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## Technology will save the climate! Attitudes towards Norway's climate policy in four social groups

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# KIEL WORKING PAPER

**Technology will save  
the climate!**

**Attitudes towards  
Norway's climate  
policy in four social  
groups**



No. 2239 February 2023

*Åsta Dyrnes Nordø, Gisle Andersen, Christine Merk*

# ABSTRACT

## TECHNOLOGY WILL SAVE THE CLIMATE! ATTITUDES TOWARDS NORWAY'S CLIMATE POLICY IN FOUR SOCIAL GROUPS

*Åsta Dyrnes Nordø, Gisle Andersen, Christine Merk*

The risk of opposition from the population increasingly plays a role in choosing the climate policy measures to achieve the objective to substantially reduce greenhouse gas emissions. In Norway, there is a long-standing cross-party consensus that the development of new technologies will be crucial for solving climate challenges.

Comparing public opinion surveys, Norwegians are significantly more convinced that new technology will solve problems induced by climate change, compared people in other European countries. A concrete example of such a technology is carbon capture and storage (CCS). Despite discussions about the costs of establishing the technology, there is a cross-party consensus in Norway that CCS is a good and suitable measure for reaching climate policy goals.

In this article, we review the historical background that has led to this broad support in Norway. Furthermore, we look at how this has been expressed in the political parties' attitudes towards CCS. There has been a long-standing consensus among all major parties that CCS should be developed and deployed. We argue that this lay the foundation for the societal support for CCS.

We analyze data from the Norwegian Coordinated Online panels for research on DEMocracy and governance (KODEM) to examine the attitudes toward CCS among citizens and three functional elites, namely elected representatives, bureaucrats, and journalists.

We find that CCS receives strong support in all four groups, but that citizens and elected representative are more skeptical compared to bureaucrats and journalists. However, when looking at the factors that influence the perception of CCS, the pattern is the same for all four groups. The more technology optimistic a person is, the more positively they tend to perceive CCS as a method to fight climate change. We also find that those who think the political efforts to reduce greenhouse gases are too great are less positive about CCS compared to those who think the efforts are appropriate or too small. Overall, the analysis indicates that all four societal groups are technology optimistic and characterized by the same attitudes toward climate change. We discuss the role of technology optimism in Norway's climate policy and the reasons for the high degree of political consensus across groups with different societal functions.

**Keywords:** Climate policy, carbon capture, CCS, technology optimism, citizen-elite congruence

**JEL classification:** Q54, Q55, Q58

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## Introduction

The Norwegian political discourse about what actions are needed to handle the climate crisis differs from what can be observed in many comparable European countries. A distinctive feature of the Norwegian debate is the broad consensus on the importance of technological development for solving climate problems. This applies not least to carbon capture and storage (hereafter abbreviated CCS), which has been discussed by Norway's political parties and environmental organizations for more than three decades.

We discuss the forces driving the attitude toward CCS in Norway and examine whether there is a match between the support for CCS that we find among the political parties and the attitudes towards CCS of other important social groups. Furthermore, we study which factors explain variations in support for CCS and whether these patterns are consistent across the different social groups we studied.

Previous studies have shown that the development and implementation of CCS technology has received very broad support from the Norway's political parties since the early 2000s (Tjernshaugen, 2011), from the Norwegian environmental movement (Swensen, 2015) and from a majority of the Norwegian population (Merk, Nordø, Andersen, Lægreid & Tvinnereim, 2022; Tvinnereim & Ivarsflaten, 2016; Tvinnereim & Steinshamn, 2016). However, qualitative studies in Norway indicate that both, the understanding of CCS and the support for the technology in the population is lower than for other climate solutions (Karlstrøm & Ryghaug, 2014; Klimek, 2014). Nonetheless, compared to many other European countries, the support pattern for CCS in Norway stands out. In Germany and the Netherlands, for example, the majority has a negative attitude toward the technology (Braun, Merk, Pönitzsch, Rehdez & Schmidt, 2018; L'Orange Seigo, Dohle & Siegrist, 2014; Whitmarsh, Xenias & Jones, 2019). In these countries, CCS typically faces opposition from the environmental movement and political parties have differing views on the technology (Dütschke, 2011; van Os, Herber & Scholtens, 2014). There are also examples of planned underground storage sites on land that have been stopped by public protests, partly due to the fear that leaking CO<sub>2</sub> could cause health risks for people living in the area. As a consequence, CO<sub>2</sub> storage is now prohibited by law in many German federal states (Krämer, 2018).

In the Norwegian context, it has been clear from the start that storage of CO<sub>2</sub> will only take place under the seabed on the Norwegian Continental Shelf, as geological formations that create oil and gas fields are suitable storage locations for captured CO<sub>2</sub>. This distinguishes Norway from many European countries where underground storage on land was - and in some countries still is - considered. The results of comparative surveys of attitudes toward CCS in European countries show, that Norway's population feels relatively positive about CCS, and to a significantly greater extent have already heard of CCS (Merk et al., 2022; Whitmarsh et al., 2019). However, results from Merk et al. (2022) and previous studies suggest, that the difference in the perceptions of offshore and onshore storage is not sufficient to explain why CCS has gained such wide support in Norway and not in other countries.

In this study, we particularly explore differences in support for CCS between social groups and examine factors that can explain variations in this support. Our results show that CCS has broad support in all social groups studied and we observe little variation. This result is remarkable in comparison to the European debate on CCS and it helps us better understanding the distinctive features of Norwegian climate policy in a European context. It contributes to the discussion about the relationship between political instruments and the support they receive from different social groups.

This paper consists of four main parts. In the next part, we examine the historical background of CCS becoming a political consensus project in Norway and the reasons why Norway is different compared to many European countries in this field. We complement our analysis of the survey answers from citizens, elected officials, administrators and journalists with a study of the role of CCS in Norwegian party manifestos in the period 1985-2021. In the analysis, the distribution of key variables for the four social groups - politicians, bureaucrats, journalists and citizens - is presented and discussed. We examine the general level of support for CCS in these four groups. Furthermore, we explore the relationship between the support for CCS, variables that measure technology optimism and the assessment of Norwegian climate policy, and political affiliation. We use multivariate regression models to identify which factors have the greatest impact on the attitude toward CCS in the four groups in the study. In the conclusion, the implications of our results and what they tell us about the importance of technological optimism for Norway's climate policy are discussed.

## **Historical background**

How energy is produced and consumed can be referred to as energy structure. Compared to EU countries, Norway has a special energy structure that has influenced which political instruments are considered to be feasible for reducing greenhouse gas emissions (Kasa, 2005, 2016). The production of electricity takes place almost without CO<sub>2</sub>-emissions because Norway mostly uses renewable energy sources, such as hydropower and wind power. In contrast to many other European countries, Norway therefore only has a few large point emissions from electricity production. Transitioning from coal to solar, wind or gas power provides a relatively easy but significant reduction in greenhouse gas emission for countries with high emissions caused by the electricity production. At the same time, Norway has a significant energy production in the form of oil and gas production, though this energy is mainly exported. In recent decades, the oil and gas extraction has accounted for approximately 25% of Norway's total CO<sub>2</sub> emissions (SSB, 2021). These emissions come from gas power plants on the offshore platforms that produce electricity for the production process. Some of these were made more efficient in the 1990s, but the combination of increased development, energy-intensive production and export installations, as well as increased energy demand for extraction as the fields are becoming emptier, has led to a 61 percent increase of CO<sub>2</sub>-emissions from the Norwegian Continental Shelf in the period 1990-2021 (SSB, 2021).

Reducing oil and gas production would have undoubtedly reduced Norway's greenhouse gas emissions but was only little discussed as a political alternative until after 2015 (Andersen, 2017; Bang & Lahn, 2019). The reason is the high importance of the sector for Norway's economy and employment. Although Norway's greenhouse gas emissions have remained fairly stable since 1990, Norwegian climate policy has never lacked ambition. The political parties have

on several occasions made ambitious decisions. Most significant in this context is, that the Storting introduced a CO<sub>2</sub> tax already in 1992. It provided an incentive to reduce emissions from the production of fossil energy and was essential for the introduction of CO<sub>2</sub>-capture and storage at the Sleipner oil field in 1996. This was the first commercial plant with CCS technology in the world and therefore became part of the emerging political debate about CCS in the following decades (for a more in-depth review, see Tjernshaugen, 2011).

### *CCS – a climate political “Lucky bag”*

Tjernshaugen (2011) argued that Norway's specific energy structure contributed to CCS quickly gaining broad political support. Seen in the light of how Norwegian climate policy has developed over the last decade, we would argue that CCS can be referred to as a climate policy egg “Lucky Bag”, as it been able to combine an ambitious climate policy with continued investment in the oil industry:

Firstly, the technology makes it possible to clean fossil energy sources. Therefore, supporting CCS makes it easier for Norwegian politicians to continue legitimizing Norway's of fossil energy exports, especially gas.

Secondly, the expertise required to develop the technology is largely the same as in the oil sector (understanding of geological structures, drilling of wells, offshore infrastructure for pumping liquids under high pressure, etc.). Thus, developing technological solutions to counteract the climate crisis can be used by Norwegian politicians to claim that the expertise in the oil sector must be preserved and further developed.

Thirdly, support for the development of CCS represents a relatively concrete measure that does not affect specific sectors or require a change in lifestyle. On the contrary, CCS is a technology that can give rise to new export opportunities. Support for CCS is therefore something Norway's politicians use for claiming that they are doing something to solve the climate crisis and which can later be reframed to “saving the world”, as former Prime Minister Jens Stoltenberg stated with bravura in his New Year's speech in 2007.

*It is our vision that within seven years we will have put in place capture and storage technology. This will be an important breakthrough in the efforts to reduce greenhouse gas emissions in Norway, and once we succeed, I am convinced that the rest of the world will follow our example. This is a major project for our country. It is our moon landing.* (Stoltenberg, 2007)

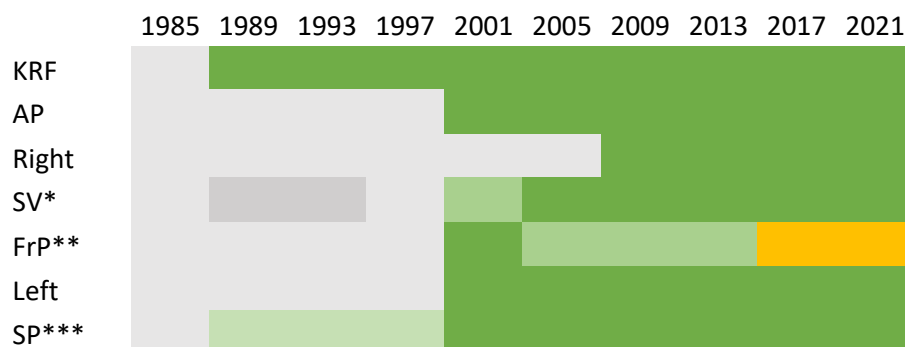
### *The development of carbon capture and storage support policy (1985-2021)*

However, the political debate about the use of CCS started long before Stoltenberg launched the moon landing. An overview of mentions of CCS the election programs of the political parties that have been regularly represented in the Storting in the years 1985 – 2021 is shown in table 1.<sup>1</sup>

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<sup>1</sup> The source of the table is the Party Document Archive of the Norwegian Social Science Data Service. To define the positions, a full-text search was used for the following words: “gas power”, “CO<sub>2</sub>”, “carbon”, “storage”, “refining” and “fossil”. If the

**Table 1** Political parties in Norway approach to CCS expressed in the election programs adopted between 1985 and 2021. Color codes: Gray – CCS not mentioned, green – expresses support for CCS, orange – does not express support for CCS. Color shades, see explanation under table.



**Notes:**

\* SV argues that purification technology does not exist in 1989-1993, only accepts gas power plants with purification in 2001.

\*\*FrP accepts CO<sub>2</sub> with purification in 2001-2013, but only if the state pays. For 2017 it is said that one should not have special Norwegian demands for purification, the party is thus not actively opposed to CCS in its party programme, but appears to be clearly the least enthusiastic and does not emphasize the topic. After they leave the government in the spring of 2020, they want to reduce the state's contribution to financing the technology.

\*\*\*SP uses somewhat unclear wording in 1989-1997, is not explicitly in favor of purification, but argues that gas power plants should not be built if they pollute more than they have to.

The analysis of the election programs shows that the political debate on CCS during these years has been linked to three different specific projects: (1) the construction of gas power plants (1989-2006), (2) the moon landing project at Mongstad (2007-2013), and (3) realization of large-scale CCS in the North Sea (2014-2022).

From the end of the 1980s until around 2005, the debate centered around using the gas from the Norwegian Continental Shelf in land-based gas power plants. Several major gas discoveries on the continental shelf in the 1980s, the development of more power-intensive industry and debates about the security of supply for the Norwegian electricity production led to increased interest in bringing parts of the gas ashore to use in gas power plants.

At the same time, all the political parties (with the exception of the FrP) had adopted ambitious targets for stabilizing or reducing Norway's CO<sub>2</sub> emissions until the turn of the millennium. While, gas power plants were expected to increased CO<sub>2</sub>-emissions and this laid the foundation for a political conflict over whether carbon capture from these power plants should be mandatory. The coalition government prosed this, but was outnumbered. In the further course, the conflict culminated when in March 2000 the Bondevik I government asked the cabinet about the matter and resigned when they faced a majority in parliament against it.

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programs did not have results for the words, the word "climate" was searched and the environmental topic was perused. For 2020 and 2021, the analyzes of the election programs are supplemented with corresponding text searches in the minutes of Storting debates, available from [www.data.stortinget.no](http://www.data.stortinget.no)



One of the gas power plants about which there had been a conflict was planned to be built at Mongstad to cover the electricity needs of the refinery there. It was fully developed without a capture unit in 2009. In the years after the turn of the millennium, climate policy had developed. Through climate policy settlements, the majority in the Storting had agreed on ambitious targets for reducing emissions. Meanwhile, the emissions from gas power plants were still significant. In 2008, the three gas-fired power plants that had been built and put into operation were also the three largest point emissions sources in Norway, accounting for around 7 percent of Norway's total greenhouse gas emissions that year.<sup>2</sup> In his New Year's speech at the turn of the year 2006/2007, then Prime Minister Jens Stoltenberg initiated his so called "Norwegian moon landing" with the plan to build a "full-scale test center" for CCS in Mongstad. However, after significant financial overruns and a lack of technological breakthroughs for a more energy-efficient capture technology, this project was shelved by Stoltenberg's second government, just before the 2013 election.

Despite this, the idea that CCS was important for reducing Norway's greenhouse gas emissions and that the technology could become a Norwegian commercial success – a "gift to the world" – was not shelved. The Solberg government (2013–2021) worked throughout the period to have a Norwegian storage location built. What was new about this plan, was the idea to build a fully functioning infrastructure for capture, transport and storage of CO<sub>2</sub>. This way, the development and the implementation of CCS would be combined. From the start, the plan was to capture CO<sub>2</sub> from Norway's emission intensive industry and store it in a suitable geological site in the North Sea. The transport and storage part of the project was initiated by an industrial collaboration between Equinor, Shell and Total, and is referred to as "*Northern Lights*". The state-funded part of the project called "*Longship*", also includes the CO<sub>2</sub>-capture (Meld. St. 33 (2019–2020)). The project is scheduled to start in 2024. Captured CO<sub>2</sub> from the cement factory NORCEM in Brevik and from the incineration plant FORTUM, both located outside Oslo, will be transported by boat to Øygarden, west of Bergen. From there it will be pumped out to the storage location under the North Sea in pipes. A central part of "*Northern Lights*" is the opening up of Norwegian storage sites and the transport infrastructure for CO<sub>2</sub> that is captured at sites in other countries.

The capture and storage of larger amounts of carbon is now becoming reality. At the same time, the all-party consensus to support CCS has shown some cracks. The Progress Party (FrP) held the ministerial post for the Ministry of Oil and Energy until they resigned from the government in the spring of 2020 and thus had political responsibility for developing the CCS project until then. After the FrP withdrew, the party also started to oppose the public funding of "*Longship*" but still supported the government's budget proposal for 2021 after negotiations.

Nonetheless, it becomes apparent that there has been a strong party-political consensus on CCS for many decades. All parties have expressed support for CCS. We assume that this sends a signal to the parties' voters that CCS is an important and suitable measure against climate change (Cohen, 2003; Zaller, 1992). CCS has also received support from other key social actors,

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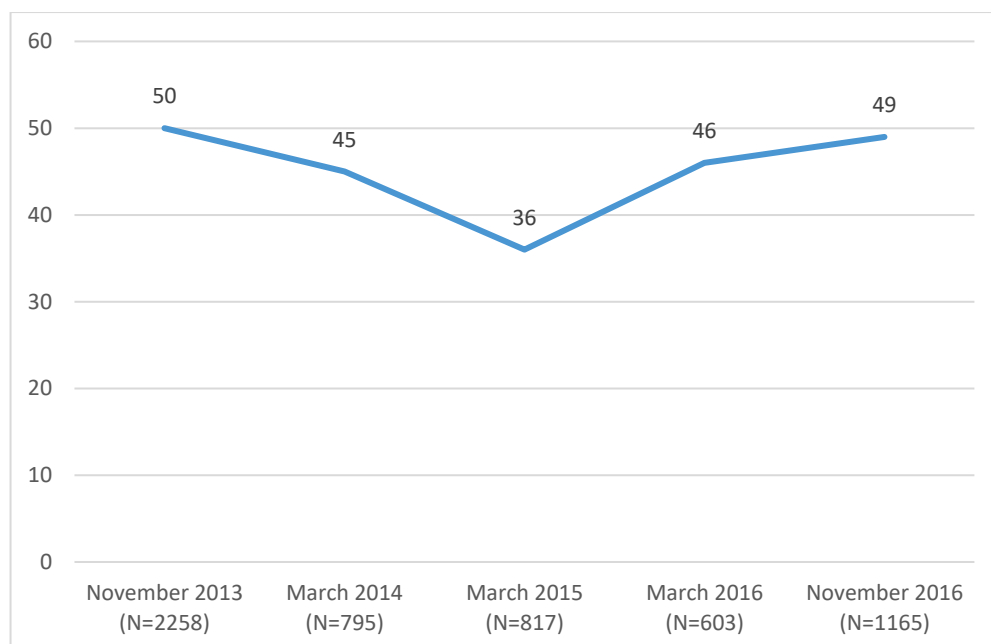
<sup>2</sup> These were the gas power plants at Mongstad, Kårstø and Melkøya. They released 3.8 million tons of CO<sub>2</sub> in 2008 (NDP, 2010: 17). Norwegian total emissions that year were 55 million tons (SSB, 2021).



such as environmental protection organizations and the petroleum industry. Overall, we assume that this led to a high level of support in the population and that we will find little variation between social groups. At the same time, climate policy has experienced a major increase in ambition levels in recent years and the Norwegian climate policy has been linked much more strongly to EU policy during Solberg's government. Stoltenberg's moon landing was canceled due to high costs without notable results fueling the debate about the high costs of the development of CCS. After spring 2020, the FrP has adopted a more indifferent attitude toward the technology. These are factors that may indicate a declining level of support over time, and that may also provide a basis for variation in support of CCS within the groups.

### *Public support for carbon capture and storage*

There is no historical data tracing the development of citizens' attitudes towards CCS all the way back to the establishment of the first CCS project on the Sleipner platform in 1996. However, since 2013, through the Norwegian Citizens' Panel, the population's attitude toward CCS as a climate technology has been measured. Figure 1 shows that the support for CCS has been relatively high, with a bit less than half of the population stating that they are positive towards the technology between 2013 and 2016. We assume the low support in March 2015 this a rather random deviation from the general pattern, as we do not have a more specific explanation for this result. The relatively low number of respondents at the three measurement points in 2013/14 and 2015 imply that we should interpret the figures with caution. A study based on data collected in 2019 shows a somewhat higher share of positive attitudes towards the technology (Merk et al., 2022).



**Figure 1** Share of respondents who are positive towards CCS. Based on surveys carried out in the period 2013-2016. The analysis is based on weighted data. Source: Norwegian Citizen Panel.

CCS is thus a technology in which the Norwegian population has consistently had a high level of confidence, and the support in Norway is higher than in other European countries, except for Great Britain (Merk et al., 2022; Whitmarsh et al., 2019).

Above we referred to CCS as a political “Lucy Bag” and described how technological optimism has been a main characteristic of Norwegian environmental and climate policy. Previous studies have also pointed out that the Norwegian public conversation is technology-optimistic. For example, in analyses of how environmental policy developed after 1945 (Andersen, 2017; Asdal, 2011), of the role of engineers in the Norwegian environmental debate (Aven, 2021), or of how the narrative of the linkage between economic growth and climate protection has shaped environmental policy (Jansen, 1989). It was reinforced by the debates about the Brundtland report “Our Common Future” from 1987 (Andersen, 2017). Studies of language use and media representations of climate change have also found, that technology optimism is a consistent feature of many public conversations in Norway (Haugseth, Huseby & Skjølsvold, 2016). Technological optimism has been shown in these studies to have a historically important role, and as a phenomenon, it occurs in many ways in climate and environmental policy. Technology optimism has also been identified in comparable surveys as particularly relevant for attitudes in Norway. The most recent data available is from a comparative study of Norway, France, Germany and Great Britain in 2016 (Steenjes et al., 2017). Here, 56 percent of Norwegians “agree” or “strongly agree” with the statement “science and technology will sooner or later solve the problems with climate change”. In the other European countries, this share is between 29 and 40 percent (ibid.:22). The share of Norwegians who are technology optimists is correspondingly high in an almost identical question that has been asked in the Norwegian Citizen Panel over the past ten years (Gregersen, 2021).

### ***Summary and expectations for the analysis of four different social groups' attitudes towards CCS***

The review of literature and data shows that the Norwegian climate policy has been shaped by technological optimism. This is expressed by political parties emphasizing that new technology, rather than changing basic structures in society, is necessary to solve the climate issues. We have argued that the structure of the Norwegian energy system is relevant for understanding the technology optimism in the climate field. The role of CCS in the development of Norwegian climate policy in recent decades is a good example because the technology provides the opportunity to politically justify the combination of ambitious climate policy objectives and the continuation of a large petroleum industry. Technology optimism is therefore not only about a general belief in technology, but also about the role new technology can have in a low-carbon society, a society “after the moon landing”.

We assume that political parties' representation and understanding of environmental problems and the role of technology in solving them will shape citizens' understanding of these issues. This effect can be reinforced when there is political consensus and when the understanding is not challenged by other actors, such as the oil industry or environmental organizations. This is an assumption founded in theory based on the level of dominance of the understandings and representation that are communicated through media, and on the ways, they are taken up by the population and how they can shape the population's attitude towards technology (Cohen, 2003; Zaller, 1992). Elements of the public debate are thus believed to help explain why the

Norwegian population is more positive about CCS and to a greater extent technology optimistic compared to other European countries.

As the faith in new technology in the face of climate change has been challenged to a lesser extent and CCS has barely been criticized as a climate measure, we expect to find a positive attitude towards CCS in all social groups. We also expect that the technology is perceived as a good climate change mitigation instrument and, furthermore, a positive relationship between technology optimism and support for CCS.

Another aspect that might support these expectations is, that CCS in Norway has been to a large extent a state initiated and publicly financed project and the trust in state actors in Norway is generally very high (Segaard, Rose & Haugsgjerd, 2020). There is also a relatively high level of trust in the oil sector in Norway, as there have been few accidents, and the sector employs so many people that most Norwegians know someone who works in the industries or closely connected sectors (Andersen, 2017). The fact, that over a long time, the sector has generated a large income stream for the treasury from the exploitation of the reservoirs far below the seabed may also contribute to the high level of familiarity and the positive perception of CCS. Survey data also suggests a connection between the structure of the energy system and the attitude towards CCS. Recent comparable survey data from the European countries show, that attitudes towards CCS are most positive in Norway and Great Britain (Whitmarsh et al., 2019), and both countries also have a relatively large petroleum sector.

We assume that there might be variations in support for CCS between the parties' voters. The Norwegian CCS project has been based on significant public funding. Furthermore, certain initiatives, such as "the moon landing", were met criticism due to the lack of cost control (Riksrevisjonen, 2013). This has also been the Progress Party's (FrP) main criticism of the public investments in CCS in recent years. It is therefore reasonable to assume that the support for CCS among right-wing voters, especially of the FrP, will be lower.

Apart from that, CCS could become the object of criticism for being a potential obstacle to the transformation towards a net-zero economy, as the technology reduces emission, but does not change general production processes. CCS can therefore be seen as an instrument which does not contribute to the type of societal transformation that is necessary to create a carbon-neutral society. This criticism plays a more prominent role in discussions about CCS in other European countries (L'Orange Seigo et al., 2014; van Os et al., 2014; Whitmarsh et al., 2019). Especially in the last 5 years, there has been a shift in the Norwegian and the European climate debate. Now, societal transformation is considered necessary to fight climate change which can no longer be seen as something happening future, but as something that is already happening. In the Norwegian context, the entry of the Green Party (Miljøpartiet de Grønnes, abbr.: MDG) into the Storting has been an important step towards giving the climate crisis a voice in the political debate (Andersen, 2017; Bang & Lahn, 2019). However, the MDG explicitly supports CCS and a target to capture and store 10 percent of Norway's emissions by 2025.<sup>3</sup> Another significant factor might be the close connection between CCS and the oil industry, since to some

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<sup>3</sup> The MDG work program, point 15, states the target of 5 million tons per year (Miljøpartiet De Grønne, 2021).

extent the acceptance of the fossil-fuel phase out increased, particularly among young voters (Gregersen, 2022).

## Data

We collected the data in autumn 2020 and spring 2021; they are part of the first round of KODEM, the Coordinated Online panels for research on DEMocracy and governance. While the panels for citizens and elected officials had already been established, the panels for bureaucrats and journalists were created in this pilot round of KODEM. Citizens and elected representatives answered the survey in November 2020, while bureaucrats and journalists had longer field periods: from November 2020 to the end of April 2021. The data collection was done via online surveys. For a review of the recruitment methodology, see Fimreite and Ivarsflaten (2023). Table 2 summarizes the key characteristics of the four panels.

**Table 2** Key characteristics of the KODEM panels.

	Total N	Observations in the analysis (N)	Share of women	Share high education	Collection period
Citizens	12 460	1 956	49%	62%	2 Nov 2020 – 27 Nov 2020
Representatives	2 344	1 149	38%	69%	2 Nov 2020– 27 Nov 2020
Bureaucrats	2 279	1 113	53%	94%	Nov. 2020 – April 2021
Journalists	760	379	41%	84%	Nov 2020 – April 2021

*Note: The shares for women and the highly educated are based on the number of N included in the analysis (column 2 in the table).*

The **citizen panel** is the longest timeseries out of the four panels. Only 8 percent of the respondents in our sample are between 18-29 years old, compared to 20 percent in the population. At the opposite end, we find a clear over-representation of those over 60. In our sample, these make up 41 percent of the respondents, compared to a 29 percent in the population. We also see that young men are more underrepresented than young women. When it comes to education, there is a systematic under-representation of respondents with upper secondary school or lower as their highest completed degree. This is strong over-representation of citizens with education at university or college level independent of gender. In terms of geography, the sample has a slight over-representation of respondents from Western Norway, while there is a corresponding under-representation in Northern Norway, Southern Norway and Trøndelag. To account for the biases in this panel, all descriptive analyzes are weighted by age, gender, education and geographic location.

In the **representatives panel**, we find that 96 percent are municipal politicians. We assume that only a small number of them engaged in politics full-time. Half of the respondents have served as elected representatives for 7 years or less, and the share of politicians from parties that are in power or in the opposition is evenly distributed. On average, they report to work on 2.8 subject areas as part of their role as elected representatives, while 26 percent

state, that they only work in one area. Men are clearly overrepresented (61%). In terms of geographical location, Oslo is markedly under-represented, while elected officials from Troms and Finnmark are over-represented.

The **bureaucrat panel** is the closest we can get to a purely elite panel among the four panels, as all respondents work in the central administration. 54 percent work in government agencies, while 46 percent work in ministries. As shown in table 2, 93 percent of the panel has education at university or college level, reflecting that formal education is a requirement for most positions in the administration. As expected, most respondents are from an urban area with almost half the panel living in Oslo. Viken is the second most common place of residence (29%). A clear majority (66%) are employed as advisors, senior advisors or in an equivalent position. 11 percent are department directors or in an equivalent position and 3 percent are directors. Most of the bureaucrats on the panel have a long tenure, 59 percent state that they have worked eleven years or more in the central administration. The bureaucrat panel thus consists of an urban and highly educated group of respondents with extensive sector experience.

In the **journalist panel**, we find an over-representation of journalists working for a media outlet with a national focus. 46 percent of work in news journalism, which is the highest share and the work there is characterized by relatively short timelines. Half of the panel has held their job for five years or less. The journalist panel also is the youngest, with 15 percent of the selection born in 1989 or later. As table 2 shows, women make up 41 percent of the panel, reflecting the proportion of women employed in the industry (see Fimreite and Ivarsflaten for a more detailed discussion of the gender balance in the journalist panel). Considering the level of education, we see that the panel of journalists can also be characterized as an elite panel, as 84 percent of the respondents have education at university or college level. In general, the respondents in the journalist panel are reticent about giving personal information, for example 20 percent do not want to state which county they live in. This means that several respondents had to be dropped from the analyses.

To analyse the expected relationships presented earlier, we comprehensively compare the four KODEM panels of citizens, elected representatives, bureaucrats, and journalists. We start by describing the support for CCS in the four panels. We then compare the support for CCS in these panels using the following key variables: the belief that new technology will contribute to solving the climate problems, the opinion on the Norwegian climate policy efforts, ideological self-positioning on the right-left axis and party choice. In the second part of the analysis, we assess the relative effect of these variables against each other in a multivariate OLS regression analysis for each panel, where we also control for the effect of gender, age and level of education. This way, we aim for a better understanding of which variables are most important in explaining the support for CCS in the four social groups. Support for CCS is analysed by using the following questions, asked in all panels: *"One of the measures that Norway has worked on to reduce greenhouse gas emissions is the capture and storage of CO<sub>2</sub> (carbon dioxide). On a large scale, technology can play an important role in limiting climate change. What do you think*

*about this technology?"*.<sup>4</sup> A four-point bipolar scale was used with values from "very negative" to "very positive". In addition, it was possible to choose the answer "don't know". The third column in table 2 shows the number of participants *N* we observe for the dependent variable in each panel.

### **What explains the support for CCS?**

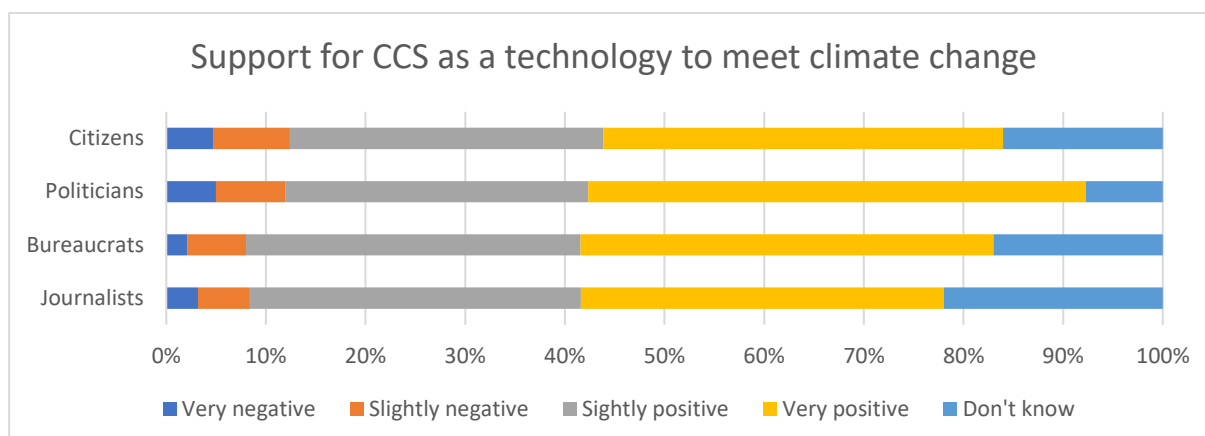
Figure 2 confirms the results from previous studies. The population views CCS positively. However, what has not been empirically confirmed in the past was, that the positive attitude is also prevalent in social groups that have different roles in democracy. We are thus talking about a consensus on a societal level, not just in the political sphere.

We see that there is a large majority of respondents who are positive about CCS, and that politicians are the most positively inclined group, with 50 percent of respondents who are "very positive" and 37 who are "slightly positive". There are smaller variations between the other three groups. Among citizens and representatives, 5 percent of who state that they are "very negative" and in general there is a larger share among those two groups who are negative towards CCS, than among bureaucrats and journalists. However, we see that the proportion of those answering "don't know" or "no opinion" is important for understanding the observed variations between the panels. The politicians are most certain about their opinion, less than 8 percent of them state that they "don't know" or have "no opinion". This share among journalists is 22 percent, while among citizens and bureaucrats it is 16 and 17 percent respectively who.<sup>5</sup> The clear support from the politicians reflects the cross-party support for CCS as a climate policy, despite the fact that almost the entire panel consists of politicians on the municipal level who have not been involved in decisions on the national CCS projects. However, CCS could also be used at a municipal level, for example to reduce emissions from waste incineration and in some industries. In any case, the main picture is a very positive attitude towards CCS as a technology that will help Norway to meet climate targets. We observe this positive attitude across all four observed social groups and this indicates consensus at the societal level.

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<sup>4</sup> The wording of the question can be criticized for only mentioning potential positive aspects of CCS. In the Norwegian Citizen Panel, support for CCS has been examined several times, with differently formulated questions. The support for CCS that we find does not differ notably from the level of support reported in Figure 1, where other formulations were used. However, we cannot rule out that the absolute level of support in this analysis is influenced by the way the question is asked.

<sup>5</sup> An analysis of those who answer "don't know" or "no opinion" across all panels shows that women and younger respondents are more likely to choose these categories (see table 8 in the appendix). We also find that less technology-optimistic respondents are more inclined to not state an opinion. The same applies to those who believe that the efforts in climate policy are appropriate, compared to those who believe that the effort are too little.

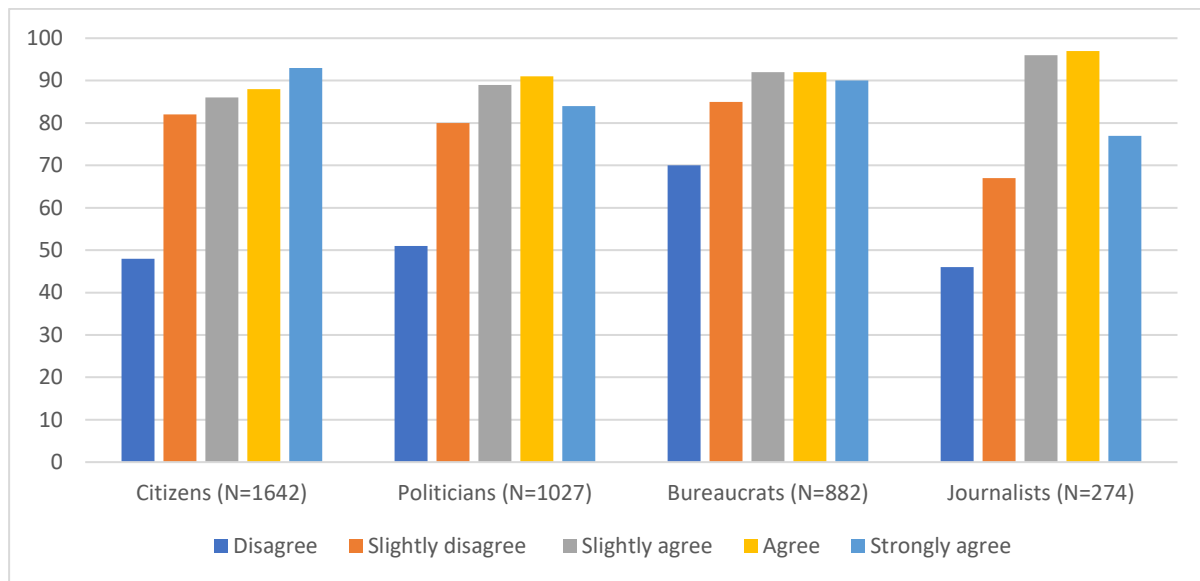


**Figure 2:** Percentage distribution of support for CCS as a technology to fight climate change in the four panels.

The relatively high share who answered "don't know" or "no opinion" invites further discussion about the extent to which we can expect the population to have enough knowledge to have a clear opinion about CCS. Previous research indicates that knowledge of CCS in the population is low and that there is a risk of measuring so-called pseudo-opinions. At the same time, comparable studies indicate that Norway stands out by having a population with a high degree of familiarity with CCS (Merk et al., 2022; Whitmarsh et al., 2019). As we saw from the wording of the question, the respondents are not given any information about what CCS actually is or what the technology does. The respondents were also not given any further information about CCS earlier on in the survey. When we then link CCS technology to combating climate change, there is a possibility that respondents without knowledge of the field will be nudged in a positive direction. This could have led to an artificially high share of positive responses. At the same time, the level of support in the population is consistent with other surveys of CCS where more information is provided and where the analysis controls for the perceived familiarity with CCS (Whitmarsh et al., 2019). This supports the interpretation that there is a relatively strong support for CCS among the Norwegian population.

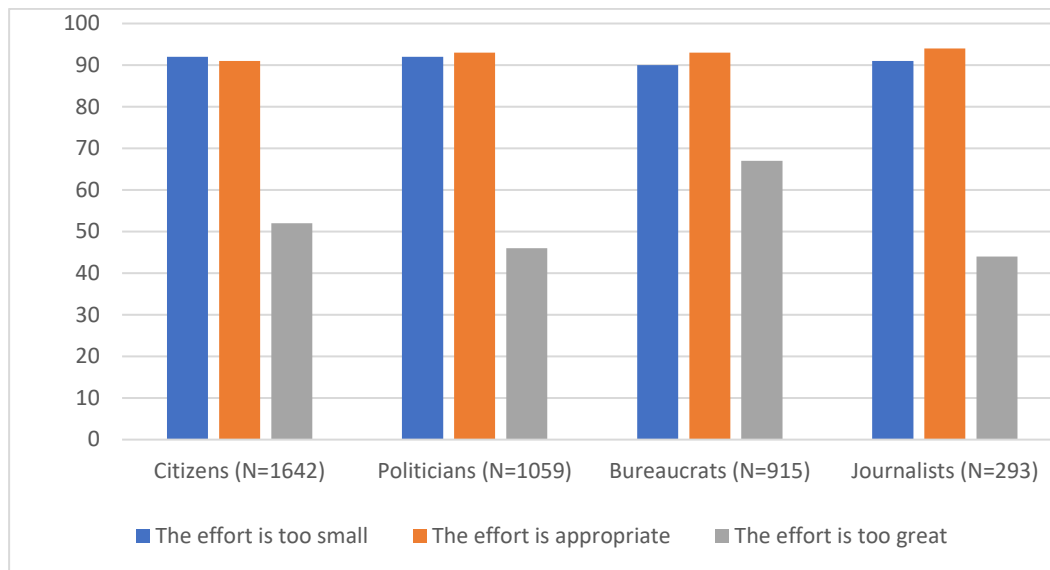
As reviewed earlier, technology optimism is a distinctive feature of the Norwegian public. We therefore investigate how the support for CCS varies with the degree of technology optimism, and whether this varies between the four social groups. Figure 3 shows the same pattern across all panels: the support for CCS increases along with the level of technology optimism. In all four panels, the technology pessimists stand out most - those who "strongly disagree" that new technological solutions will solve the climate problems.<sup>5</sup> Moreover, they are markedly less positive toward CCS than the rest in all four social groups. For citizens, bureaucrats and politicians the support for CCS is high among those who agree to a greater or lesser extent, that new technology is part of the solution. The journalist panel stands out by the broadest variance. It breaks the pattern of the other panels: those who believe in new technology to the greatest extent are clearly less supportive of CCS, than those who have a more moderate belief in new technology. However, it must be pointed out again that the journalist panel is markedly smaller than the other panels and that we must therefore interpret the findings with caution.





**Figure 3:** Proportion in percent who are positive about CCS as a measure against climate change by degree of technology optimism and panel.

Because the development of CCS in Norway has been presented to such a large extent as a measure to reduce greenhouse gas emissions, we expect that the way citizens assesses the overall climate policy effort in Norway will have an impact on their attitude towards CCS. Figure 4 shows the proportion of those who are positive about CCS according to their view of Norwegian climate policy. We see that there is a clear distinction between those who believe that “the effort is too great” and the rest. In all four panels, around 90 percent of those who think that the Norwegian climate policy efforts are appropriate or too little are positive about CCS. For those who think the efforts are too great, support for CCS varies between 44 to 67 percent. It is reasonable to assume that those who are against CCS as a climate technology will also be negative about most other climate policy measures because they the efforts should overall be lower. In this context, the negative attitude can be interpreted rather as general skepticism about climate policy, than a specific opposition to CCS.



**Figure 4** Proportion in percent who are positive about CCS as a measure against climate change by the views on Norwegian climate policy efforts and panel.

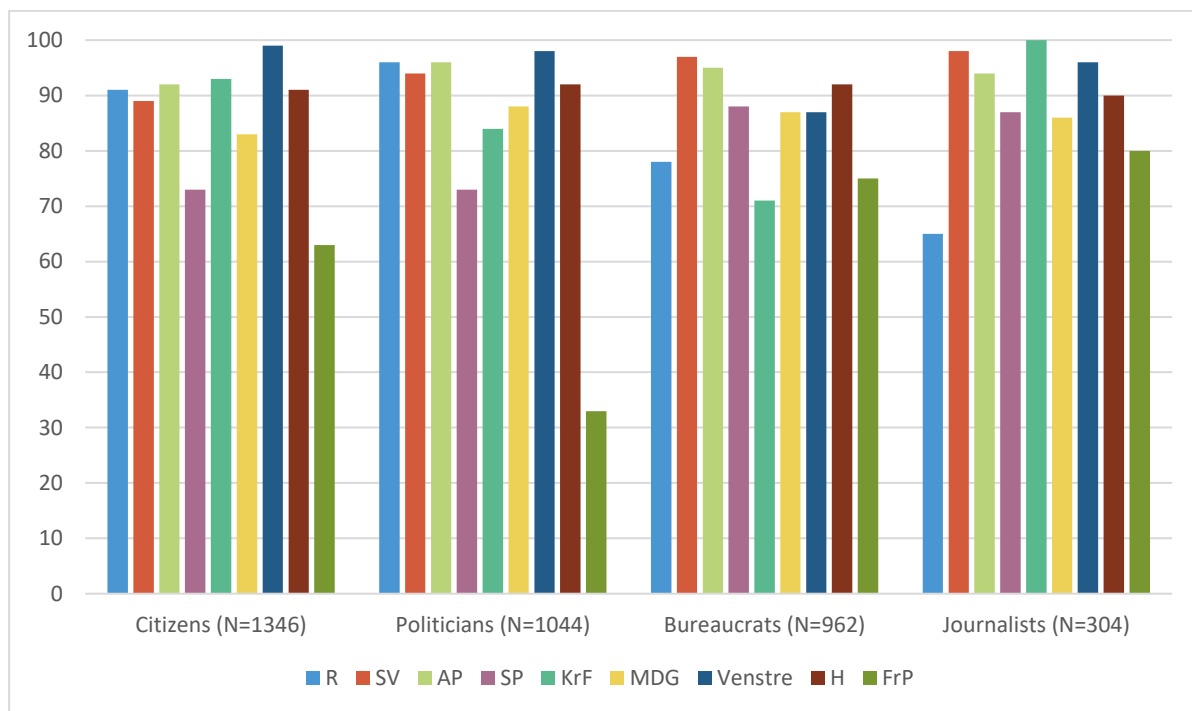
As the project of developing CCS has been characterized by cross-party support, it is interesting to look more closely at whether this is also mirrored in the CCS attitudes by political identification in the four panels. An analysis of the support for CCS by ideological self-placement shows the history of small differences based on ideology. Across all four panels, it is still the case that those who place themselves on the right are markedly less positive about CCS than those who see themselves as centrist or left-wing. This distinction becomes the most visible for journalists and politicians. As described in the historical analysis, the cross-party consensus is broken up in the autumn of 2020 when the project part “*Langskip*” was launched and the FrP started to criticize it. The reason for the FrPs rejection, were the high costs to the Norwegian taxpayers. The data collection for the journalist panel was mainly carried out in spring 2021. Thus, it is possible that this partly led to the clear distinction regarding the assessed effort of the climate policy measures we see among the journalists who are oriented towards the political right.<sup>6</sup> It is therefore interesting to take a closer look at whether the party’s support is important for how CCS is assessed.

Figure 5 shows the proportion of respondents who are positive toward CCS by party choice. We include the nine national parties that are represented in the Storting. For the elected representatives, we have used the party they represent. This figure shows that the right-wing party supporters are split. Among the parties that identify with the right wing in Norwegian politics, namely the Conservative Party and the FrP. We find an overwhelming support for CCS among those who say they would vote for the Conservative Party if there were elections tomorrow. The support is equal across social groups. For those who say they would vote for FrP, the picture is more complex. We see that the politicians who are members of the FrP are the only group where a clear majority that view CCS negatively. Only 33 percent of the FrP politicians in the panel are positive about CCS. We also see that among the citizens who support the FrP the skepticism is higher than among the other voter groups, with 63 percent who are positive

<sup>6</sup> The party publicized such criticism in the media Ekroll (2020) and in the Storting (S.tid 2020/2021: 921)

toward CCS. Among the bureaucrats and journalists who vote FrP there are respectively 75 and 80 percent who are positive about CCS. However, it is important to point out, that the proportion of the FrP voters is low in the panels, and it is particularly low for bureaucrats and journalists, thus we must be careful in drawing conclusions.

Otherwise, Figure 5 confirms the picture that there are only small differences between the panels, but there is a clear difference between the panels for KrF voters and Rødt voters. But here again, the number of observations in these groups is small, so we must be careful not overinterpret the differences. The bureaucrats, who vote KrF, support CCS to a small extent, the same applies to the journalists who vote Rødt. The main impression is, that FrP voters stand out from the rest, with markedly lower support for CCS compared to the other voters in all four panels.



**Figure 5** Share in percent who are positive about CCS as a measure against climate change by party vote and panels.<sup>7</sup>

### What explains the differences in support? A multivariate analysis across four panels

In this part of the analysis, we examine which factors have the strongest influence on support for CCS as a measure against climate change, and whether the same factors are relevant for all panels. To investigate this, we include the variables that we have studied descriptively in the first part of the analysis in a multivariate regression analysis: *technology optimism*, *views on Norwegian climate policy* and *political orientation*. In addition, we include the sociodemographic control variables *gender*, *age* and *level of education*.

<sup>7</sup> The panel of politicians was not asked about prospective vote choices. Here we have used the party they represent, assuming that the vast majority of politicians votes for the party they represent.

We use a linear regression model with *support for CCS* as a dependent variable, but exclude the response option “don't know”. This particularly applies to the panel of journalists, where 76 out of 348 respondents for our analysis. We lose further respondents for the analysis because some respondents preferred not to state their political position. We report unstandardized coefficients, which means that the coefficient reflects the variables’ design.

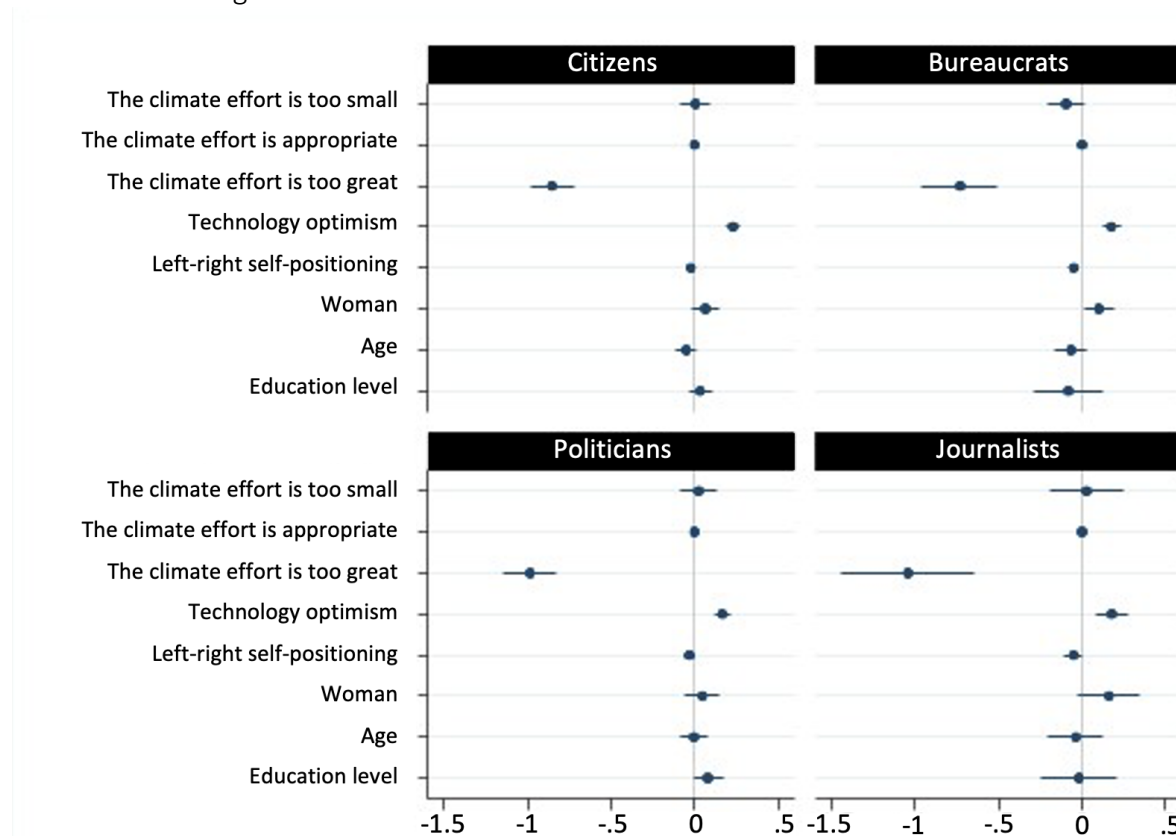
The results from multivariate analysis are displayed in figure 6 in the form of a coefficient plot. They confirm our impression from the literature review and from the descriptive analyses that Norway is characterized by a consensus about the development of CCS as a measure against climate change. Beyond the effect of for explanatory variables, the constant term shows that there is still an overwhelmingly positive attitude towards CCS. The first three rows in the plot show the relationship between the evaluation of Norwegian climate policy and the support for CCS. “Appropriate” is the base category – shown at 0 in the chart. Compared to respondents in this category, that those who think the climate policy effort is too great are significantly less positive about CCS, controlling for other explanatory variables. The effect is strongest in the panel of journalists, where moving from the perception “the climate effort is appropriate” to “the climate effort is too great” yields a decrease in the dependent variable *support for CCS* of 1.1 points. At the highest level of the scale, this indicates a significant decrease of 36 percentage points. As expected, based on Figure 4, we find no difference in support for CCS between those who say “the climate effort is too small” and those who think “the climate effort is appropriate”.

Furthermore, we see that the belief that new technology will solve the climate problems also explains variation in support for CCS. The positive and significant coefficients across all four panels also confirm that the effect is the same across the panels we study. The more technology optimistic, the more positive the perception of CCS. The effect for technology optimism is also strong. If we compare the ends of the scale, i.e. those who do not believe at all in new technology to solve climate change and those who strongly believe in it, the increase in support corresponds roughly to a 33-percentage point increase in *support for CCS*. Here, the effect sizes are similar across the panels.

When it comes to political position, measured as people's self-positioning on an eleven-point scalar from furthest left to furthest right, we also find statistically significant correlations for all the panels except the journalist panel. The effect is negative and indicates that the further to the right a person self-positions, the less positive they are about CCS. However, the effect is not very strong, and we know from figure 5 that the variation in support for CCS is driven by those oriented toward the political right and primarily from the FrP voters. The effect is strongest among the bureaucrats, where the decrease in support for CCS among those farthest to the right compared to those farthest to the left is about half the value of the dependent variable, or 16.5 percentage points.

When it comes to the control variables, we see that *age* and *level of education* do not explain variation in the attitudes towards CCS. *Gender* also has no effect except in the bureaucrat panel. Moreover, the positive coefficient indicates that female bureaucrats are more positive toward CCS than male bureaucrats.

If we look at the explanatory power of the models for the panels, expressed in share of explained variance  $R^2$  in table 7 in the appendix, the model explains 21 percent of the variation in the dependent variable for citizens and elected officials. For the journalists, the model explains 19 percent, while for the panel of bureaucrats it explains only 10 percent of the observed variation.<sup>8</sup> In this sense, our explanatory model does a good job of explaining the support for CCS as a climate policy measure among citizens, journalists and elected officials' but only to a limited extent among bureaucrats'.



**Figure 6** Support for CCS across the four social groups, according to key factors. The multivariate regression models on which the figure is based can be found in table 7 in the appendix.

### Technology optimism at a turning point?

The analysis shows that CCS as a technology to reduce CO<sub>2</sub> emissions has broad support among the Norway's citizens, elected representatives, bureaucrats and journalists. For all panels, there also seems to be the same mindset that drives this support. CCS thus appears to continue to be a climate policy consensus project in Norway with a broad support in citizens' and all elite panels. This result confirms the findings in is as can be expected based on the literature on how political parties and elites influence voters' attitudes. Nonetheless, it is worth highlighting that we also find support for the assumption that the party preferences shape the attitudes of

<sup>8</sup> One possible assumption is that the variation in the bureaucrat panel is also driven by the subject area the respondent is working on, such as energy or environmental issues. We lack data to test this and other assumptions.

bureaucrats in the central administration. To the best of our knowledge, this has not been shown before.

In our opinion, this shows how the political conversation - when characterized by consensus - can function in a very positive way across groups with different roles in democratic governance. The sense of consensus we find in Norway is also interesting compared to the debates about CCS in other European countries. We have argued the structure of the Norwegian energy system is relevant for understanding how the debate around CCS has developed. What we have referred to as “technological optimism” is expressed in the political conversation by emphasizing that new technology, rather than changing basic structures in society, is necessary to solve the climate problem. CCS is a particularly good example to understand what technological development can contribute. For decades CCS has made it easier to defend the continuation of Norway’s oil and gas production. This helped to make CCS a particularly tempting technology that has received broad and sustained support.

However, consensus is by definition unstable. It only takes one dissenting vote to disrupt it. It is therefore not certain, that the past and current patterns will persist in the future.

However, our survey data documents broad societal support and we do not see any trends that indicate declining trust in CCS or in technological solutions to fight climate change. Moreover, we argue that CSS technology continues to be a “lucky bag” for Norwegian climate policy. The fact that the technology is now becoming a reality can strengthen rather than weaken the positive attitude towards CCS. Within five to ten years, a European market for carbon storage capacity will very likely be established and Norway is about to take a leading role as a supplier. In such a situation, it may be even easier to use CCS as an argument for maintaining and investing further in the knowledge and expertise of the oil and gas industry. If this will be the case, the FrP’s arguments against public funding for CCS will be further weakened once a market is established and less government support will be needed.

There are, however, several factors that can lead to a political situation where CCS no longer has cross-party support. In general, consensus can lead to a less critical view of the policy that is being pursued and thus potentially problematic aspects might be ignored. When establishing the necessary infrastructure, there are in two new aspects that come into play. Firstly, the CO<sub>2</sub> capture and transport will then happen closer to residential areas and may give rise to local resistance (Braun et al., 2018; L’Orange Seigo et al., 2014). Even though, the CO<sub>2</sub> is stored offshore, this could possibly lead to a stronger public opposition against the implementation of CCS. Secondly, the establishment of a European market for storage capacity means that Norway would import CO<sub>2</sub> from other countries. Merk et al. (2022) find that this might lower public support substantially. This is might be driven by the perception of CO<sub>2</sub> as waste and a fear Norway might become a dumping ground for other countries. The development of infrastructure could thus also lead to an increase in opposition and the political mobilization against CCS.

There is little evidence to suggest that CCS will soon become a topic of conflict among the political parties, however, this will also depend on the EU policy framework for CCS that will emerge. In European countries, there are critical voices that argue CCS obstructs societal transformation and might even prolong the use of fossil energy rather than lead to its phase out.

The establishment of a market for capture and storage also depends on the revenue potential, i.e. that captured and stored CO<sub>2</sub> can actually be deducted from the companies' emissions allowances (Rickels et al. 2021). In recent years, Norway has closely linked itself to the EU, thus the EU's policy is crucial for the establishment of an EU market for the technology. A Europe that moves away from CCS, or that treats it as a short-term transition technology in the green shift, could also reignite the Norwegian debate.



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## Appendix

**Table 3** Variable overview Citizen panel

	Average	Standard deviation	Min. value	Max. value	Note
Assessment Norwegian climate pole	1.68	0.68	1	3	1430
Technology optimism	3.12	0.89	1	5	1430
Left-right self-positioning	4.87	2.36	0	10	1430
Woman	0.46	0.50	0	1	1430
Age	1.64	0.32	1	3	1430
Education level	2.58	0.59	1	3	1430

**Table 4** Variable overview Bureaucrat panel

	Average	Standard deviation	Min. value	Max. value	Note
Assessment Norwegian climate pole	1.40	0.58	1	3	865
Technology optimism	3.18	0.88	1	5	865
Left-right self-positioning	4.40	1.85	0	10	865
Woman	0.50	0.50	0	1	865
Age	1.90	0.48	1	3	865
Education level	2.58	0.59	1	3	865

**Table 5** Variable overview Journalist panel

	Average	Standard deviation	Min. value	Max. value	Note
Assessment Norwegian climate pole	1.36	0.59	1	3	268
Technology optimism	3.19	0.92	1	5	268
Left-right self-positioning	4.08	1.81	0	10	268
Woman	0.38	0.49	0	1	268
Age	1.97	0.53	1	3	268
Education level	2.86	0.39	1	3	268

**Table 6** Variable overview Politician panel

	Average	Standard deviation	Min. value	Max. value	Note
Assessment Norwegian climate pole	1.64	0.68	1	3	1008
Technology optimism	3.21	0.92	1	5	1008
Left-right self-positioning	4.56	2.31	0	10	1008
Woman	0.37	0.48	0	1	1008
Age	1.74	0.57	1	3	1008
Education level	2.66	0.54	1	3	1008

**Table 7** Regression table of support for CCS according to four different panels. Figure 7 is made based on this model.

	Citizens b/see	Bureaucrats b/see	Journalists b/see	Politicians b/see
Climate effort is too small	0.005 (0.05)	-0.098 (0.06)	0.011 (0.11)	0.023 (0.06)
Climate effort is appropriate	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Climate policy effort is too great	-0.855*** (0.07)	-0.732*** (0.12)	-1.076*** (0.20)	-0.982*** (0.08)
Technology optimism	0.231*** (0.02)	0.174*** (0.03)	0.180*** (0.05)	0.166*** (0.03)
Left-right self-positioning	-0.023* (0.01)	-0.049*** (0.01)	-0.045 (0.03)	-0.030* (0.01)
Woman	0.066 (0.04)	0.102* (0.05)	0.157 (0.09)	0.045 (0.05)
Age	-0.052 (0.03)	-0.064 (0.05)	-0.055 (0.08)	-0.002 (0.04)
Education level	0.033 (0.03)	-0.081 (0.10)	-0.007 (0.12)	0.080 (0.05)
Constant terms	2,758*** (0.13)	3,448*** (0.33)	3,053*** (0.41)	2,822*** (0.17)
R <sup>2</sup>	0.214	0.104	0.185	0.213
bic	3280.785	1852,475	610,867	2323.945
N	1430	861	267	1005

Note: Unstandardized coefficients with standard errors in parentheses. Dependent variable goes from most negative to most positive on a four-point scale. The "don't know" category is excluded from the model.

**Table 8** Regression table of respondents who answered "don't know" or "no opinion" to the question of support for CCS.  
Joint analysis for all four panels.

	NODK b/see
Climate effort is too small	-0.041** (0.01)
Climate effort is appropriate	0.000 (.)
Climate effort is too great	-0.000 (0.02)
Technology optimism	-0.024*** (0.01)
Left-right self-positioning	-0.002 (0.00)
Woman	0.096*** (0.01)
Age	0.039*** (0.01)
Education level	-0.019 (0.01)
Constant terms	0.186*** (0.04)
R <sup>2</sup>	0.030
bic	3006.433
N	4165

OLS regression with unstandardized coefficients with standard errors in parentheses. The dependent variable is dichotomous, where 1=the respondent has answered "don't know" or "no opinion" and 0=the respondent has conveyed an opinion about CCS. Linear regression is chosen to make interpretation easier. A logistic regression has also been run, this shows identical results in terms of direction and statistical significance.