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# A blessing in disguise: advisers' experiences with promoting climate change mitigation among Norwegian farmers

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## ABSTRACT

**Purpose:** The purpose of the paper is to analyze how promotional and advisory efforts address climate change mitigation in Norway and to learn how advisers navigate between governmental goals to address the common good and farmers' private needs.

**Methodology:** Empirical data was obtained through semi-structured in-depth interviews with eight agricultural advisers with the mandate of promoting climate-friendly farming, as well as through notes and presentations from a workshop involving advisers and agricultural schoolteachers. Data were analyzed qualitatively on the basis of meaning condensation and meaning categorization.

**Findings:** Only the most enterprising farmers have proactively sought climate advice and attended climate courses – and primarily for farm-benefiting gains other than climate change mitigation. The advisers see it as essential to highlight the overall gains that derive from climate change mitigation and that benefit farms in the broader sense in order to motivate farmers, while the central communication around climate advice and courses more narrowly solely focuses on the opportunity to reduce emissions.

**Practical implications and value:** It is important to create a suitable framing of climate change mitigation and its benefits both at the macro (policy and programme) and micro (farm-level advice) levels, in order to reach out to as many farmers as possible.

**Theoretical implications:** Advice framing that puts greater emphasis on the private, non-climate-related benefits of climate change mitigation actions seems to stimulate greater support for these actions than a common-good framing focused on addressing climate change only.

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Farming; climate; mitigation measures; promotional work; informative means; policy

## 1. Introduction

Like many sectors across society, the agricultural sector is expected to reduce its greenhouse gas (GHG) emissions considerably. Strong consensus around this goal is often seen at the national level (see, e.g. Fellmann et al. 2018), but implementing the necessary

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changes at the farm level seems to be a more challenging task. While many managerial changes at this level are often aimed at immediately accruing private benefits for the individual farm – e.g. through uptake of new technologies and/or practices to achieve increased productivity (Abadi Ghadim and Pannell 1999; Feder and Umali 1993; Griliches 1957; McCann et al. 2015; Rogers 2003; Ruttan 1996) – public requirements are primarily aimed at attaining benefits for the common good (Ahnström et al. 2009; Ramborun, Facknath, and Lalljee 2020). The requirement for the agricultural sector to reduce its share of GHG emissions (Klima- og forurensningsdirektoratet 2010; Leahy, Clark, and Reisinger 2020; Tubiello et al. 2013) is a current and highly relevant example of the latter.

In Norway, agriculture is estimated to be responsible for about 9% of the country's GHG emissions, and the emissions from agriculture have been quite stable since the 1990s (Miljødirektoratet 2023). The government and the two farmers' unions signed a letter of intent in 2019 to jointly reduce GHG emissions and to increase the uptake of carbon in agriculture (Regjeringen 2020). Thus, in this case, the farmers' organizations agreed on behalf of the farmers to cooperate in solving a common-good problem. However, since farmers in Norway run their own independent enterprises, they do not automatically implement suitable climate mitigation measures proactively from an intrinsic motivation, due to both structural and behavioral reasons (Brown et al. 2021; Farstad, Mahlum Melås, and Klerkx 2022). Due to the biophysical complexities of carbon emissions and carbon storage – not least in a biological type of production like agriculture – many measures are largely developed externally and presented to farmers by specialists, such as researchers and policymakers (Willson and Roderick 2018). Another important type of actor in this context are agricultural advisory systems (Nettle, Crawford, and Brightling 2018; Prokopy et al. 2015; Ptak, Graversgaard, and Dalggaard 2023; Wiener, Álvarez-Berrios, and Lindsey 2020), consisting of specialized advisers who solely provide independent advice, and other actors with the mandate of promoting climate-friendly changes at the farm level but who also have other activities besides providing advice. The latter category, which has been dubbed 'embedded advisers' or 'linked advisers' (Klerkx and Jansen 2010; Sutherland and Labarthe 2022), includes commercial representatives of feed suppliers, food-processing firms, and public consultants<sup>1</sup> at the national, regional, or local levels.

In Norway, like in many other countries (Birner et al. 2009; Garforth 2010), since the 1990s the task of advising farmers has largely been transferred from public (municipalities, counties, state agencies) to private organizations (Klerkx et al. 2017), in terms of both specialized and embedded advisers. Much of the advice is now provided by farmer-owned organizations, which are partly financed by the members and partly via public funding. In Norway, two organizations in particular have been given the role to provide what is called 'climate advice' to farmers. One of them, Norsk Landbruksrådgiving, is a nationwide advisory organization offering advice on several farm-related issues, including agronomy and economy; the other one, Tine, is producer-owned and the largest dairy company, which has a separate department on advisory services for dairy farmers. As indicated above, the organizations have committed to fostering farm-level change in terms of climate change mitigation behavior. Furthermore, public agricultural advisers connected to the offices of county administrators, county authorities, and municipalities arrange courses, organize information campaigns, and/or provide consulting to steer farming and food production in nationally decided directions.

The officially announced focus of the Norwegian government has primarily been emission reductions, and specific goals have been set to this end. Even though several reports have been published on possible measures that can be undertaken for agriculture (e.g. biogas production, manure management, production and storage of biochar) as well as for other sectors (Klima- og forurensningsdirektoratet 2010; Miljødirektoratet, Kystverket, and Norges vassdrags- og energidirektorat 2020), the emphasis of the overarching communication toward Norwegian farmers is not specifically on particular climate change mitigation measures: rather, it is almost solely on the potential for emission reductions. Consequently, the formulations of climate change mitigation measures to be implemented at the farm level in Norway are quite vague and open-ended. This seems, among other things, to be due to an overarching national understanding that such effects are highly farm-specific (related to production, weather, soil structure, etc.) and that the best and most effective measures must be assessed and decided for each individual farm (e.g. see Klimasmart 2023; Nortura 2023).

This puts a lot of responsibility on the advisers, who in light of these policies have recently been trained to provide advice on emission reductions and who have been instructed on the goals and on relevant means (Ferstad 2022). In this context of climate change mitigation, there is typically some discrepancy between the government's expectations of the advisers to achieve the common good and the private goals from the farmers, as is common in privatized systems (see, e.g. Garforth et al. 2003; Klerkx, de Grip, and Leeuwis 2006). While advisers' experiences and perspectives have previously been assessed for their provision of advice on other sustainability issues with a public-good character, such as nutrient management and mastitis prevention (Klerkx and Jansen 2010; Klerkx, de Grip, and Leeuwis 2006), they have only to a limited extent been explored for the topic of climate change mitigation (a few examples are the studies by Stål and colleagues in Sweden (Stål and Bonnedahl 2015; Stål, Karl, and Bonnedahl 2015)). In view of this gap, the current paper examines the experiences of agricultural advisers in providing advice on climate change mitigation, operating within overarching policy frames that dictate that farmers reduce their emissions.

Thus, the aim of this study is to learn from the experiences of Norwegian climate change mitigation advisers and to provide new knowledge on how general climate change mitigation pursuits oriented toward farmers are working in terms of engaging the latter. Through their regular contact with farmers, our interviewees have valuable insights into how farmers generally relate to mitigation measures and to discussions about and requests for more climate-friendly agriculture. In this way, the paper adds to earlier research on how advisers navigate between governmental goals for the common good and farmers' private needs (e.g. Albaladejo, Couix, and Barthe 2007; Klerkx and Jansen 2010; Laurent, Cerf, and Labarthe 2006; Prager et al. 2016). Our work was guided by the following research question: *What are the approaches and experiences of agricultural advisers supporting farmers in Norway in implementing climate change mitigation measures?* This question allowed for exploring both the climate adviser's role in providing climate change mitigation advice, and about the perceived potential of climate change mitigation advice to influence farmers' decision-making at their farms.

The empirical material consists of interviews with a selection of agricultural advisers with the mandate of promoting climate-friendly farming, along with notes and

presentations from a seminar involving some of the interviewees. Drawing on the empirical findings, we discuss what seems to be the most suitable and effective ways to conduct advisory and promotional work in the future.

In the remainder of this paper, we review the relevant literature before providing more details about the Norwegian case context and an account of the material and methods. After the empirical findings are presented, the paper ends with a discussion of the findings and suggestions and implications for practice and policy.

## **2. Literature review: agricultural extension and the promotion of climate change mitigation behavior**

In this section, we review perspectives and models developed in extant studies on the promotion of environmental behavior in general, on how farmers perceive and act in relation to demands involving the common good (e.g. climate change mitigation, nature conservation, ecosystem services, farming with less pesticides), and on how advisory services and other relevant actors can contribute to change in that respect. This review also highlights how farmers' climate change-relevant decision-making (Orlove et al. 2020) makes up the essence of agricultural advisers' field of work.

### ***2.1. The potential for changing farmers' behavior in terms of climate change mitigation***

Several studies have highlighted how multiple and interacting conditions – such as the farmer's attitudes, the farming context, and sustainability-related schemes – influence farmers' decisions and, thus, must be recognized in the efforts to promote various changes toward sustainable practices (Ahnström et al. 2009; Greiner 2015). Critical pre-conditions for adopting sustainable practices were well summarized by Runhaar (2017), who highlighted four main conditions: (1) motivation, combined with (2) a call for farmers' participation, (3) ability to participate/the enabling thereof, and (4) legitimation (i.e. regulations or social norms not inhibiting necessary practices). As Runhaar has indicated, the conditions can be created by governance arrangements, such as financial incentives or regulation, but farmers' motivation also depends on personal characteristics (Runhaar 2017).

In the specific case of farm-level change in pursuit of climate change mitigation, previous research has demonstrated how 'ideal' climate change mitigation behavior is rare. Interest in climate change among farmers has shown to be quite low (cf. e.g. Brobakk 2018; Flemsæter, Bjørkhaug, and Brobakk 2018; Prokopy et al. 2015), and weak climate consciousness among farmers is viewed as an important barrier to climate change mitigation in agriculture (e.g. Arbuckle et al. 2013; Barnes and Toma 2012; Prokopy et al. 2015; Wreford, Ignaciuk, and Gruère 2017). The literature indicates particular challenges with regard to the task of convincing farmers to implement climate change mitigation measures. One such finding indicates that farmers are generally more likely to adopt environmental practices if one can identify ways to make the methods and results more observable and to reduce the perceived complexity (Griskevicius, Tybur, and Van den Bergh 2010; McCann et al. 2015; Weber 2013); in this context, the exact opposite is the case when observability is not immediate (as change takes a long

time) and the measures are part of a complex system (Corner and Clarke 2017; Corner and Randall 2011). This presents a serious challenge for promoting climate change mitigation practices.

Orlove et al.'s (2020) comprehensive literature review and discussion of *climate change-relevant decisions*<sup>2</sup> at a more general level seem relevant in this regard. Importantly, these authors recognize that any explicit decision having implications for climate change is a decision that matters in this respect. Thus, they argue that it is not only decisions based on decision-makers' explicit climate change mitigation-driven motives. This broader approach 'helps to reveal the true scope of the challenges involved in improving climate-related outcomes through changes in (...) decision-making' (Orlove et al. 2020, 276). Considering this, motivations unrelated to climate change mitigation that nonetheless trigger that mitigation measures are implemented have also been identified as prevalent among farmers in several studies (Burton and Farstad 2020; Davidson et al. 2019; Kragt, Dumbrell, and Blackmore 2017; Moerkerken et al. 2020). In this sense, climate change mitigation is a 'by-catch' of other motivated changes on farm, which is promising for the goal of promoting behavioral change toward climate change mitigation.

## **2.2. How advice can support climate change mitigation changes at the farm level: the role of framing**

Ample research has been conducted on what advisers can do to assist in getting farmers to implement new and improved practices; results include developing learning communities, enhancing farmers' self-efficacy and power to follow through, and contextualizing farmers' learning – i.e. to relate desired changes to the wider farm and production (e.g. Ahnström et al. 2009; Cooreman et al. 2021; McKim and Velez 2016; Sewell et al. 2017), as well as finding the best way to promote changing management practices. Agricultural adviser–farmer encounters based on trust, empathy, credibility, and consultation (instead of instruction) enable better knowledge exchange and thus also better opportunities for sustainable farm management (Ingram 2008). This approach involves co-creating knowledge instead of merely disseminating information (Höckert and Ljung 2013; Klerkx and Jansen 2010) and acting as a facilitator and sparring partner rather than as a technical expert prescribing solutions (Klerkx and Jansen 2010; Nettle and Paine 2009).

With regard to agricultural advice, research has also explored the significance of different *framings* of desired climate change mitigation action. Ngo, Poortvliet, and Klerkx (2022) examined the efficacy of various types of messages related to climate change mitigation and adaptation used to encourage farmers. While they did not find significant differences between different frames for mitigation, they found that farmers were more willing to engage in climate change adaptation when exposed to concrete and gain-framed (i.e. gain-focused) messages rather than abstract and loss-framed messages. More generally, other research (e.g. Cohen et al. 2021; Walker, Kurz, and Russel 2017) has further shown how the framing of co-impacts – i.e. a greater emphasis on non-climate-related benefits of mitigation actions – can motivate greater support for such actions in certain cases. Specifically in agriculture, Willson and Roderick (2018) found that a campaign targeting soil management managed to stimulate a higher level of interest for climate-relevant measures than generic messages about agriculture and

climate change, as the climate change messages were realigned with practical on-farm management in the former.

According to Orlove et al. (2020), framing plays an important role in the decision-making process. They explain how climate change-relevant decisions may be influenced by different kinds of framing, where frames can be either diagnostic (identifying the problem and whom to blame), prognostic (suggesting appropriate solutions to the problem), and/or motivational (by creating understanding for the need to act, and a sense of urgency). In this regard, framing may be understood as a collective and sometimes political process where various interests (such as social movements, government, and industry) compete on defining and shaping the significant frames (Benford and Snow 2000 in Orlove et al. 2020). Orlove et al. highlight how research on the effects of various types of framing (e.g. climate, social, economic, etc.) on decision-making often has shown that non-climate frames may be equally or more effective than climate frames when promoting a particular kind of decision-making. This connects with earlier work on sustainability measures in agriculture, which has shown that an optimal framing and balance of public and private interests need to be attained in order to make sustainability measures appealing to farmers (Klerkx, de Grip, and Leeuwis 2006; Runhaar 2017).

### ***2.3. Advisers' challenge in balancing public and private goals***

Supporting changes related to sustainability issues, and balancing public and private interests, is not easy (Klerkx, de Grip, and Leeuwis 2006). Cerf, Guillot, and Olry (2011) highlighted several issues that change agents have to deal with when supporting sustainable agriculture: potential tension stemming from the agent's engagement in promoting more environmentally friendly practices, and managers' and farmers' expectations of the agent's role regarding topics such as short-term profitability; combining scientific knowledge with farmers' knowledge; and ensuring continuity of change at the farm level. This requires that advisers gain new knowledge and advisory skills (such as climate education for advisers), to be able to meet the different types of needs and questions farmers have and to provide new advisory services that support farmers in light of changing circumstances, such as the increasing pressure on reducing emissions at the farm level (Albaladejo, Couix, and Barthe 2007).

One challenge is that demand for advice on public-good issues may be lacking. However, as Klerkx and Jansen (2010) noted, a lack of awareness among farmers of a public-good issue (such as climate change) may not be the main problem: rather, a change agent's proactive approach to sustainable farm management may be hindered by the broader institutional context if regulatory frameworks are unclear, as this makes farmers reluctant to implement measures and ask advice about them (which is linked with ideas from Runhaar (2017) about 'being enabled' to change). The latter indicates that a clear and stable institutional context is crucially important. Examining a macro perspective of pluralized advisory systems (incorporating public advisers, along with specialized and embedded private advisers), Birner et al. (2009) highlighted how the set-up and functioning of an agricultural advisory service, and how it attends to the public good, is influenced by the following contextual conditions: the policy environment (e.g. policy institutions, policy goals), the capacity of potential service providers

(e.g. state, NGOs, private actors), production system and market access (e.g. agronomic potential, type of productions, market regulation), and community aspects (e.g. land size, educational levels, capacity to cooperate) (see also Laurent, Cerf, and Labarthe 2006; Prager et al. 2016). In this line of thought, Albaladejo, Couix, and Barthe (2007) emphasized the importance of political support for rural development agents and of the social and institutional recognition of their skills.

In summary, the literature on agricultural advisory services suggests that ‘climate change mitigation advice’ concerns factors at the micro level – such as farmers’ motivations, advisers’ knowledge, and the interaction between the two – and at the macro level – such as governance structures, resources in the advisory systems, and regulations and financial incentives set by the state. In order to understand the context and opportunities for advisers to provide valid advice to farmers on climate change mitigation, we must focus on both the macro and micro level, particularly how the macro level influences the promotional work done at the micro level.

### 3. Case context and methods

#### 3.1. Norway as case

For years, politicians and authorities from all sectors in Norway have stated the importance of reducing national GHG emissions (Klima- og forurensningsdirektoratet 2010). In 2021, the government presented a comprehensive climate plan, ‘Klimakur 2030’ (Miljødirektoratet, Kystverket, and Norges vassdrags- og energidirektorat 2020), for restructuring the entire society as of 2030 to meet climate goals and simultaneously create green growth. In agriculture, a letter of intent was drawn up in 2019 between the government and the agricultural organizations as a basis for climate work in agriculture in the future (Regjeringen 2020). This is a voluntary agreement to reduce GHG emissions and increase the uptake of carbon from agriculture to be implemented in the period of 2021–2030 (Meld. St. 2020–2021 2020–2021–2020–2021).<sup>3</sup>

Even though the Norwegian Parliament has defined overall goals for emission reductions, the government’s climate and environmental policy is based on sectoral responsibility (Ministry of climate and environment 2019). General legislation on climate goals was adopted in Norway in 2017 (Klima- og miljødepartementet 2017); this law states, among other things, that the emissions shall be reduced by 50% by 2030 and that each year the government shall present figures to the parliament on the development in emissions reduction in each non-quota sector, which includes agriculture. Furthermore, subsidies are provided for various climate-related agronomic improvements.<sup>4</sup> However, as legal instruments largely have yet to be introduced, the implementation of climate-friendly measures at the farm level heavily depends on farmers’ voluntary choices on their farms.

Currently, some actions are being taken at the sectoral level (by agricultural and environmental authorities) to ensure the provision of relevant information and engage in consultancy work focused on climate change that is directed toward farmers. In 2017–2019, farmers’ organizations and cooperatives in Norway (17 organizations in total) ran a project called ‘Climate-Smart Agriculture’ with the aim of developing tools for climate-smart farming and providing ‘climate advice’ and information to farmers



(Klimasmart 2023). The advisory organization Norwegian Agricultural Extension Service (NLR) was central in coordinating and contributing to actions to reach the goal of the project, through (among other things) the development of the ‘climate calculator’, to be used at the farm level as part of the climate advice. This is a digital tool that collects information from different data sources and provides the farmer with information on GHG emissions from the farm. Based on an assessment of the calculations, the farmer and the adviser can work together to set up a plan for future farm operations that considers climate emission reductions, food production, and farm economy.

To make climate-relevant knowledge available to farmers in general and to motivate them to implement climate change mitigation measures, the parties to the agricultural agreement (‘Jordbruksavtalepartene’) decided to introduce climate advice as a measure in the Regional Environmental Grant Scheme (RMP) (Landbruks- og matdepartementet 2020). This has made it possible for Norwegian farmers to apply for environmental subsidies based on having received climate change mitigation advice (hereafter referred to as ‘climate advice’) and an action plan from an approved adviser. In this context, the NLR and Tine (the farmer-owned national dairy processing company) have developed climate advice as a separate offer for farmers, including having trained and certified climate advisers across the country.

The current communication on climate change mitigation from public authorities to farmers, both at the national and the regional level, is mainly gain-framed (cf. Ngo, Poortvliet, and Klerkx 2022) and climate-centered in the way that it primarily emphasizes the climate-mitigating advantages of making various changes on the farm; additionally, it often mentions the state–agriculture agreement. Typical examples here are the offered ‘climate advice’, the branded ‘Climate calculator’, and the wider project it belongs to, ‘climate-smart agriculture’. In addition, the largest farmer organization promotes climate change mitigation measures (Norges 2022) in a similar way, as do farmer-oriented media, advisory services, and Innovation Norway (a public institution supporting innovation and business development). In the analysis section, we present the experiences of advisers operating within these frames.

### 3.2. Methods

This study was part of a research project focusing on conditions facilitating the implementation of climate change mitigation measures at the farm level in Norway. To identify and analyze the experiences and perspectives of mitigation-focused agricultural advisers, we conducted eight in-depth interviews with various kinds of agricultural advisers, and we collected and analyzed additional data at a workshop on climate advice with advisers and agricultural schoolteachers. The climate change mitigation-promoting advisers involved in our study worked with/as agricultural extension services, regional government administration, and leaders of publicly funded climate projects. Specifically, we carried out semi-structured interviews with four agricultural advisers certified to provide climate advice (specialized, private advisers) and with four other agricultural, non-specialist/linked advisers (from public administrations, agricultural organizations, and publicly financed regional climate projects).

As both the interviewees and workshop participants were operating at the regional level and also came from different regions in the country (at the workshop, specialized

regional-level advisers from 10 out of 11 counties were represented), our material offers a good overview of the general situation in Norway with regard to both the provision of climate advice and farmers' responses to it. Consequently, we are confident that our findings and interpretations of the overall situation are well recognizable to Norwegian advisers and farmers in general. Still, it should be mentioned that in other studies within the same research project, we have also analyzed farmers' motivations related to climate mitigation based on both farmer and key actor<sup>5</sup> interviews (Farstad et al., 2022) and a large farmer survey (Melås 2020. "muligheter og barrierer for innføring av klimatiltak på norske gårder." rapport nr. 8/2020. ruralis - institutt for rural- og regionalforskning), where the findings from those analyses are well in line with what we find in the present study.

Some of the interviewees (Advisers 1–4) were identified through an official list of certified climate change advisers in agriculture that came from two different (agricultural co-operative-linked) organizations that provide this kind of advice. Variation among these were ensured regarding region, gender, and area of expertise (coarse fodder production and feeding, respectively). The other linked and non-specialized advisers, Advisers 5-8, were identified through the project partners' professional networks and invited due to their various public/publicly financed positions, where some were operating at the national level and others at the regional level. The interviewees were, purposely, a mix of women and men of varying ages, largely operating at the regional level, and covering different parts of the country. Common to our interviewees is their mandate to convince and support farmers to make climate-friendly changes on their farms. The certified, specialized advisers worked most directly with the farmers, while the linked and non-specialized advisers worked more with farmers as a collective or with groups of farmers.

The semi-structured interview guide—informed by the existing literature on if and how advise can support changes at the farm level and advisers' potential challenge in balancing public and private goals—included a number of core topics around which the discussions were based: the adviser's role in promoting the uptake of mitigation measures, how they approach the topic of climate when working with farmers, how farmers respond to their involvement, what barriers advisers encounter and when, how and why they succeed, and whether or not they believe climate advice is a sufficient means to get more farmers involved in implementing climate-friendly measures. In addition, climate change certified advisers were asked about their recent climate education, as this is relevant contextual information.

The interviews were held between winter 2021 and winter 2022. They were conducted individually (except for one interview that included two interviewees together) as digital video meetings and lasted approximately one hour each. The interviews were recorded and later transcribed. When the data was analyzed, each interview was first categorized through grouping of quotations based on thematic content, via a blend of an inductive process (i.e. an explorative approach) and a deductive process (topical guidance from the literature review). Further categorization identified different themes based on participant perspectives, noted differences and similarities between participants and across interviews, and recognized both anticipated and unanticipated links to other relevant research. As such, the analysis is based on meaning condensation and meaning categorization (Kvale 1997).

In addition to the interviews, a workshop on climate advice with advisers and agricultural schoolteachers was arranged as part of the current study in autumn 2021. The purpose of the workshop was to facilitate exchange of experiences and perspectives on the task of including climate regards in agricultural advice and education for farmers, i.e. it was convened to address the research question in a more interactive manner than individual interviews. The workshop lasted four hours and included 11 certified climate advisers from agricultural extension services as well as three teachers<sup>6</sup> from two agricultural schools and researchers from the project. As with the interviewees, the 11<sup>7</sup> advisers attending the workshop were selected strategically to obtain a diversified group of participants regarding region, gender, and type of expertise (coarse fodder; grain; soil- and plant culture). The agricultural schoolteachers were recruited from the researchers' professional networks and were included in the workshop due to their relevance as actors educating future farmers (to see how the agricultural schools integrated climate in the education). Four of the advisers introduced a wider discussion on the topic with prepared presentations of their own experiences in the adviser role. A couple of researchers did also present their preliminary findings (on farmer perspectives and economic modelling of farming and emissions, respectively) to see if these rhymed with the participants' perceptions. In this way, the workshop and the interviews complemented each other well. The data from the workshop (comprehensive notes, together with the presentations used) were analyzed thematically in a similar manner as, and in relation to, the already analyzed interview data.

#### **4. Results: experiences and approaches of agricultural advisers promoting climate change mitigation**

In this section, we present the findings from our analysis of the approaches and experiences of agricultural advisers supporting the implementation of climate change mitigation measures among farmers in Norway. This includes the advisers' understanding of their field of work, and the advisers' perceptions, strategies, and outlooks as to the achievement of overarching goals.

##### **4.1. The experienced response to climate change mitigation-focused counseling and promotion**

All the interviewees reported quite moderate responses to the various advising, courses, and projects on climate change mitigation directed at farmers in their region. One of the advisers pointed out the problems of arranging a course on climate-smart dairy production during a period in which national media repeatedly presented the cow as a 'climate sinner':

The focus on reducing climate emissions when producing food, in contrast to various luxury consumptions, you know, that is what provokes the farmer, and what is perceived as unreasonable. Coarse fodder and meat production are what provide protein-rich food in Norway, and suggestions to reduce cattle numbers are perceived as unreasonable, [and] related to the self-sufficiency rate here in Norway, and the fact that the human body needs protein. (Adviser 3, climate change certified)

These reports of farmers' reactions reflect that some think that agriculture is the wrong target when large emission cuts are to be made. Adviser 4 (climate change certified) even

said that ‘it felt like being thrown to the wolves, but someone had to take this job,’ which highlights the negative response received from the farmers in the same period. Another adviser (not climate change certified) described the variety in farmers’ approaches to implementation of the desired measures:

Interviewer: What status do you perceive that climate initiatives have among Norwegian farmers?

Adviser 6: (...) There are always some energetic farmers who are eager and make solid efforts. But there is also a large share of farmers who do not seem to see the value of this yet. It’s a process. It takes time.

The same adviser further elaborated on why he thought some farmers implement climate-friendly measures:

There are some farmers who are extremely skilled. And that may be the case even if they deny the climate challenges. But often, professional skills are related to the fact that you understand things like this and are interested in new things [as] ‘what can it mean for my production?’ (Adviser 6, not climate change certified)

The interest in benefits other than climate-related ones from the measures were noticed by all the advisers. One adviser shared that he was a bit surprised that many of the volunteering participants appeared to be more pragmatically oriented than environmentally oriented, and he tried to explain this phenomenon:

We have received feedback that they want to improve both the economy and the agronomy at the same time: ‘What improvements can we make?’ They cut climate emissions, but it is also better for the farmer in other ways, right. (Adviser 2, climate change certified)

The farm-related benefits of the measures are not necessarily obvious to all farmers, as commented by one of the advisers:

Parts of this field are not very accurate. It is based on belief to some extent. You don’t fully know how this works out, right. And this may entail that you don’t prioritize joining various things: ‘It is not concrete enough. It is not sufficiently beneficial to me right away.’ (Adviser 5, not climate change certified)

While some of the advisers described the (limited number of) volunteering participants as a rather heterogeneous group of farmers, others reported that they were middle-aged participants with relatively large farms. In addition, many of the farmers who volunteered for climate-focused advice/courses seemed to already have a personal interest in the measures. Adviser 5, who promoted various soil-based climate change mitigation measures and conducted certain field experiments to this end, said:

We have specified that we want farms where you have a low carbon content (...), but what we get is those who are interested in the topic. (...) And that is not necessarily those who have the greatest challenges with soil. (Adviser 5, not climate change certified)

In general, a large share of the farmers who volunteered seemed to be both well-informed and already well underway with making climate-friendly changes at their farm. The advisers also saw some clear barriers to farmers’ implementation of the measures, which could explain the low participation:

It is also about the economy. Not everyone can afford [it] ... I have been visiting farmers who must choose whether to [buy basic crop production inputs] or to put food on the table for the kids (...) So it's highly variable. (Adviser 4, climate change certified)

And some farmers try to run their farm as easy as possible. They have more than enough to do in their other jobs. That is probably where the division goes, and what's more, there may be someone denying this, who thinks it is nonsense. (Adviser 6, not climate change certified)

Therefore, the quite limited and skewed response to climate change mitigation-focused counseling and promotion were perceived as being due to both behavioral (i.e. motivation, limited interest in or opposition to climate change mitigation) and contextual (i.e. limited resources) conditions.<sup>8</sup> Moreover, to this end, the existing motivation of farmers seemed to be highly centered on farm improvements.

#### **4.2. Recognition of the farmer's situation and the significance of voluntary implementation**

All the advisers expressed an understanding of and sympathy for the farmers' situation, as one expressed in the following quote:

We follow up afterward by asking questions about what they got out of it as well, but we don't hang on to the farmers who participate at our events and insist that they must implement this on their own farm. (...) You know, we have the economy [in mind] and the understanding that it requires quite a lot to farm within the framework that we promote. (Adviser 7, not climate change certified)

The same adviser further added that 'after all, it is private property and heritage and everything we are dealing with here, so it is important to have respect for that as well.' Another adviser, Adviser 2, talked about 'cutting emissions on the farmer's premises'; he highlighted the importance of not forcing things through in a way that would entail closure but that would attain 'best practice' for each individual farm, strengthening rather than weakening the farms. Yet another adviser specified that it is not always the largest changes that are required:

There are enough general requirements in agriculture, that you should do this and you should do that. But it may be reasonable to look at the individual farm: 'what is it possible for you to do, what is easy to achieve here, what is it that you yourself have the ability and resources to do', right? (...) They can reduce a few percent points of the emissions solely by optimizing, really. And maybe some small changes in practice, additionally. (Adviser 6, not climate change certified)

In summary, the advisers indicated that they were generally in touch with the farmers' situations and were conscious about providing advice and recommendations that would benefit rather than harm the established farm businesses.

#### **4.3. A shared perception that good agronomic practices equal climate-friendly farming**

All the advisers seemed convinced that good agronomic practices benefit the climate:

The better crop you get, under the same conditions, the fewer emissions there will be. So it's a very simple calculation. And running the farm badly is stupid, right. It is not wise to

neglect your field, and to let the animals get bad feed, and poor production is not wise. So it goes without saying. But sometimes it can require large investments, right. (Adviser 6, not climate change certified)

The same adviser added that, among other things, ‘there are many measures to be made that are not only beneficial to the climate, but that also have a good effect on crop level or on soil, [for] which productive capacity is also to be kept for the future.’

To discover how climate advice is separate from general farm advice, the climate advisers were asked if they, before they adopted the climate perspective, had ever provided advice that they would not provide today. Adviser 4 (climate change certified) replied:

Good question. (silence) I think we have been providing much of the same advice, but to me, it has now been put in a slightly different light, with regard to the climate.

This adviser subsequently confirmed that the climate education the agricultural advisers had received led to a better awareness of various measures’ climate-friendly qualities, rather than advice on implementing new practices/measures. Similarly, Adviser 1 explained that it was not a big jump to go from regular adviser to climate adviser, but they basically had to link agronomy to some climate-related points and highlight these connections. Adviser 9 (from the workshop) described the climate advice as more or less a regular advice appointment including a farm visit, except that they ignored topics such as plant protection and mechanization. He perceived the (subsidized) climate advice as a golden opportunity to receive good general advice.

Yet another adviser highlighted the agronomic benefits of relevant measures:

Fortunately, most mitigation measures benefit the farmer; you improve the agronomy, among other things, or if you improve the soil health, you obtain lower emissions from soils. (Adviser 2, climate change certified)

As such, the term ‘mitigation measures’ often refers to measures that already exist and are farm-sensible measures, independent of their impact on climate emissions.<sup>9</sup>

#### ***4.4. Highlighting farm-Benefiting aspects as an essential additional ‘Sales Strategy’***

All the advisers clearly saw the necessity of attracting farmers with something more than merely reduced emissions as the outcome of making changes on their farms. A few shared their reflections in this regard:

There are always farmers who do not find it interesting. And we also notice that when the agricultural extension services organize topic-based days with climate as the main theme, then no one comes. But if it becomes part of a thematic meeting, for example on soil health, then it is interesting. To only have a course series on the climate: no. We need to integrate it into the things that are already there and where it fits. (Adviser 8, not climate change certified)

We cannot use much wording like ‘this is important for the climate and the climate crisis’. We try to stay away from that. Of course, we mention the climate, because it is a main focus. But we try not to use it in the first part of the sentence when we present a new measure. (Adviser 7, not climate change certified)

After being met with farmers’ opposition to a course on climate-smart dairy production, Adviser 4 (climate change certified) shared the lesson learned from this:

We realized that we had to highlight that climate is not the only goal, but we have to show how the issue of good agronomy is linked to climate.

Other advisers explained how they also emphasised farm-benefiting aspects of the relevant measures:

It is not problematic to say: 'if you utilize the manure better, perhaps you don't have to buy as much fertilizer,' and that is very relevant now, as the fertilizers are very expensive. You need to link to some very relevant things, too, because then they understand that this could be meaningful. (...) It is challenging, too, as many want to know if the mitigation measures will pay, so preferably, I could 'bring with me' some economic numbers, because then I think I could have greater influence. (Adviser 1, climate change certified)

When you start talking about it more like ... [focusing on] avoiding waste at all levels, avoiding waste of feed in the sense that you harvest a feed that the cow can utilize and that you can produce relatively a lot from (...) then it is much easier to communicate with the farmer. (Adviser 3, climate change certified)

Adviser 1 (climate change certified) clarified how focusing on the climate may support advice that is already well integrated and used by the agricultural extension services:

My experience is that quite a lot of what we are already doing is related to climate, and that this can enrich the discussion, that one can see the bigger picture. And then it is about making the farmers get engaged and interested. Then you should meet them on their own home court and discuss issues they already have started to consider. Then it is easier to connect theory and hook it on professional pegs.

While several advisers hoped that climate information and advice would enhance farmers' consciousness of the climate even if it did not result in the implementation of concrete measures in the first round, the advisers also tried to motivate farmers to improve agronomy and to strengthen ordinary advice by pointing to climate change mitigation as an additional benefit.

In response to us asking a question about it, Adviser 2 (climate change certified) thought they could possibly benefit from promoting relevant measures as something else than climate change mitigation measures, but added:

To receive money from the state, it is important to use that [climate] context, [in order] to be granted money. It may be easier to sell the other advantages, but if we don't have the climate framing, then it is more difficult to obtain economic support. It is much easier to get project funding if we use the magic word 'climate'. So there, one is a bit squeezed, I guess.

Relatedly, Adviser 10 (in the workshop) reflected on why the provision of climate advice was established and clarified that this was requested by the largest farmer union, in relation to their climate agreement with the government. Consequently, the adviser concluded that this is politics, in which the farmer extension services are supposed to transform into agronomy. Still, Adviser 10 wondered if bisected communication would have been preferable in this context, i.e. different communication with the government and with farmers, respectively. This can be interpreted as an argument for splitting the strategies of demonstrating agriculture's efforts to really make a change (directed at the government) and making farmers lower the emissions from food production (directed at farmers).

#### **4.5. Reflections on how to reach the public goal**

The advisers were asked how close to a transition they were able to get, based on the vision encompassing the climate calculator, climate advice, and various climate courses offered. In her answer, one of them pointed to the limited capacity for facilitating change:

Clearly, to offer advice at the farm level to 20,000 farmers, that requires an enormous amount of time spent. I think this must be integrated into the regular advice that otherwise takes place. (...) There are not that many [climate] advisers, and it requires a demand from farmers, and each visit takes a day, right, if you are going to visit a farm and discuss [everything there]. (Adviser 6, not climate change certified)

The advisers all agreed on the necessity of engaging in active promotion efforts to attain the goals set by the sector. Adviser 1 (climate change certified) further reflected on what is needed to generate a climate-based transition in Norwegian farming:

I think the big changes will not happen until someone higher up in the system says, 'Now it is actually not allowed to spread livestock manure with a broadcast spreader that throws it up in the air.' (...) Someone really must decide what climate-smart agriculture is. It's like plastic bags: if someone decides 'it's not allowed anymore,' then we just had to think, 'ok, that was a pity, but we can solve it.' The big things may have to come from above, even if it feels bad to receive duties by decree.

One of the advisers called for better support schemes for solar panels on barns, elaborating further:

If agriculture is supposed to cover such a great slice of the cake as the government has decided that they must, then the government actually needs to involve itself and make sure it is economically responsible to do it. If not, people won't make that investment. And that is understandable. It isn't desirable, but it is understandable. (Adviser 7, not climate change certified)

Another adviser commented that those who have a substantial amount of work outside the farm seem not very interested in making any extra efforts, and explained:

This is something I think is difficult, and what can we do about it? It would probably not help to increase a given rate by 10 NOK [1 euro] more, as it won't trigger any change in those farmers' behavior. (Adviser 8, not climate change certified)

One of the advisers also mentioned conflicting political goals for Norwegian agriculture, highlighting how climate change mitigation is not always compatible with other sustainability goals:

We recognize that this should be seen in a wider perspective, for if one is solely focused on lowering emissions in a narrow way, there are some measures that pay, but perhaps they do not pay in the grand scheme of things. (Adviser 2, climate change certified)

He explained by citing models that indicate better effects from using more concentrated feed than coarse fodder in terms of lower emissions and increased production and commented that this goes against the sustainability goal of producing more food on Norwegian resources. This reveals the need for a conducive institutional environment and policies indicating clearer directions for further development, which supplement advice.



In summary, while the advisers were fully convinced of the necessity of making Norwegian farm management more climate-friendly, most of them struggled to see a straightforward route to the goal and called for further instruments to be employed to this end.

## 5. Discussion and conclusion

In this paper, we show how agricultural advisers try to draw in and convince farmers to make climate-friendly changes on their farms. We sought to answer the following research question: *What are the approaches and experiences of agricultural advisers supporting farmers in Norway in implementing climate change mitigation measures?* In the subsequent pages, we discuss the findings around the three main themes (see section 2) that guided the analysis: (1) the perceived potential for behavioral change; (2) the balance between public and private interests in climate change mitigation; and (3) critical preconditions for climate change mitigation inducing advice. Finally, we discuss what is needed to induce further mitigation actions at the farm level, before rounding off with some limitations of the study and pointers for future research.

### 5.1. A perceived yet unrealized potential for behavioral change toward climate change mitigation

To start, the findings indicate that, so far, advisers perceive they have not managed to reach to the majority of farmers (whether measured nationally or at the single-regional level). The advisers perceive that this is due to both intrinsic/personal conditions of farmers (disinterest in or opposition to the mitigation focus in agriculture) and contextual conditions (the farm economy). Their observations corroborate that the defined goal of reducing GHG emissions is set on a macro level by national authorities, while individual (and independent) farmers do not necessarily regard reduction of GHG emissions as a priority (Brobakk 2018). Moreover, advisers indicate that some farmers question the legitimacy of the demanded GHG emission reductions in agriculture, such as decreasing the production of red meat, especially if other sectors in society continue with what farmers perceive as less-necessary GHG-emitting activities.

However, some farmers still choose to join the climate advice/courses/projects offered by the advisers and implement climate change mitigation measures (where such measures can be improved manure/fertilizer management, carbon farming, improved coarse fodder quality, and/or production of renewable energy, among other things). These farmers seem to be largely interested in other benefits of the measures than climate change mitigation in itself. This was surprising to several of the advisers, yet this interest in farm-related benefits of relevant measures aligns with other research conducted nationally (e.g. Burton and Farstad 2020), even within the current research project (Melås 2020. "[muligheter og barrierer for innføring av klimatiltak på norske gårder.](#)" rapport nr. 8/2020. ruralis - institutt for rural- og regionalforskning; Farstad et al. 2022), and internationally (Davidson et al. 2019; Kragt, Dumbrell, and Blackmore 2017; Moerkerken et al. 2020). The advisers observed that while climate change mitigation did not attract much attention, primarily farm-related benefits connected to mitigation measures motivated farmers to make the changes; these were seen as a 'blessing in disguise' by the advisers in their efforts to

engage farmers to implement such measures. In line with Runhaar (2017) and Klerkx and Jansen (2010), they acknowledge the need to provide a complete package of complementary advice and measures.

### ***5.2. Advisers merging public and private interests***

The national/public demand for reduced emissions and the obligations and potential desire to advise farmers in the best way might put the adviser in a bind as they aim to also attend to the private needs of the farmer (Garforth et al. 2003; Klerkx, de Grip, and Leeuwis 2006). As our findings demonstrate, the advisers take both public and private demands seriously and have found ways to handle this combined task – regardless of whether they are public or private, specialized or linked. The advisers are aware of and sympathetic to the farmer’s situation, and they work together with the farmers to identify measures that would best fit into the farm business; this seems to include encounters based on trust, empathy, credibility, and consultation, just as Ingram (2008) (among others) mentioned. This approach is something the advisers perceive as unproblematic and rather rewarding, due to the connections they see between the relevant measures, good agronomy (and hence good/better farm economy), and reduced emissions. Since most farms can in some way be improved agronomically, advisers rarely struggle to find measures to offer that also can reduce GHG emissions. Nevertheless, given the farmers’ response, the advisers are fully convinced of the necessity of meeting private interests (such as practical needs) when pursuing the common good, in line with both earlier research in agricultural advice (Klerkx and Jansen 2010; Klerkx, de Grip, and Leeuwis 2006) and other research on framing of co-impacts related to climate change mitigation actions (Cohen et al. 2021; Walker, Kurz, and Russel 2017; see also Orlove et al. 2020).

### ***5.3. Implications for programme design: the significance of suitable framing at all levels***

Although advisers have found (albeit hidden) ways to generate interest in implementing climate change mitigation advice, the advisers’ important considerations of each farm’s situation and the farm-benefiting outcomes of implementing the measures are almost invisible in the overarching framing that is currently employed in the overall/national communication toward farmers. This highly climate-change-centered communication – both mentioned in previous sections and commented on by the interviewees as a framework they have to follow up on – represents an almost unilateral focus on farmers’ opportunities to reduce their emissions, often including a reminder of the agreement between the state and the farmers’ organizations. While some particularly opportunity-seeking farmers can obviously see the farm-related benefits of the measures, these benefits should be utilized more strategically to attract more farmers. It seems unfortunate and ill-fitting to highlight the public good when farmers are mainly interested in the potential private goods of the same measures. As indicated by Ngo, Poortvliet, and Klerkx (2022), a gain frame seems important, but it must be focused on the right gains for the targeted audience. Thus, our findings underscore the relevance of research in other fields (Cohen et al. 2021; Orlove et al. 2020; Walker, Kurz, and Russel 2017)

arguing that a framing that puts greater emphasis on the non-climate related benefits of mitigation actions can motivate greater support for these actions.

However, the current situation fully demonstrates Orlove et al.'s (2020) point that framing sometimes can be a political process: The non-optimal<sup>10</sup> communication, wherein the framing contrasts the more micro-level farmer-oriented promotional work and advice offered by the advisers, seems to be due to the fact that the agricultural sector tries to use climate-focused communication to perform three different functions at the same time, due to reasons that can be found in the macro-institutional context (as per Birner et al. 2009). First, the agricultural sector needs to demonstrate to the government that agriculture takes responsibility for reducing its own emissions, as each sector in Norway is expected to contribute to the realization of the national climate policy goals (Ministry of climate and environment 2019, 19). This is perceived to strengthen the general legitimacy of the agricultural sector; furthermore, demonstrating that the sector is making an effort on its own initiative may also be an important means with which to prevent external forces (i.e. national authorities) from deciding to impose action (see Farstad, Vinge, and Stræte 2021).

Second, as also mentioned by several of the advisers in this study, it seems necessary to operate with a climate framing, in order to release and justify the climate-marked public funding paying for the promotional activities. Third, a climate change frame is introduced and used to make farmers implement the necessary measures on their farms; the effect of this communication seems sub-optimal, in light of the farmers' general tepid response to the current climate-framed promotions, but it seems hard to change this framing. As a result, all levels of the agricultural sector are somewhat 'trapped' or locked into their current communication framing, highlighting only emission cuts rather than their interplay with farm-benefiting outcomes. This can be understood as a challenge of the agricultural sector's policy focusing on climate change actions, which probably should be stated and discussed openly in public to allow more goal-oriented communication and framing for each purpose.

#### ***5.4 What is needed to induce further climate change mitigation actions?***

All in all, our study indicates that getting farmers to make changes toward food production with fewer GHG emissions depends on a range of conditions that advisory systems and advisers must handle. Thus, issues like the farm context, motivation, competences, technologies, political regulation, incomes, and market demands (potential 'climate requests' of farmers by market actors in view of agrifood standards and labels) have to be taken into consideration. Interestingly, we notice that, so far, no legal instrument has been adopted in Norway to specifically attain land-based food production with fewer emissions of greenhouse gases. In line with both Runhaar (2017) and the advisers' reflections on what seems required, more should be done at the macro level to create an enabling context and a more effective framing, to create a constructive mix of 'push' and 'pull' measures (Klerkx and Jansen 2010; Scherer and Verburg 2017). While competent advisers know how to identify suitable improvements (enable positive change) and motivate farmers, stronger demand – such as legislation and penalties, and for certain measures higher subsidies – seems needed, together with clearer directions for further development (legitimacy).

Changing farming to practices with lower GHG emissions while at the same time maintaining food production and upholding farm economies is not an easy task, not least because the greatest share of emissions is decided by the number of animals in production (Hohle 2020; O'Mara 2011); nevertheless, researchers, agricultural authorities, agricultural advisers, and some farmers all see the potential for agriculture contributing positively in this direction. To motivate as many farmers as possible to change their behavior in a climate-friendly direction, the study in particular highlights how a climate-centered framing at the macro level can create challenges for advisers in their work at the micro level, especially when it comes to stimulating interest in and enthusiasm for relevant measures. Based on the findings of this study, it seems more strategic to employ framing that emphasizes what farmers are most interested in – the farm-related benefits of relevant measures – and then highlight the potential of emission cuts as a positive co-benefit, in line with the point made by Orlove et al. (2020), among others. This is directly opposite to the current approach of advising on climate change mitigation and hinting about potential positive farm effects from implementing the measure. Furthermore, in light of the ambitious emissions reduction goals at both the national and the international level, it would probably be sensible to ensure that all kinds of advice/courses/education oriented toward farmers are in line with, rather than clashing with, climate goals, through some kind of 'climate mainstreaming' or 'climate proofing'.<sup>11</sup> This would probably not entail great challenges, based on the advisers' conclusion that climate advice fits well with regular agronomic and economic advice.

### **5.5. Limitations and future research**

Our study captures a broad picture of agricultural advisers' experiences and reflect the experiences of certified climate advisors from ten of Norway's 11 regions. However, our data set is modest, and there may be other advisers who are more uniformly focused on emission reductions, and who try to push the farmers accordingly, regardless of the circumstances around the farmer and farm. Likewise, it may well be the case that there are individual farmers whose actions are more heavily influenced by climate concerns than what seems to be the general picture. This would perhaps be discovered with a larger sample. Furthermore, while the goal of the provided climate advice is to ensure reduced emissions from farming, our study did not attempt to reveal the actual implementation of climate mitigation measures subsequently to the climate advice. This would require a longitudinal study, or a retrospective study carried out further forward in the future.

For future research, it would be interesting to compare the experiences of several countries with different national strategies and corresponding public funding investments and communication to ensure implementation of climate change mitigation measures at the farm level. We do not know how the ambitious emissions reduction goals set by, e.g. the EU have been followed up at the central level elsewhere (various studies indicate that this is an important goal for the Scottish land use sector (e.g. Feliciano et al. 2014)), but we assume the limited literature in this particular field reflects other or missing strategies of this kind in other countries so far. At the same time, it would also be interesting to know if climate change issues are more or less controversial in the agriculture sectors of other countries, and how this is potentially solved at both the macro and the micro levels. For future social research on climate change mitigation in

agriculture in general, it is important to recognize and emphasize the value of (farmers') climate change-*relevant* decision-making (Orlove et al. 2020), rather than only focusing on decision-making based on explicit mitigation-driven motives or goals.

## Notes

1. In Norway, these are state agencies, with the mandate of promoting the Norwegian agricultural goals and current national policies in this field.
2. Their definition of climate change-relevant decisions also includes decisions on plans for future decisions and actions (Orlove et al. 2020), e.g., such as plans made by farmers in collaboration with an agricultural adviser.
3. The annual GHG emissions from agriculture in Norway amounted to 4.5 million tons of CO<sub>2</sub>e in 2018. This is 8.5% of the country's total emissions. The agreement states that in the period 2021–2030, the emissions from the agricultural sector shall be reduced by 10%--without, however, reducing domestic food production (Regjeringen 2020).
4. Most of these are initiated as a follow-up to other environmental concerns than GHG emissions.
5. Among them four non-specialized advisers who are included also in the analysis of the present study.
6. Teachers from high schools based on the provision of vocational education and training within the agricultural field.
7. These were picked from an official list of the certified climate advisers; close to 100 in total.
8. As an additional hurdle, the advisers mentioned that, as long as climate advice is supposed to be based on the climate calculator, one significant barrier to climate advice participation has been identifying farms with sufficient concrete numbers to feed into the calculator.
9. The exceptions to this may be biochar for carbon storage in soil, and biodiesel, if they are not sufficiently subsidized and hence economically beneficial.
10. In terms of responses as well as the absence of responses from farmers as the target group.
11. This would correspond to rural mainstreaming and rural proofing (Atterton 2008; Shortall and Alston 2016). Rural proofing is the method used to ensure that rural mainstreaming is correctly carried out.

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