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# Climate change mitigation options in the rural land use sector: Stakeholders' perspectives on barriers, enablers and the role of policy in North East Scotland

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## ABSTRACT

The rural land use sector could potentially mitigate a large amount of GHG emissions. Implementation requires the engagement of farmers and other land managers. Understanding the barriers and enablers for the uptake of these practices is essential both to inform policy-makers and to achieve effective policy outreach. In Scotland, the rural land use sector is subject to a greenhouse gas (GHG) emission reduction target of 21% by 2020 relative to 1990 levels. This study contributes to the body of research on stakeholders' perspectives about suitability of climate change mitigation practices at the regional level. Mixed-methods were used to collect the data, namely participatory workshops with scientists and relevant stakeholders, a farmer questionnaire, and focus groups with farmers. Findings show that farmers were mainly willing to expand the uptake of mitigation practices they were already implementing because they consider these are the most cost-effective. Barriers to the implementation of mitigation practices are mainly related to physical–environmental constraints, lack of information and education and personal interests and values. Similarly, enablers are also related to physical–environmental factors and personal interests and values. Economic incentives, voluntary approaches and provision of information have been identified by workshop participants as the most favourable approaches needed to promote the uptake of technically feasible mitigation practices. Farmers, however, consider that agriculture is a “special case” and should have not to comply with GHG emission reduction targets. Mitigation practices, should, therefore, be integrated with other initiatives.

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## 1. Introduction

The European Union recommends that Member States provide information on the support for climate change objectives in line with the ambition to devote at least 20% of the European Agricultural Fund for Rural Development (EAFRD) to climate change mitigation and adaptation (Council of the European Union, 2012). Several studies have suggested technologies and practices to mitigate GHGs emissions from agriculture (e.g. Johnson et al., 2007; Freibauer et al., 2004; Ovando and Caparros, 2009; Powlson et al., 2008; Smith et al., 2008). In the UK, marginal abatement cost curves (MACCs) for agriculture and land use, land use and forestry have been developed (Macleod et al., 2010; Moran et al., 2008, 2011). These indicate the cost of reducing an additional unit of carbon equivalent emissions given the adoption of a certain mitigation practice, averaged across a range of farms. Although certain GHG mitigation options can be implemented with very low costs, or in many cases even with a net profit (Moran et al., 2011; Smith and Olesen, 2010), these so-called win-win options are often identified at the national level and not always suitable at the regional or even farm level. Anastasiadis et al. (2012) distinguished between mitigation that is probable (likely to be implemented given current trends), and mitigation that is possible (while technologically feasible, is unlikely to be implemented given current trends). In the investigation of likely uptake of measures this distinction is crucial. Many studies focus mainly on technical mitigation potential rather than the socio-economic potentials but this do not reflect the real availability of land to implement mitigation practices, which can be affected by barriers such as tenurial status or the need for food production (Barnes and Toma, 2012; Reidy et al., 2008). Smith et al. (2007) and Smith and Olesen (2010) reviewed policy and technological barriers to the implementation of GHG mitigation options in agriculture from a farm level perspective. According to these authors, it is likely those barriers are highly regional and often even farm-specific depending on site specific factors, regional policy socio-economic and cultural conditions. This largely influences farmers' decision making in relation to the implementation of mitigation practices. Dandy (2012) organised the extent of influences on land-manager decision making in four categories: economic, social, physical–environmental and operational. Hallam et al. (2012) reviewed and classified the key enablers of decision making processes and farmers' behaviours in external factors, economic factors internal factors and social factors. The combination of economic, social and physical–environmental factors in a particular pattern reflects different farming styles, and these are said to explain the large homogeneity of farming that can be found in particular settings (Van der Ploeg, 2010). Farming styles are also likely to affect GHG emissions from agriculture as well as the uptake of practices to mitigate these emissions.

Given the central role of the agricultural sector in Rural Development Programme spending, an understanding of how farmers would respond to climate change mitigation initiatives is required to inform effective outreach strategies (Arbuckle Jr., et al., 2013; Rejesus, 2012; Barnes and Toma, 2012). It is also essential to understand which policy

mechanisms influence farmers' behaviour the most to ensure a high uptake of GHG emissions mitigation practices. This study aimed at contributing to the body of literature on stakeholders' perspectives on barriers, enablers and policy mechanisms regarding the implementation of GHG emissions in the rural land use sector. The definitions of perspectives, barriers and enablers were adopted from the Oxford online dictionary.<sup>1</sup> Therefore, perspectives were defined as the way farmers regard situations and facts, a point of view or a particular attitude towards something; barriers were defined as the circumstances or obstacles that prevent communication or progress; and enablers were defined as factors that cause particular phenomenon to happen or develop. Four main questions were investigated:

- i. What are the current and preferred mitigation practices to be implemented in the future?
- ii. What are the barriers and enablers to the uptake of mitigation practices?
- iii. What are the most supported mechanisms to promote the uptake of suitable mitigation practices?
- iv. What are farmers' perspectives on meeting the Scottish 2020 GHG emission reduction target in the land use sector?

The study is built on the premise that a regional approach is an appropriate level to formulate suitable land-based mitigation strategies because it considers regional specificities in terms of biophysical conditions as well as behaviours, traditions and land use practices. Winter and Lobley (2009) recommended that local responses to climate change mitigation should not be neglected, and called for an emergent sense of place in agricultural, food, and land-based mitigation policy discourses. The North East of Scotland is the region chosen for this study because it provides a suitable study context to explore the challenges of adopting mitigation practices in the farm sector. Tackling climate change is regarded by the Scottish Government as the responsibility of all sectors of the economy, and the Scottish farm sector is advised to take steps to reduce GHG emissions (SRUC, 2013). The Delivery Plan for the Climate Change (Scotland) Act 2009 expects agriculture and agricultural land use to reduce their emissions in 2020 by 21%, compared to 1990 levels (Scottish Government, 2009a) and the Scottish Land Use Strategy emphasises that this sector should be part of the country's climate change mitigation strategy (Scottish Government, 2011a,b). The Scottish policy also recognizes the effective uptake of low-carbon initiatives require local knowledge and local buy-in (RSE, 2011). Regional-level assessments are important because climate change scientists usually identify standard mitigation practices which might be applicable to the whole country but are not suitable at the local level. Different regions have different land use systems depending on the combination of local skills, culture and tradition. As a consequence, local barriers and enablers need to be identified in order to design mitigation practices which are consistent with the different systems. This information is essential to upscale regional policies at the European Union policy level. The methodology provided in this study can be applicable in other regions of the world to assess stakeholders' perspectives on the implementation

<sup>1</sup> <http://www.oxforddictionaries.com/>.

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