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Global Institute for Agri-Tech Economics,

Food, Land and Agribusiness Management Department,

Harper Adams University

## Proceedings of the 4th Symposium on Agri-Tech Economics for Sustainable Futures



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# Factors affecting British Farmer's adoption of carbon emissions reduction practices

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## Abstract

**Background:** Agriculture is a significant contributor to greenhouse gas emissions in the UK. Therefore, numerous studies have assessed the factors motivating farmers to introduce environmental practices. However, the determinants of farmers' decisions to reduce carbon emissions in line with the new net-zero goal are not well-understood.

**Methods:** This study aimed to explore factors affecting UK farmers' adoption of carbon emissions reduction practices using a mixed method approach based on 101 online survey responses. The survey questionnaire included a combination of closed and open-ended questions. Three additional in-depth interviews were conducted. No responses were obtained from farmers in NI. The respondents were from all farming sectors with majority being cereal growers and lowland livestock farmers. Factors explored include a range of motivating factors, perceived barriers to adoption of carbon emission reduction practices, farmers perceived behavioural control and farmers innovativeness. Attributes of farm and farmer such as location, farm type, farm size, age, and level of education

**Results:** Multiple linear regression analysis shows that 31.5% of farmer's adoption of carbon emissions reduction practices can be explained by five factors, which are farm size, financial incentives, farmers innovativeness, farmers perceived behavioural control and crop farming only. Further cluster analysis showed a typology of four categories of farmers with Early Adopters and Late Majorities reporting more actions in reducing carbon emissions than innovators, and Laggards taking fewest or no actions at all. Larger farmers and crop farmers are more likely to take more actions than animal and mixed farmers. Those who take less or no actions in reducing carbon emissions in farms were more likely to believe that there is not much farmers can do. Qualitative data analysis suggests that more accessible information and knowledge transfer should be provided to unlock the potential of achieving Net Zero target by 2050.

## Keywords

Net zero, farmer's behaviours, factor analysis, multiple linear regression.

## Presenter Profile

Dr Eric Siqueiros works as Innovation Specialist for the European Regional Development Fund project AGRI at Harper Adams University. He is also a visiting lecturer for the Food Land and Agribusiness Management Department. His main interests are in developing processes and strategies for the sustainability of the Food and Agricultural Sector. Eric holds a PhD focused in Sustainable Energy and Waste Recovery from Newcastle University.

## Introduction

Climate change is one of the most prominent international crises, attracting the attention of global academic researchers, governments, and the wider population. The leading cause of climate change is the increasing concentration of carbon emissions (Abeydeera, Mesthrige and Samarasinghalage, 2019). Global emissions have increased 135%, from 14 billion tonnes in 1971 to 33 billion tonnes in 2017. The UK is responsible for 1.1% of emissions, making them the 16th largest contributor (OECD, 2020).

In the UK, agriculture accounts for 10% of carbon emissions, 70% of nitrous oxide emissions, 50% of methane emissions, and 1% of carbon dioxide emissions (DEFRA, 2020). Pressure has mounted on all industries to reduce carbon emissions. In particular, the Climate Change Act 2008 (2050 Target Amendment) Order 2019 made the target of net-zero carbon emissions by 2050 legally binding. Agriculture is uniquely placed to be part of the solution, as both an emissions source and a sink. There are several practices farmers can implement to reduce emissions, but adoption varies.

It was not until 2008, that the CCA made UK emission reduction targets law. The legislation binds the UK Government to reduce greenhouse gas (GHG) emissions by 80% by 2050 and to support adaptation to achieve this. It established the Committee on Climate Change (CCC) and the Adaptation Sub-Committee, to advise industries on adaptation, mitigation strategies and formulate 'carbon budgets' (Lorenzoni and Benson, 2014). In May 2019, the CCC recommended amending the CCA (2008) target to 100% reduction by 2050, now known as net-zero. From 27th June 2019, the Climate Change Act 2008 (2050 Target Amendment) Order 2019 introduced this new legally binding target.

The agricultural sector report focuses on non-CO2 abatement, with an emphasis on the potential for innovative or novel measures (Barnes *et al.*, 2019) . It suggests methods to reduce nitrate and methane emissions and analyses the cost-effectiveness of the suggested measures. The CCC (2019) reported that one-fifth of agricultural land must change to alternative land uses, afforestation, biomass production, and peatland restoration, to achieve emission reduction targets. The report notes 'the voluntary approach pursued so far for agriculture is not delivering reductions in emissions'.

In 2012, the Government established The Greenhouse Gas Action Plan (GHGAP) to deliver a reduction in agricultural-associated emissions. Reviewed in 2016, the GHGAP remains the main framework in place. It consists of ten performance indicators, including overarching indicators such as farmer 'attitude and knowledge' and sector-specific indicators such as 'manufactured fertiliser application on cereals'. A key indicator is mitigation method uptake, a reliable guide to whether farmers are being effectively motivated to reduce emissions. The 2016 Review confirms the Government's preferred method to motivate farmers' uptake remains the voluntary GHGAP.

## Literature review

### Environmental land management schemes

The most recent government action aimed at motivating farmers to reduce carbon emissions is the Environmental Land Management Scheme (ELMS). ELMS will pay farmers for managing their land in a way that delivers against key 25 Year Environment Plan goals and particularly supports the delivery of the net-zero target (DEFRA, 2020).

DEFRA is undertaking Phase 1 in a programme of tests and trials. So far, 42 trials are active, focussing on areas such as payments, advice delivery, and collaboration. A national pilot is expected by the end of 2021, with the scheme officially launching in 2024. A three-tier model is currently proposed. Tier 1 focuses on actions many farmers can take to improve environmental sustainability (for example, cover crops or wildflower margins), with an emphasis on practices that are most effective when delivered at scale. Tier 2 focuses on local priorities and relies on collaboration between local land managers. Tier 3 focuses on landscape-scale projects recognising that projects such as woodland creation, peatland restoration, and management of carbon-rich habitats are critical to achieving the ambitious net-zero target (DEFRA, 2020).

In 2020, the CCC raised concerns about ELMS with DEFRA. They agreed tiers 2 and 3 have potential to drive systemic change, and tier 3, in particular, could deliver carbon mitigation benefits through its focus on landscape-scale change. However, they noted that DEFRA has not explained how ELMS will sit within the wider suite of climate policies, including the current Environment Bill, the 25 Year Environment Plan and various policies for afforestation and peatland restoration, or how these different strategies worked together to support the Government's climate change goals.

A survey by the Country Land and Business Association (CLA) and Strutt & Parker, investigated farmers' concerns about ELMS. Over 50% reported they had already taken action to reduce GHG emissions. Four out of five said they are likely or very likely to join ELMS when it is launched in 2024.

However, apprehensions were raised about payments, with 76% concerned they will be insufficient (Bracken, Bulkeley and Maynard, 2014). The Rural Payments Agency currently pays farmers £86 per acre under the Basic Payment Scheme. DEFRA is yet to confirm if ELMS will be more or less generous (Vigani *et al.*, 2021). NFU (2019) cited productive farming as a key pillar to achieving net-zero. Farming more efficiently reduces emissions, and produces other carbon-reducing benefits, by ensuring fewer inputs to achieve the same production levels. DEFRA (2020) committed to providing grants for investment in equipment and infrastructure to drive improved productivity. The grants are due to open in 2021 and will be similar to the current Countryside Productivity Scheme.

Nevertheless, it is uncertain whether the ELMS scheme will motivate farmers to reduce their carbon emissions. Uptake of previous environmental schemes may be a good indicator. Studies have revealed that a complex combination of personal, business and external factors influence farmers' willingness and ability to participate in agri-environmental schemes(Gasson, R. and Potter, 1988). Lobley and Potter (1998) studied participants in Environmental Sensitive Areas (ESA) and Countryside Stewardship (CS) schemes in the southeast of England. This revealed ESA participants were predominantly motivated by financial gain, whereas those in CS were primarily motivated by conservation. Questioning the sustainability of schemes with financial incentives to engage otherwise disinterested farmers, suggesting that, while a short-term gain may be achieved, long term this may not be enough to continue good environmental practice (Lobley and Potter, 1998). These studies are limited in their usefulness due to their age, as farmers' motivations might have changed over time. However, they are still a helpful indication as to the general attitudes towards the uptake of good environmental practices, which is quite likely to translate to farmers' motivations today. More recent studies,(Wilson and Hart, 2001; Rosemarie Siebert, Mark Toogood, 2006), confirm Lobley and Potter's (1998) findings that economic considerations have been the main factors influencing participation in government environmental schemes. Jones *et al.* (2013) found that adoption of carbon emission reduction practices varied depending on the advice and support given to farmers, and there is a need for flexible policies to enable farmers to select measures best suited to their holdings (Jones *et al.*, 2013). Policies that provide help accessing financial support are considered beneficial to improving farm practice(Deressa *et al.*, 2009).

### Farmer attitudes and knowledge

May (2019) found that a farmer's knowledge of the interaction between their business and the environment positively affected motivations to adopt beneficial environmental practices. These motivations could be reinforced if the investment made a reasonable return, but this was not the dominant motivation (May, 2019). In contradiction, Hornsey and Harris (2016) concluded climate change beliefs were marginally related to people's motivations to adopt new practices. This was supported by Lane *et al.* (2019) finding that although farmers were concerned about emissions, they experienced other pressures such as profitability, labour and regulations, which were more significant in their decision-making. Acceptance of knowledge increase if shared through farmer-to-farmer groups and the research is not only scientific but also based on experience (Burbi, Baines and Conway, 2016). Morris, Mills and Crawford (2000) confirmed this finding when stating that, while mass media is relevant to awareness creation, personal contact and demonstration are critical to action, with the best advocates for environmental schemes being farmers themselves.

Studies have suggested that farmers who were more willing to take risks, explore new ideas and adopt innovations were more likely to adopt new environmental sustainability practices (May, 2019). Rogers (2010) 'diffusion of innovations theory' categorised farmers into adopter categories: innovators, early adopters, early majority, late majority, and laggards. Moerkerken *et al.* (2020) found farmers' attitudes to innovation to be the strongest predictor for the uptake of climate change mitigation technologies. Farmers classified as innovators were more likely to be motivated to take up climate-friendly practices than farmers in the late majority and laggards categories, even if they had little knowledge about climate change. Moerkerken et al. (2019) found energy-saving measures were likely to be adopted by majority farmers but more complex renewable energy measures were more likely to be adopted by innovators and early adopters, with only innovators most likely to adopt complex non-$CO_2$ measures. Moreover, Barnes and Toma (2012) and Diederen *et al.* (2003) also concluded innovator farmers were more likely to be motivated to adopt carbon reduction methods. However, Niles and Mueller (2016) found that farmers who had climate change mitigation practices in place, and as a result were classed as innovators, were less likely to adopt further measures in the future.

DEFRA (2019b) measured farmer awareness of emissions, and intentions to change practice, as key indicators of mitigation method uptake. The survey results showed 13% of farmers felt it 'very important' to consider GHGs when making decisions relating to their farm, and a further 42% considered it 'fairly important'. However, 38% placed little or no importance on considering GHGs in their decision-making. Franks and Hadingham (2012) reported 38% of UK farmers believe climate change is already having an impact on their land, and 57% expect it to have an impact in the next 10 years. DEFRA (2019b) reported 61% of farmers were taking actions to reduce emissions. This is an increase from Franks and Hadingham's (2012) earlier data, which revealed 47% of farmers, had taken some action to reduce future climate change. When asked about their main motivations 84% of respondents believed it is 'good business practice'. Other strong motivating factors were the environment (71%), profitability (55%), and regulatory reasons (41%), whilst meeting market demands was only 19%.

The Theory of planned behaviour (TPB) has been widely used to understand human behaviour. It assumes that human behaviour originates from individuals' intentions to perform a specific behaviour (Ajzen, 1991). The TPB hypothesis is that intention is determined by three central psychological constructs: attitude, subjective norm and perceived behavioural control. In this study, the intention of a farmer is defined as the intention to adopt carbon emission reduction practices. The TPB has been used to explore behaviours in other related agricultural issues, like intension to diversify, pesticide handling and to perform agri-environmental measures (van Dijk *et al.*, 2016; Senger, Borges and Machado, 2017; Bagheri *et al.*, 2019).

## Methods

In order to explore what factors affect UK farmers' adoption of carbon emission reduction practices, data were collected using a mixed-method approach involving semi structured in-depth interviews and online questionnaire survey with both closed and open questions.

Purposive but convenient sampling based on pre-determined criteria (to represent crops, animals and mixed farms) was applied to recruit study participants of the semi-structured interviews. Each interview lasted approx. 30 minutes. The interview participants are from different regions and different enterprises. Two interviewees are farm owners while the third one is a farm manager employed by a farming company. All interviews were recorded and fully transcribed. Thematic coding was used to explore participants' perspectives on barriers and attitudes to reducing carbon emissions. The thematic analysis showed three key barriers and four motivators to reducing carbon emissions in farms. These were used to inform the questionnaire design.

For the questionnaire-based survey, a snowballing technique using social media platforms such as Twitter and Facebook was used to distribute the questionnaire survey link. This method may be biased towards young farmers, which is not representative of the general farmer population with an average age of 60 (DEFRA, 2017).

The survey questionnaire's design was partly informed by the results of the thematic analysis of the interviews and partly informed by the literature reviewed. The questionnaire included items about relevant socio-demographic information, farmer's innovativeness, and carbon emission reduction practices adopted by farmers and influencing factors. Socio-demographic information included farmer's age, level of education, farm size, farm location and farming sector. Farmer's innovativeness was measured with the typology of innovation adoption (Rogers, 2010).

Carbon emission reduction **behaviour** was measured by the mean score of the summation of the applicable actions with binary answers as listed below:

- Increasing use of clover in grassland
- Improving nitrogen fertiliser application accuracy (e.g. using a fertiliser recommendation system, regularly checking and calibrating fertiliser spreaders)
- Increasing use of legumes in arable rotation
- Improving energy efficiency (reducing fuel use, producing own energy)
- Recycling of waste materials from the farm (e.g. tyres, plastic)

- Improving nitrogen feed efficiency, livestock diets (e.g. using ration formulation programme)
- Improving efficiency in manure and slurry management and application (e.g. covering stores)
- Other measures (e.g. planting hedgerows and trees on farm and no tillage)

Influencing factors includes attitudes towards carbon emission reduction by farmers, perceived behavioural control, perceived barriers to implementation, and key motivators.

Attitudes (Mean score)

- Own concern for environment (5-point scale)
- I consider it good business practice to reduce carbon emission (5-point scale)
- Importance of carbon emissions in decisions (5-point scale)

Neutralisation – denial of responsibility (MEAN SCORE)

- I don't believe there is much farmers can do to reduce carbon emission (binary)
- I have already done all I can to reduce carbon emission (binary)
- I don't believe my farm produces much emissions (binary)

Perceived behavioural control

- I am not sure what to do to reduce carbon emission (binary)

Motivators to reduce carbon emission

- To improve farm profitability (5-point scale)
- To meet market demand (5-point scale)

Multiple linear regression analysis was performed in order to determine which factors affected farmers' decisions to adopt carbon emission reduction practices. Moreover, cluster analysis identified the typology of the farmers and their motivations for implementing carbon emission

## Results

### Socio-demographic characteristics of the respondents

In total 101 valid responses to the online survey were collected. No responses were from the Northern Ireland. The majority of the respondents were based in England (79.2%). 48% of the respondents reported a farm size of 200 + hectares, which is bigger that the average farm size in England (87 ha) (DEFRA, 2021). Most participants (36%) are aged 18-30 years. Moreover, 46% have a degree (e.g. BSc, BA) with only two without qualifications. The respondents are from all farming sectors with 27.7% of the farms are crop only, 41.6% are animals only, and 30.7% of the farms have mixed farm activities involving both crops and animals. Majority are cereal growers (n = 54 of which 15 cereal) and lowland livestock farmers (n=49, of which18 were lowland livestock only).

**Table 1: Socio-demographic attributes of the respondents**

| Age group | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| 18-30 | 36 | 35.6 | 35.6 | 35.6 |
| 31-50 | 26 | 25.7 | 25.7 | 61.4 |
| 51-65 | 30 | 29.7 | 29.7 | 91.1 |
| 65+ | 9 | 8.9 | 8.9 | 100.0 |
| Total | 101 | 100.0 | 100.0 | |
| **Education level** | | | | |
| No Qualifications | 2 | 2.0 | 2.0 | 2.0 |
| GCSEs or equivalent | 7 | 6.9 | 6.9 | 8.9 |
| BTEC or Diploma | 16 | 15.8 | 15.8 | 24.8 |
| A levels or equivalent | 23 | 22.8 | 22.8 | 47.5 |
| Degree (e.g. BSc, BA) | 46 | 45.5 | 45.5 | 93.1 |
| Higher degree (e.g. MA, PhD) | 7 | 6.9 | 6.9 | 100.0 |
| Total | 101 | 100.0 | 100.0 | |
| **Farm size** | | | | |
| <20 ha | 10 | 9.9 | 9.9 | 9.9 |
| 20-50 ha | 13 | 12.9 | 12.9 | 22.8 |
| 51-200 ha | 30 | 29.7 | 29.7 | 52.5 |
| 200 ha + | 48 | 47.5 | 47.5 | 100.0 |
| Total | 101 | 100.0 | 100.0 | |
| **Farming sector** | | | | |
| Crops only | 28 | 27.7 | 27.7 | 27.7 |
| Animals only | 42 | 41.6 | 41.6 | 69.3 |
| Mixed | 31 | 30.7 | 30.7 | 100.0 |
| Total | 101 | 100.0 | 100.0 | |
| **Location** | | | | |
| South-East England | 29 | 28.7 | 28.7 | 28.7 |
| South-West England | 12 | 11.9 | 11.9 | 40.6 |
| East Midlands | 8 | 7.9 | 7.9 | 48.5 |
| West Midlands | 14 | 13.9 | 13.9 | 62.4 |
| North of England | 17 | 16.8 | 16.8 | 79.2 |
| Wales | 9 | 8.9 | 8.9 | 88.1 |
| Scotland | 12 | 11.9 | 11.9 | 100.0 |
| Total | 101 | 100.0 | 100.0 | |

### Dependent variable: Farmers carbon emission reduction practices

Table 2 shows the responses to the carbon emission reduction practices. Three practices are not applicable to crop only farmers whilst one is not applicable to animal only farms. Three generic practices were reported by more farmers with the highest uptake reported being recycling of waste materials from the farm (n=70). The lowest up take of activities are improving livestock diets (n=25) and improving manure and slurry management and application (n=28).

**Table 2: Carbon emission reduction activities practiced by farmers**

| Carbon emission reduction activities | Yes | | No | | Not applicable | |
|---|---|---|---|---|---|---|
| | n | Valid % | n | Valid % | n | % of total |
| Increasing use of clover in grassland | 51 | 68.00% | 24 | 32.00% | 26 | 25.74% |
| Improving livestock diets (e.g. using ration formulation programme) | 25 | 34.25% | 48 | 65.75% | 28 | 27.72% |
| Improving efficiency in manure and slurry management and application (e.g. covering stores) | 28 | 38.36% | 45 | 61.64% | 28 | 27.72% |
| Increasing use of legumes in arable rotation | 29 | 49.15% | 30 | 50.85% | 42 | 41.58% |
| Improving nitrogen fertiliser application accuracy (e.g. using a fertiliser recommendation system, regularly checking and calibrating fertiliser spreaders) | 57 | 56.44% | 44 | 43.56% | | |
| Improving energy efficiency (reducing fuel use, producing own energy) | 65 | 64.36% | 36 | 35.64% | | |
| Recycling of waste materials from the farm (e.g. tyres, plastic) | 70 | 69.31% | 31 | 30.69% | | |

To calculate the score for dependent variable of carbon emission reduction behaviour, the mean score of applicable items was used. The mean value of this calculated behaviour variable is 0.5655 (n=101, min = 0.00 and max. = 1.00, Std deviation= 0.27813).

## Independent variables

Reliability of multi-item measures were tested. Table 3 reports the reliability (where applicable) and descriptives of the independent variables. Two items were removed from "denial of responsibility". One factor test (Harman) was conducted. The first factor accounted for 32.9% of the total variance indicating that common method bias was low.

**Table 3. Descriptive statistics for the independent variables**

| | N | mean | min | max | SD |
|---|---|---|---|---|---|
| Attitude (Cronbach's Alpha = .732)<br>• Own concern for environment<br>• I consider it good business practice to reduce carbon emission<br>• Importance of carbon emissions in business decisions | 100 | 3.38 | 1 | 5 | 1.04 |
| Business motivator<br>• Financial incentives<br>• To improve profitability (removed)<br>• To meet market demand (removed) | 101 | 4.11 | 1 | 5 | 1.019 |
| Denial of responsibility –<br>• I don't believe there is much farmers can do to reduce carbon emission.<br>• I don't believe my farm produces much emissions (removed)<br>• I have already done all I can to reduce carbon emission (removed) | 100 | .20 | 0 | 1 | .40 |
| PBC - I am not sure what to do to reduce carbon emissions | 101 | .35 | 0 | 1 | .478 |
| Innovativeness (stages of innovation adoption) | 101 | 3.1 | 1 | 4 | .889 |
| Farm size | 101 | 3.15 | 1 | 4 | .994 |

### What explains the difference in farmers' carbon emission reduction behaviour

Multiple linear regression was carried to find out what might explain the differences in farmers' behaviour in reducing carbon emissions on farm. Table 4 presents the test results.

**Table 4. Regression model summary and coefficients**

| | Standardized (Beta) | t | Sig. |
|---|---|---|---|
| (Constant) | | -2.155 | 0.034 |
| Attitude | 0.177 | 1.858 | 0.066 |
| Denial - I don't believe there is much farmers can do | -0.219 | -2.263 | 0.026 |
| Financial incentive to reduce emissions | 0.289 | 3.248 | 0.002 |
| Farm size | 0.256 | 2.82 | 0.006 |
| Innovativeness | 0.222 | 2.367 | 0.020 |

R = 0.556, R Square = 0.309, Sig. < 0.001

The regression showed five significant determinant factors: underlying belief about carbon emissions reduction, financial incentives, farm size and the farmer's innovativeness all positively influence the carbon emission reduction adoption whilst denial of responsibility has significant negative influence on adoption (p = 0.026). Financial incentive has the strongest influence of all (Beta = 0.289, p = 0.002). Together, the factors explain 30.9% of the differences in adoption behaviour by farmers.

Farmers' self-reported innovativeness was found to be a significant determinant factor. This was confirmed by the interviews. Thematic coding revealed interviewee 2 as an innovator. They had undertaken the most innovative measures, including two wind turbines, a hydro-generation scheme, solar panels and participation in a Climate Change Focus Farm Scheme. This supports Moerkerken *et al.* (2019) findings that only the most innovative groups are likely to adopt complex renewable energy measures and non-$CO_2$ measures. Interviewee 1 was classed in the majority category due to their cautiousness and cynicism of certain practices. However, they were recycling and improving fuel use, reinforcing the suggestion that these actions can be easily adopted regardless of farming enterprise (DEFRA, 2019b). Interviewee 3 have numerous plans to improve their farming practices, but were waiting to calculate a carbon basis before undertaking actions, placing them in the early-adopter category. Attitudes as an influencing factor was also confirmed by the interview results. All interviewees said they felt a moral responsibility to reduce carbon emissions but stated further knowledge and actions were needed before net-zero could be achieved.

Interviewees repeatedly chose the economic factors 'lack of incentive' and 'too expensive' as barriers to reducing emissions. This strengthens the pattern identified throughout the results that economic factors are influential, supporting Siedenburg *et al.* (2012), Swann and Richards' (2016) conclusions that financial incentives are required to motivate farmers and overcome barriers.

## Discussion and Conclusions

The research aimed to understand what motivates farmers to reduce carbon emissions in line with the new net-zero target. From the results and literature, it was clear numerous factors influenced motivations. This study suggests economic factors are a significant motivation for reducing carbon emissions, however it also showed that between farmers different typologies can be identified that will respond differently to this motivation. The results showed that innovators are the least motivated by financial incentives. They also tend to be the larger farmers and their main enterprise is crop growing. Those who take less or no actions in reducing carbon emissions in farms were more likely to believe that there is not much farmers can do, this group was identified as passive resistors. Where they do not actively resist to actions to reduce carbon emissions nor are motivated by financial incentives, this group consist of the smaller farmers. When comparing attitude groups, it was shown that less innovative farmers (those more resistant to change) were more influenced by regulation. To achieve the net-zero target, a combination of factors to incentivise all farming groups is essential. For example, environmental incentive schemes will motivate the innovative farmers, whereas more unwilling farmers can be encouraged to reduce carbon emissions through stronger regulation. Qualitative data analysis suggests that more accessible information and knowledge transfer should be provided to unlock the potential of achieving Net Zero target by 2050.

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