important issue shaping the widespread implementation of renewable energy technologies and the achievement of energy policy targets. It is commonly assumed that 'public attitudes' need to change to make more radical scenarios about the implementation of renewable energy technologies possible (Devine-Wright 2008a).

The Norwegian electricity system is dominated by renewable hydroelectricity, itself a clean and cheap energy source. In the period from the end of WWII to the late 1980s, several factors combined to accustom both individual and large-scale Norwegian electricity consumers to abundant electricity at a very low price. Norway has many waterfalls and a history of social democratic governments willing to subsidise dam construction to provide cheap electricity for industry and price controls for household consumers. It also has had a

highly centralised supply-driven approach to generation and transmission of electricity that relied on constructing new production capacity well in advance of increases in demand (Thue 1996). This means that many Norwegian hydro plants have been in operation for decades and are paid for many times over.

However, the last large-scale hydro development in Norway took place in the early 1980s, when a large dam project in the far north was constructed against opposition from conservationists and indigenous activists. The controversy led to a de facto moratorium on large hydro dam constructions. There are not many large waterfalls not already used for electricity production left in Norway, and using the remaining few for electricity production would be extremely controversial. As a result, when demand for electricity caught up with available supply towards the end of the 1990s, the question of more small-scale new electricity generation came to the forefront of public discussion. At the same time, Norway committed to increasing its production of renewable energy through EU agreements (Skjølsvold, Ryghaug, and Dugstad 2013). Norwegian geography allows for the best wind resources in Europe, both on- and offshore, so the theoretical potential for new renewable energy is significant.

Today Norway finds itself in a paradoxical situation regarding the role that new production of energy from renewable energy sources should play in the Norwegian energy system. On one hand, new types of renewable energy are far away from being competitive with the country's traditionally cheap main source of electricity and therefore need some sort of public support or subsidies in order to be realised. Norway has chosen to adopt a "technology neutral" approach to renewables, meaning a fixed governmental support for renewable production regardless of type. So far, the renewable construction has been mainly wind and small-scale hydro. However, a new green certificate subsidy scheme is in place, which promises to lower the economic barriers to new projects ("Electricity Markets

Agreement” 2011). On the other hand economists and others are claiming that Norway does not need more production of renewable energy as the domestic electricity demand has levelled out, the country is already more or less self-sufficient with predominantly renewable energy, and measures to enhance the production will in practise lead to subsidising electricity production in Europe (Bye, Hoel, and Strøm 1999). In relation to this a much discussed idea has been to use Norwegian hydropower as a “green battery” for Europe, aiding a transition towards European low carbon societies (Skjølsvold, Ryghaug, and Dugstad 2013) as the storage capacity of this hydropower system could be used to offset the intermittent nature of renewable energy. This is an argument for the need to increase the electricity production in Norway. However, this would require investments both in cables to Europe and it raises the tricky question about who should bear the costs. Thus, all in all the Norwegian public is faced with a rather complex situation regarding what role new renewable energy technologies should and could play in the energy system.

In addition to renewables, Norwegian political debate has also turned around the possible construction of new gas power plants, which would utilise Norway’s considerable gas resources domestically, but also contribute to increased CO₂ emissions. The controversy even caused a centre-right government coalition to split in 2000. Installation of carbon capture and storage (CCS) in gas power plants is one option that Norway has invested heavily in, with increased production and transportation of liquid gas as a goal. This means that the discussion of new renewables in Norway should be seen in the context of non-renewable energy sources.

This paper discusses how citizens view energy technologies and sources in Norway, in light of the situation described above. Rather than attempting to “solve” the problem of why new construction of renewables is slow or non-existing we wish to examine different types of renewable technologies and discuss some factors that might contribute to their

(un)popularity. Different types of renewable energy of course carry with them different sorts of potential problems and obstacles. Consequently, this paper should be seen as an attempt to outline some possibilities for an aggregate analysis of public attitudes towards disparate technologies and energy resources. We analyse survey responses by the Norwegian population on the desirability of various energy technologies such as hydro dams, onshore and offshore wind, bioenergy combustion plants and, for contrast, gas plants with and without carbon capture and storage technology. Are attitudes towards these energy sources the same? Are attitudes among different groups of the public the same, or if not, what can explain these differences?

In the following sections, we first present location based and knowledge deficit theories of public attitudes regarding new renewable energy technologies. Then we go on to discuss an alternative explanation that to a limited degree has been analysed in earlier studies of public attitudes towards energy sources, namely the role of political preferences, before testing these explanations empirically and finally offering some concluding remarks on the explanatory power of these theories as well as some thoughts on how to better approach the issue of public understanding of renewable energy technologies in the future.

Public attitudes towards renewables and lack of support

Energy users have heterogeneous interests, values and worldviews (Sovacool 2009). 'Energy' possesses many different meanings in contemporary society (Aune 2007), and can be seen in relation to a scientific view, an economic view, an environmentalist view, a social welfare view and energy security (Stern and Aronson 1984), each of which differs in their conception of energy, diagnosis of what counts as energy problems, and policy prescriptions (Sovacool 2009). Several studies have attempted to identify levels of public understanding and awareness of different forms of energy technology and their impacts. These have produced a rather mixed set of findings, in part due to the varied nature of

questions asked. In terms of general energy knowledge, McGowan and Sauter (2005:12) found that respondents 'tended to have only a vague idea of where energy was used but a rather better sense of the sources of energy'. Results suggest high levels of awareness that energy use is rising (e.g. Eurobarometer, 2003), that energy comes from a variety of sources and is often imported (e.g., Populus 2005), that renewable energy, particularly technologies such as solar panels, enjoy strong support both in the UK and across Europe, but that most individuals are reluctant to pay more for energy generated from renewable resources (Eurobarometer, 2006).

Traditional social acceptance studies that query the general public on attitudes or support have tended to show widespread support for green energy technologies in the Europe (Sengers et al. 2010; Eurobarometer, 2008), demonstrating that the public generally views renewable energy very favourably. Interestingly enough, most literature on the public perception of renewable energy technologies focuses on public resistance (Devine-Wright 2008a)² especially when focusing on the site-specific nature of different renewables that often invites conflict with existing or planned land uses. The landscape itself can shape public attitudes towards renewables, as some landscapes are more valued than others (Sovacool 2009). However, aspects of social acceptance of renewable energy technology implementation was largely neglected when Norwegian policy programs specifically aimed at new renewable energy started in the 1980s as most developers, including energy companies, authorities, and private local investors thought that implementation was not a problem, because the first surveys on the public acceptance of renewables, in particular wind power, revealed very high levels of support of the technology (Wüstenhagen, Wolsink, and Bürer 2007a). Even though governments are increasingly interested in pushing for

² For instance see, Sengers et al (2010) for an analysis aiming at opening the black box of resistance to new energy technologies by analyzing media discourse.

more renewable developments, and the public generally view renewables favourably, specific construction projects often meet with resistance, both locally and on a national level.

Several theories have been proposed to explain the fact that renewable energy production is often favourably viewed in theory while still meeting with a lot of resistance in actual construction situations. Most of these explanations are location based theories (Schively 2007), claiming that one's proximity to areas affected by new development is a key factor in opposition to for example wind farms. Among this set of theories the most prominent one is by far the NIMBY (Not In My Back Yard) thesis that in short claims that while support for renewables might be strong in general, this support can quickly evaporate when the development moves close to one's home. NIMBY explanations have been extensively criticised in the literature, among other things, for focusing too much on individuals' perceptions of renewables and not enough on the wider social context within which these perceptions are formed (Bell, Gray, and Haggett 2005) Critics have demonstrated that people's reasons for opposing renewable energy encompass a broad range of social and personal factors affecting human interactions with social and political institutions that extend beyond NIMBYism (West, Bailey, and Winter 2010; Upreti and van der Horst 2004; Bell, Gray, and Haggett 2005; Walker 2008; Wüstenhagen, Wolsink, and Bürer 2007a; Walker and Cass 2007). Most of the literature which seeks to explain so called 'NIMBY' responses is naturally based on case studies within particular localities as understandings of support and opposition for particular developments must be understood in context (Aitken 2010). Here our focus is not on specific renewable energy developments touching upon the lives of Publics-in-Particular. Rather we are examining the views of the Publics-in-General on renewable energy technologies through a large N study that is poorly suited to verify the validity of NIMBY explanations.

Location based theories are of course not the only explanations offered in the literature on support/resistance to renewables. Some have also framed resistance as a result of a general information or 'knowledge deficit', assuming that more knowledge about a technology leads to more positive sentiments towards it (Brunk 2006). In line with this, some studies indicate that support for new renewables increases if respondents are given thorough information about the pros and cons of new developments in advance (Ogarra, Mourato, and Pearson 2005). This vision of well-informed citizens faithfully supporting new technological developments has nonetheless been criticised repeatedly (Tipaldo 2011; Devine-Wright 2008b) and previous studies have also found that education does little to reduce differences between advocates of conventional and alternative energy technologies (Gottlieb and Matre 1976). To sum up, the knowledge deficit model has been met with a lot of criticism and there is still much uncertainty about what "knowledge" in the case of new renewables really constitutes, not to mention what shape it should take and how it should be disseminated in order to make people more positive towards these technologies (Ricci, Bellaby, and Flynn 2008).³ What kind of knowledge is needed? Is it facts about the working of the technology, better understanding of energy policy and the energy system or perhaps effects of the technology on for instance climate mitigation that would count as relevant knowledge in this case? This may be interesting questions to scrutinize further when studying the development of specific plants.

Socio-demographic variables

Given that the exact information of each respondent is hard to gauge, for our analysis we will settle with a more general examination of how level of *education* may influence the

³ After all, it is unlikely that one will get the opportunity to carefully explain this particular issue in long conversations with every single citizen.

support or opposition to different energy technologies, as an indirect measure of knowledge about energy. In addition to education, various background variables have been found to affect attitudes towards renewables. One of them is age. Earlier studies from the UK give a somewhat unclear picture of the relationship between attitudes towards renewable energy and age, as some regional surveys have found higher levels of opposition towards renewable energy amongst older respondents (Mcgowan and Sauter 2005), while a national study found levels of opposition to be lower in younger and older cohorts (ages 16-24 and 65+) in comparison with middle-aged respondents. A study of the Australian public demonstrated that the support of renewable energy is stronger among younger Australians (Tranter 2011). There are few explanations as to why this category should play a role, but it is not inconceivable that generational effects on attitudes can be found. Gender has previously been known to play a role regarding environmental concern, and may therefore be expected to affect attitudes towards renewables. In general, surveys have demonstrated fairly consistent results that women are more environmentally oriented than men (Dietz, Stern, and Guagnano 1998; Zelezny, Chua, and Aldrich 2000; Tranter 2011). However, whether environmental attitudes issues would actually predict attitudes towards renewables is a more difficult question, as one may easily foresee that strong environmental attitudes also may foster reluctance towards renewable energy, as it can be seen as a threat towards both biodiversity and vulnerable natural areas due to large area demands. While there has been little discussion of why age and gender would play a role in influencing attitudes, they seemed to have played a role in previous empirical investigations. Therefore, we have chosen to include these as variables to study in this paper.

New renewables are also clearly a political question, touching upon issues such as local industrial development, construction of infrastructure and larger issues of security of energy supply and increasing electricity demand, environmental protection, as well as climate mitigation policy. Some of these questions obviously fall outside the classic left-right political scale, making single-issue politics pertinent to the question of opposition to renewables. Thus, it is interesting to look at how links between party preference and environmental attitudes influence views on energy technologies.

Party preference and political views

Very little scholarly work has been done on the connection between voters' political preferences and their attitudes towards renewable energy. This is somewhat surprising given the highly political nature of much of the debate surrounding renewables. One reason might be that environmental issues do not easily fit into a traditional left-right policy pattern, as they in a sense are a more recent political development than the types of questions that were the focus of the earliest political parties (Rootes 1995). In spite of this, there is evidence that agreeing with a party on one issue makes voters more likely to adopt that party's policies on other issues, bringing personal opinions in line with the party's stance (Gerber, Huber, and Washington 2009). This means that those parties that do not traditionally have a strong environmental focus have a chance to affect their voters' attitudes towards energy issues, sometimes by "de-sensitising" them to environmental issues by placing a higher priority on other matters, such as industrial development.

These indications point towards party politics or political party preference being an important factor in informing citizens' views on energy questions, but do not say much about the general direction of this influence or how political party preference relates to support of different renewable energy technologies. Some evidence that voters of left-wing parties are generally more environmentally oriented than others exists (Neumayer 2004).

Empirical findings suggest that political beliefs are correlated with social acceptance of different low carbon technologies, although these studies are not particularly fine-grained when it comes to distinguishing between different types of social acceptance (Wüstenhagen, Wolsink, and Bürer 2007b). They also do not differentiate between different types of technologies. However, one study of UK citizens' views on demand side measures such as making changes in personal behaviour versus supply side measures such as constructing more renewables showed that demand side measures are what separate left-wing and right-wing voters rather than supply side matters, meaning that the possible construction of new renewables was not as clear-cut a political identifier as for example recycling (Poortinga et al. 2012).

More is known about voters' party preference and more general environmental values, at least in Norway. When it comes to the general question of the place of environmental issues in Norwegian politics, it can be noted that since its rise to prominence in the political debate towards the end of the 1980s, environmental values have been a factor for Norwegian voters in their consideration of which party to vote for (Valen, Aardal, and Vogt 1990), but for most it has not been decisive in choice of party (Tjernshaugen, Aardal, and Gullberg 2011). However, with increased media and public attention to climate issues in the wake of recent IPCC reports, the political parties have focused more on climate issues in their programs (Gullberg 2009).

In the case of the UK, Populus (2005) indicated that 37% of individuals indicating support for the Conservative party were supportive of new nuclear power stations (in comparison to only 12% of Labour supporters and 14% Liberal Democrat) whilst being less strongly supportive of new renewable energy developments (62% as against 86% and 84% respectively). We also know from prior research that willingness to pay to address

environmental problems is influenced by partisanship in Australia, environmental concerns being generally much stronger among Labour and Green supporters (Tranter 2011).

Data, material and methods

We set out to research public attitudes towards renewable energy with large scale opinion polls as data. In this way this analysis stands out from the growing field in the area of public engagement and acceptance of renewables that has been more interested in studying specific instances of localised public resistance rather than the more general politics of renewables – a distinction Michael (2009) has termed the difference between Publics-in-Particular (PiPs) and Publics-in-General (PiGs). PiPs can be broadly defined as those publics that have an identifiable stake in a particular scientific or technological issues or controversies. Public-in-general is what we most often think of as in terms of an undifferentiated whole often seen as an equivalent of ‘society’ and composed of persons who are politically capable in principle (Michael and Brown 2000).

This paper is based upon two sets of survey data from a representative sample of population of Norwegian citizens taken from projects called “The Deregulated Consumer” (N=1500, sampled autumn 2009), a one-off collaboration between the Norwegian University of Science and Technology and various electricity companies and “The Climate Barometer” (N=1032, sampled autumn 2011), a biannual survey of Norwegian consumers’ attitudes on environmental issues carried out by the analysis company TNS Gallup. The surveys consisted of questions on a broad range of energy related issues. Here we will concentrate on the responses to questions about various types of renewable energy.

Through the analysis of survey data on these questions, it is possible to get a more general overview of the state of attitudes towards renewables than specific case studies can provide. It should be noted, however, that there are limits to the explanatory power of this type of data. Aggregated survey data does not say much about the larger social context

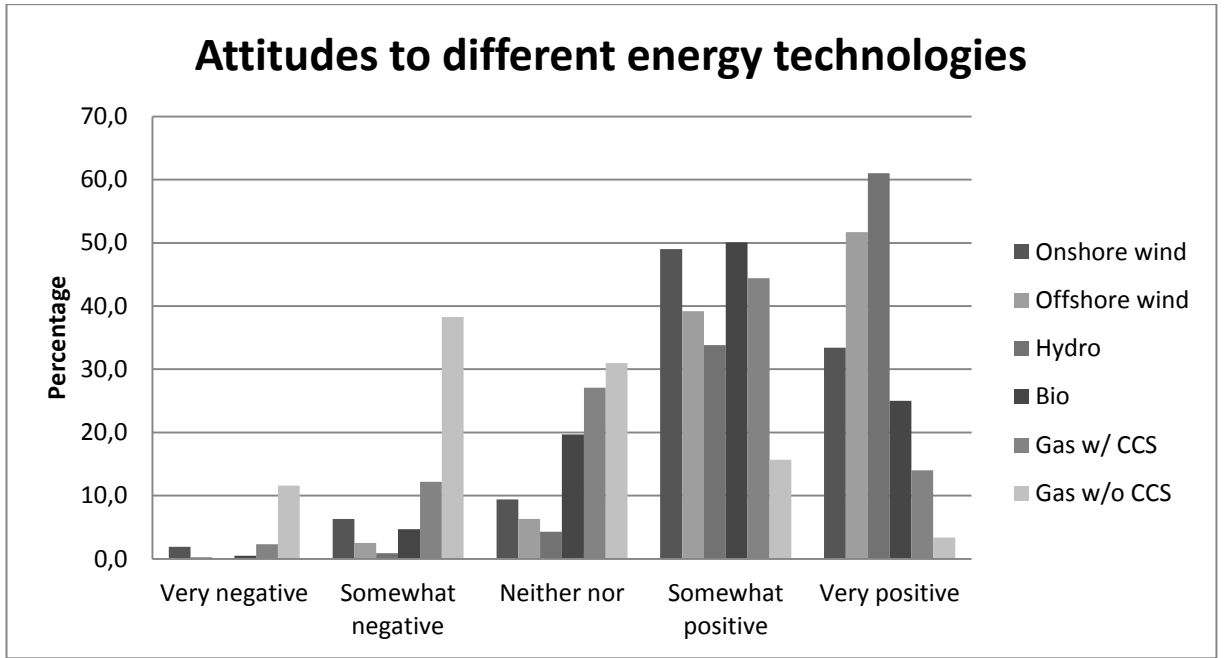
these attitudes are formed within, and is ill suited to capturing small, but potentially powerful resistance. Similarly, the types of standardised questions utilised in questionnaires cannot to a large degree capture certain types of information, such as how much knowledge an individual actually has about renewables (that would require longer, more in-depth interviews) or the way respondents associate their attitudes towards renewables with attitudes they might have towards other issues of a political nature. As a final caveat we add that there is evidence for considerable differences in public support for renewables in various countries (Gelissen 2007), so the findings we present are not necessarily applicable outside Norway.

The data is analysed using simple correlation measures, as well as ordinary least squares regression using background variables selected with an eye to the theoretical debates discussed above. The way these methods are utilised in relation to the theories discussed above will be dealt with in the findings section.

Public attitudes to different energy technologies

In this section, we present the findings from the survey data. Mainly, the statistical tests are carried out on the data from the Climate Barometer survey, as it contains relevant background variables– especially the question of political preference. The Deregulated Consumer survey is used as a control where applicable, to corroborate the data from the Climate Barometer.

Before presenting the statistical tests, it can be useful to look at the simple distributions of attitudes. The graph below shows the attitudes of respondents to a selection of energy technologies, taken from the Deregulated Consumer data.



As can be seen from the graph, people are generally positive to most energy technologies in the sample, with the mean lying close to the “somewhat positive” answer. The clear exception is gas without carbon capture and storage, which is predominantly viewed negatively. Gas with CCS is also somewhat ambiguously viewed, with a mean score almost exactly on the “neither positive nor negative” category.

Exploring the role of party preference and background variables

Based on the theoretical arguments presented above and the relevant socio-demographic variables in the survey, we performed a least squares regression analysis of the attitudes towards different energy technologies with a series of relevant background variables, including party preference, as independent variables. The following tables, taken from the Climate Barometer, present the regression coefficients for the attitudes towards different energy technologies. The variables used in the analysis are age, gender, party preference, education (low/high) and income.

Table 1: Regression results for energy technologies

	Onshore wind	Offshore wind	Hydro	Bio	Gas with CCS	Gas w/o CCS

Constant	4.405	4.611	4.497	3.907	2.766	2.560
Age	-.07*	-.10**	.05	.00	.26**	.04
Gender	-.00	.01	-.19**	.11**	-.15**	.05
Income	-.01	-.02	-.03	-.04	-.01	.11**
Education	-.07*	-.04	.05	-.00	-.02	-.10**
Labour Party	.01	.08	.01	.03	.12**	-.05
Progress Party [†]	-.02	.01	.02	-.02	.04	.06
Conservative Party	.11**	.13**	.07	-.01	.12**	.04
Christian Democrat Party	.02	.03	.03	-.01	-.02	-.08*
Centre Party	.02	.07	-.06	-.01	.04	-.02
Socialist Left Party	.02	.08*	-.01	.06	.04	-.13**
Liberal Party ^{††}	.05	.06	-.01	.03	.07*	-.11**
R-squared	.02	.02	.06	.02	.13	.07
N	1017	1007	1011	969	910	904

Standardized coefficients reported

* and ** indicate significance at the .05 and .01 level, respectively.

† The Progress Party can be characterised as right-wing populist.

†† The Liberal party roughly corresponds to the UK liberal democrats.

Table 1 shows that older people are generally more sceptical towards onshore and offshore wind than younger people, and more favourable towards gas with CCS. Here, age is used as a continuous variable. When age is broken down into generational segments, it becomes clear that it is people over the age of 60 that are significantly negative to renewables. Women are more prone to have positive attitudes towards bioenergy than men, and are more negative towards hydropower than men. Women's tendency to be more negative towards hydropower might be explained by the fact that women are generally more environmentally oriented than men and that hydropower is seen as having the highest impact on nature. Another notable feature of these tables is the presence of definite party preferences in the cases of energy sources that are *not* renewable, as in gas with or without CCS. For the most part, voters' views on these technologies correlate well with the distinction between industry oriented and environmentally oriented political parties. As explained in the section on Norwegian energy politics, gas is pretty unpopular on average

due to high emissions, but even more so among voters of parties that emphasise their environmental profile. One telling exception is gas with CCS, which is viewed favourably by the environmentally minded voters of the Liberal Party, as well as by the industry friendly Conservatives and Labour party voters. This points to the complicated discussion over the environmental merits of CCS (Daamen et al. 2011). Whether or not these issues are partly the reason voters affiliate with certain parties or whether the parties shape their voters' attitudes towards these matters is unclear, but there are signs that agreeing with a party on one policy tends to make voters align more closely with the policies of that party on other issues (Gerber, Huber, and Washington 2009).

Political views and renewables

As noted above, renewable construction touches upon a host of political issues, and different parties across the political spectrum might give varying weight to these. We examine the correlations between a positive view of various renewables (and some non-renewables) and preferences for various groups in Norwegian politics, based on self-reporting of voting in the last general election. The voters are placed in blocks according to two criteria: the first is a left-right scale based on the political parties' views on economic policy, and is a traditional delineation in Norwegian politics (Ryghaug and Jenssen 1999). The parties in the blocks are Sosialistisk Venstreparti (Socialist Left Party, SV) and Arbeiderpartiet (Labour Party, AP) in the "left" block, Kristelig Folkeparti (Christian Democrats, KrF), Venstre (Liberal Party, V) and Senterpartiet (Centre Party, SP) in the "centre" block, and Høyre (Conservative Party, H) and Fremskrittpartiet (Progress Party, FrP) in the "right" block.

Not all political divisions follow the traditional left-right schema. Environmental issues can to a certain degree be said to comprise a separate political axis, where some voters on the right can agree with some on the left in putting environmental concerns before industrial

development or jobs, and vice versa. The second block is based on the parties' public profile for being "environmentally friendly", prioritizing conservation efforts or the cleanest renewables regardless of cost, and "industry friendly", which is more concerned with jobs and cost-efficient investments in the power infrastructure (Tjernshaugen, Aardal, and Gullberg 2011). In the environment block we find SV, SP, KrF and V, and in the industry block AP, H and FrP⁴. One way of testing the assumption of environmental and industrial focus among voters is to check the two blocks against some more general questions about the state of the environment and energy system of the world. Table 2 shows some correlations between statements about the environment and the answers among the two blocks. The responses are on a five-point Likert scale where positive correlation implies agreement with the statement.

Table 2: Correlations between political blocks and statements about the environment

	Industry	Environment
I am worried about the consequences of global warming	-.13**	.16**
I think climate change is caused by human action	-.18**	.21**
Norway doesn't put enough effort into constructing new renewables	.07*	.04
The world's energy demand will have to be met by oil and gas for a long time	.18**	-.20**
More hydro is needed for Norway to meet its emissions goals	.12**	-.13**
The Norwegian power industry is concerned about climate change	.03	-.08**
The Norwegian power industry is concerned about conservation	.05	-.11**

⁴ Note that these three parties are by far the largest in Norwegian politics, and this block amounts to about 75 % of votes.

The Norwegian power industry is developing more climate friendly production techniques	.04	-.09**
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i * and ** denote significance below the .05 and .01 level, respectively.

From Table 2 it should be clear that there is a definitive distinction between political blocks, with the conflict lines being interest in and concern about environmental issues on the one hand and a more engineering and construction oriented political worldview.

There is some overlap between the two block categories of left-right and environmental-industrial. The parties on the right are both in the industrial block, while the centre parties have a very environmentally oriented profile. In this issue, it is the left that is split between industrial and environmental concerns. A look at the correlations between the blocks reveals this: The opinions of right-wing voters are strongly correlated with the industry block ($r = .570$, sig. $< .01$) and the centre with the environment block ($r = .698$, sig. $< .01$), while the left is positively correlated with both blocks (industry: $r = .229$, sig. $< .01$, environment: $r = .081$, sig. $< .01$), with slightly stronger correlation with the industrial block due to the Labour Party being by far the largest party on the left.

Table 3: Correlations for various renewable energy technologies and preference for different political blocks

	Left	Centre	Right	Industry	Environment
Onshore wind	-.02	.06	-.00	-.03	.05
Offshore wind	.02	.03	.02	.01	.05
Hydro	-.04	-.03	.10**	.08**	-.01
Gas w/ CCS	.02	-.01	.10**	.16**	-.06
Bio-energy	.07*	-.00	-.06*	-.03	.05
Coal w/o CCS	-.08*	-.07*	.03	.04	-.15**

Gas w/o CCS	-.11**	-.12**	.16**	.14**	-.21**
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i * and ** denote significance below the .05 and .01 level, respectively.

Table 3 reveals some interesting phenomena. Firstly, with no significant correlations, wind power does not “belong” to any of the political blocks. This could indicate that voters either see wind both as an environmental measure and as industrial development, and therefore a win-win solution, or as ambiguous because the benefits do not easily outweigh the drawbacks. Secondly, hydro – a clean, cheap and abundant resource in Norway that carries with it some large negative effects of damming up creeks, rivers and lakes – is more favourably viewed by the right and industrial blocks than by the rest. This might be explained by its connection to Norway’s industrial production base (especially in the so-called power intensive industry sector, mostly aluminium production) as well as its history of controversy detailed above.

The third notable finding here has to do with gas plants. There has been a heated debate about the use of gas in power plants in Norway, and the issue seems to divide the voters. The centre-left government have announced their plans to construct large-scale carbon capture and storage (CCS) facilities in order to start utilising more gas in electricity production without increasing emissions of CO₂. These plans have assuaged the environmentally minded somewhat (which might be why there is no clear correlation between the left, centre and environment blocks and the issue of gas plants with CCS), but also represent a significant cost to the construction of new gas plants. This last point can explain the most polarised of the above technologies, gas plants without CCS. Clearly, this is unacceptable for the environmentally oriented voters on the left and in the centre, while the cheaper construction cost of these plants might explain why right voters are even more strongly in favour of this option than the one with CCS.

Table 4: Correlations for various renewables and specific party preferenceⁱ

	Ap	FrP	H	KrF	Sp	SV	V
Onshore wind	-.03	-.04	.09**	.01	-.00	-.01	.03
Offshore wind	-.00	-.05	.06	-.00	.03	.03	.02
Hydro	-.01	.02	.09**	.04	-.07**	-.03	-.02
Gas w/ CCS	.07*	.02	.10**	-.05	.01	-.03	.03
Bio-energy	.03	-.04	-.04	-.02	-.02	.06	.02
Coal w/o CCS	.01	.06	-.01	-.04	-.01	-.12**	-.08*
Gas w/o CCS	-.01	.10**	.11**	-.07*	-.02	-.14**	-.10**

ⁱ* and ** denote significance below the .05 and .01 level, respectively.

Table 4 breaks down the political preference correlations on the individual party level. While it mostly confirms the impression from the block data, a few things are worth noting. The most important is that some parties' voters have much more polarised views on these issues than others. For example, Labour Party voters do not deviate from the average in their attitudes concerning any of the electricity generation options, and neither do those voting for Christian Democrats or the Centre Party. In contrast, the voters of the Conservative Party are strongly in favour of gas power plants (and also onshore wind and hydro), while voters of the Socialist Left Party and the centre-right Liberal Party are equally opposed. This can either imply that gas plants are clearer examples of an energy technology that is less ambiguous in terms of the trade-off between environmental and industrial concerns than for example wind, or that this specific issue has been made into a political talking point, where the involved parties already have invested prestige in backing or opposing the issue – or a combination of the two.

Conclusion

In this article we do not focus on case studies within particular developments that have to be understood in a context where publics are viewed as something in particular, pinned down spatially, normally in some geographical area that is deemed to be the site of some techno scientific impact (Michael 2009). Rather, we have framed our analysis as a study of the general public, with a particular focus on the influence of socio-demographic variables and political preferences on renewable energy.

Our analysis reveals that most people are positive towards renewable energy sources. This is in line with previous studies. Given the paradoxical and unsettled role of *new production* from renewable energy technologies in the Norwegian energy system the positive attitudes are still noteworthy. We also find that attitudes towards renewable sources vary, and that there are differences between new renewable sources and conventional sources like gas – although that picture is complicated by the inclusion of CCS technology which is met with slightly more positive views than conventional coal and gas plants.

The analysis also revealed that most socio-demographic variables to a little degree can explain attitudes towards energy sources, whereas there are interesting relationships between political preferences and attitudes towards energy sources and technologies, something which has been largely overlooked by earlier studies in this area.

We find a clear correlation between people's preferences for parties that emphasize environmental values and their attitudes concerning energy installations. This pertains especially to the types of energy installations that cannot be said to be environmentally friendly, such as gas or coal plants. We also find that those types of renewables that can be tied to other values than environmentalism, for example through association with industrial development, enjoy a more cross-political support than those that are seen as only mitigating climate issues.

In light of the focus of much research on public perception of renewables, we believe the findings of this paper should challenge some assumptions about the role of policy regarding renewables. The differences in views on different kinds of renewable energy technologies point to the need to avoid treating renewable technologies as one monolithic category. If the findings presented in this paper hold for other parts of the world, current theories on renewable energy opposition must take into account the heterogeneous nature of these technologies, both in their specific contexts and more generally, as we have treated it here . This point was also made by McGowan and Sauter (2005), who revealed that public opinion in general is not linked to renewable energy as an aggregate term, but to specific renewable energy technologies, solar being the most popular renewable source of energy in the UK. Similarly, the connection between voters' party preference and their views on different renewable technologies hint at the importance of the framing of new developments in terms of industry development or environmental costs when they are presented to the public.

Earlier studies of attitudes on renewables have concentrated on ethnographically oriented work on Publics-in-Particular that are directly affected by new developments. By adding information about party preferences to the usual survey questions about attitudes towards renewable energy, we have demonstrated that the Public-in-General is also a meaningful category worth of study, as such preferences and political views can be important factors related to the support of renewable energy technologies. Our research indicates that the support of renewables crosscut the traditional left-right party delineation in Norwegian politics. Support is better explained by two blocs: an industrialist versus environmental protectionist blocs. These two blocs do however not represent the two more stable coalitions in Norwegian politics, who for the most part are still dominated by the Labour party dominated left and the Conservative party dominated right (in opposition). In line with this, it is reasonable to think that the fact that the energy issue (and to a large party

climate and environmental protection policy) in Norway seems to crosscut the traditional left-right coalitions might have contributed to taming this as a conflict line and salient political issue for some time. We believe that examining in what way renewable energy policies intersect with politics-as-usual can be a relevant future research topic.

Acknowledgments

We wish to thank Knut Holtan Sørensen and two anonymous reviewers for helpful comments in the process of improving this article.

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