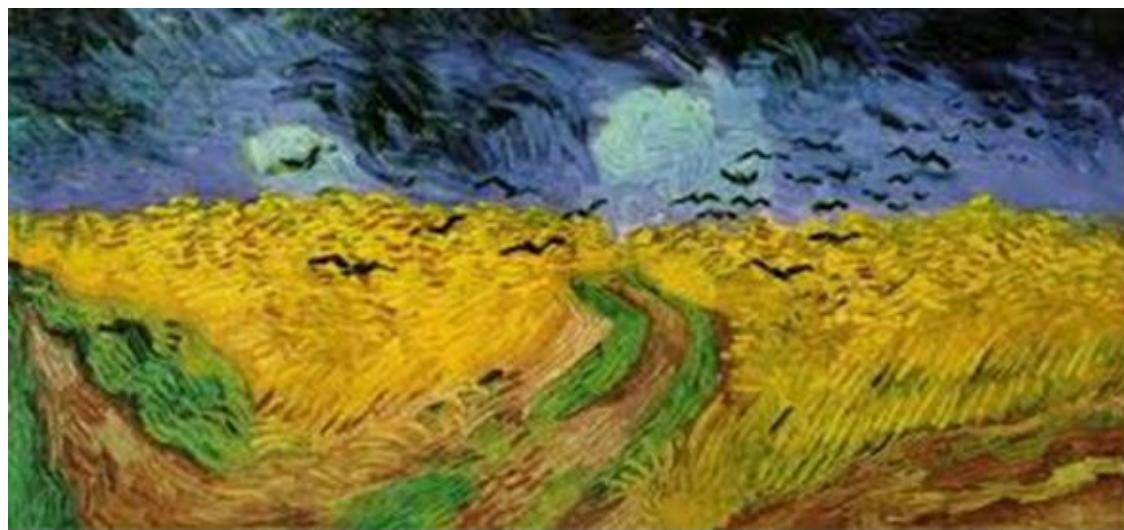


Policy options for promoting the use of an EU-wide carbon calculator

Deliverables 2.4.2 and 2.5.2



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Administrative summary

Specific Contract No 4 implementing Framework Contract 385309:

The specific contract *EU wide data availability and testing of low-carbon farming practices assessment tool* was signed by the European Union represented by the European Commission, which was represented for the purposes of the signature of this contract by Mr Guido Schmuck, Acting Director of the Institute for Environment and Sustainability (JRC/IES) on 15 December 2011, and by Mr. Kees Slingerland, Managing Director of Institute Alterra of Stichting Landboukundig Onderzoek, representing the contractor, on 15 December 2011.

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EXECUTIVE SUMMARY

This report presents the results of the survey on policy options for promoting the use of an EU-wide carbon calculator. The European Parliament requested the European Commission to carry out a pilot project on the “certification of low carbon farming practices in the European Union” to promote reductions of global warming emissions from farming. The Fragaria consortium supported the JRC with this task by carrying out a study on “*EU-wide data availability survey and testing of low-carbon farming practices assessment tool*”. The project tested the calculator, made recommendations to improve the functioning of the calculator, and conducted a survey to determine what would be the most appropriate policy method to promote the use of the carbon calculator.

The policy option survey was carried out in eight different Member States, and both farmers and stakeholders were consulted. The questions were aimed at assessing which of three different policy options would be the most appropriate for potential implementation of the carbon calculator. Three options were examined: regulation (use of the carbon calculator would be made compulsory e.g. by incorporating it into CAP cross-compliance requirements), *state-funded voluntary incentive schemes* (use of the calculator would be made a requirement for participation in voluntary schemes funded under rural development programmes), or *certification or assurance schemes* (use of the carbon calculator would be a requirement of one or more privately operated, or state operated, assurance and certification schemes).

The survey shows significant variation in the attitudes towards, and perceptions of, different policy options in terms of their potential to promote the use of the carbon calculator and low carbon farming practices. The survey nonetheless identified a number of strengths and weaknesses of these options according to their ability to encourage use of the carbon calculator, increase environmental awareness, and drive GHG mitigation. Regulation would likely ensure the highest amount of participation and hold the most potential for GHG mitigation. However, it has significant weaknesses in terms of farmers viewing it as an imposed environmental constraint. If the targets for compliance were set low enough to gain political acceptance, real environmental improvements would not be achieved. State-funded voluntary incentive schemes are likely to motivate participants to implement mitigation measures and gain higher levels of environmental improvements. The weaknesses they suffer are that extra financial resources are needed to utilize this policy option and there is lower participation with “problem cases” not being addressed since participation is voluntary. Certification schemes are strong for increasing the consumers’ awareness of farming’s contribution to climate change, but the weaknesses identified are that they depend upon market demand and may fail due to excessive certifications confusing consumers.

Given the diversity of opinions, a wider consultation may be needed to discern the preferred policy option. This would need to be based on the actual detailed design of each approach (for example, how the baseline is set within cross-compliance, and how the additional requirements in agri-environment measures are defined).

Some possible suggestions emerged from the consultation, in particular from the side of stakeholders, which provide additional guiding principles for future policy design. Specifically, these are:

- 1) A combination of approaches, each with a different focus, may address the disadvantages while making the most of strengths of the different options.
- 2) Regardless of which of the three proposed policy options is chosen, the coverage should be EU-wide to maximize the benefits of the calculator and reduce any objections among farmers about potential discriminatory effects.
- 3) The carbon calculation needs to be part of a package of conscious improvement of environmental practices among farmers which also leads to added value that can be captured by the farmer. The approach to promote a carbon calculator and low carbon farming needs to consider potential trade-offs that could occur if GHG mitigation measures were the sole focus, so newly implemented measures must take into account existing obligations (e.g., preservation of biodiversity).
- 4) A change in the language used to promote the carbon calculator towards emphasizing resource efficiency and farm resilience planning as opposed to solely a GHG mitigation focus would be beneficial. The potential for cost savings resulting from mitigation actions and improvements in resource use efficiency can be emphasised more.
- 5) Beyond the three policy options presented in the survey, expanded reporting on greenhouse gas emissions to account for all agriculture-related greenhouse gas emissions and clear policy mandates/targets in the form of binding national or EU reduction targets would provide a stimulus for mitigation action in agriculture and the relevance of a carbon calculator.

1. Introduction

This report presents the results of the survey on policy options for promoting the use of an EU-wide carbon calculator, undertaken within the context of the study ‘Fragaria Consortium: Framework contract number 385309 on the provision of expertise in the field of Agri-Environment.’

In 2010, The European Parliament requested the European Commission to carry out a pilot project on the “certification of low carbon farming practices in the European Union” in order to promote reductions of greenhouse gas emissions from agriculture. Whilst explaining that “the scheme should target the whole farming sector and should aim to take into account all the main factors contributing to carbon emissions from farming”, the European Parliament stressed that “in order to ensure its relevance throughout the territory of the EU, the certification scheme should be tested through practical trials on a number of farming regions appropriately situated in various parts of the Union”.

In this context, an EU-wide carbon calculator (CC) was developed through a project commissioned by the Joint Research Centre (JRC)¹ in order to:

- Provide an estimate or calculation of on-farm greenhouse gas emissions and provide suggestions on mitigation options.
- Raise awareness among farmers and contribute to a change of attitude / behaviour of farmers towards climate change and climate mitigation policies and measures.

The Fragaria consortium contributed to the testing of the carbon calculator and provided a series of recommendations for improving and promoting the carbon calculator, its use, and the uptake of mitigation-related farming practices. Farmers were surveyed about their interest in, and willingness to use, a carbon calculator and whether they would implement mitigation measures on their farms. The results of testing are available in a separate report².

This report presents the results of the consultation with farmers and stakeholders on the different policy options that might be employed to promote the use of the carbon calculator among farmers. The testing of the calculator and the policy options consultation were carried out with the same sample of farmers.

For the policy options consultation, both farmers and stakeholders (e.g., consultancy services, agricultural trade associations, retailers, certification scheme operators, academics or training services, and government) were surveyed. Three policy options were reviewed to identify the most appropriate approach to promote the use of the carbon calculator and delivery of mitigation measures in European farming systems. These were: 1) regulation (for example, via an extension of cross-compliance), 2) state-funded voluntary incentive schemes, and 3) certification or assurance schemes.

¹ The project "Carbon calculator to promote low carbon farming practices" was carried out by Solagro, France, and can be downloaded here: <http://www.solagro.org/site/476.html>

² Elbersen et al. (2013). Testing the carbon calculator. Deliverable 2.1 and 3.2 to the Institute of Environment and Sustainability (JRC/IES). Alterra Wageningen UR, Ecologic Institute, University of Copenhagen and EuroCARE.

This report consists of four chapters. Following the introductory chapter, Chapter 2 explains the methodology behind the survey. Chapter 3 presents the reactions of farmers and stakeholders towards the carbon calculator, as well as their opinions about the three different policy options and an effective design of a certification scheme for low carbon farming. Chapter 4 provides conclusions.

2. Methodology

2.1 Sampling and recruitment

The policy options survey aimed to obtain insights from farmers, as well as stakeholders interested and involved in the field of agriculture and climate change, on a range of issues, including the policy framework in which a carbon calculator (CC) tool might best be administered. Two separate questionnaires were designed, one for farmers and a second for stakeholders. The policy questionnaires were translated into national languages. The English language versions of the questionnaires are available in Annex 2 and Annex 3. As shown in Table 1, a total of 37 stakeholders and 60 farmers from eight case study countries were surveyed (United Kingdom, Spain, Germany, Poland, Slovenia, the Netherlands, Denmark, and Sweden).

Farmers involved in the evaluation of the carbon calculator were recruited for the policy options survey according to the sampling plan elaborated in Deliverable 2.1 and 3.2 (Elbersen et al., 2013). This plan ensured an even inclusion of farmers over the different farm types and environmental zones in the EU-27. The policy survey of farmers was carried out alongside the testing of the calculator due to both limited resources available and because it was deemed important that farmers were familiar with the carbon calculator (at least its requirements) when answering policy related questions. Depending on their availability, two different approaches were used to consult with farmers:

1. A regional workshop was organized to present and discuss the carbon calculator with participating farmer; verify the farmers' willingness to use the carbon calculator; and fill in the policy options questionnaire (either individually or as a group);
2. Individual interviews (face-to-face or via telephone) were conducted with farmers who could not attend a workshop due to time constraints. If interviews were conducted over the phone, it was not possible to present the carbon calculator, but an introduction to it and description of its functions was given beforehand. Moreover, the farmers' willingness to use the carbon calculator was verified.

Stakeholders were approached directly by the research teams in each case study country based on their direct interest in climate change mitigation, use of carbon/environmental foot-printing techniques within agriculture, or because they had particular knowledge of the agri-business, farm advisory, environmental advisory, or policy and regulatory sectors. Representatives of groups such as non-governmental organizations (NGOs), farm associations, research, advisory services, certification scheme operations, agricultural trade,

food businesses, and public authorities were interviewed or provided written responses to the questionnaire in each country.

The individual approaches to data collection for the policy options survey in each region are described in Annex 1. More specifically, the process by which farmers were identified, invited to participate in the survey, and the overall rates of response are detailed. Such information also reveals something of the broad level of interest of farmers and relevant stakeholders in the use of carbon calculators and their reasons for not participating. In some cases it proved difficult to gain interest despite favourable timing of the study (outside of peak work periods in agriculture) and good contacts established in the regions. This might also indicate that climate change mitigation is not a high priority for farmers in several of the EU regions included in the study.

2.2 The sample

Over two-thirds of the farmers surveyed (42 of 60 providing an answer) have been, or are currently, involved in agri-environmental programs. This is partially linked to the fact that farmers with greater environmental interests appear to have been more likely to participate in the survey³. These farmers tend to have greater awareness of, and interest in, climate change and environmental issues in agriculture and thus are more likely to be interested in using a carbon calculator.

Many farmers in the sample already have some experience with a range of mitigation practices, in particular: crop diversification, use of catch crops, and winter ground cover (about half of farmers indicated past use of these approaches). Conversion of arable to grassland, permanent set-aside, reduced tillage, and lower stocking rates were less commonly cited (about one-quarter of farmers).

Thirty-seven stakeholders participated in the consultation. Sixteen respondents were associated with advisory services—slightly more than half from general (e.g., Head of Farm Management for SmithsGore) and half from more specialist advisory services (e.g., Head of the Environment Division of Promar International and the Director of Increment Ltd). One respondent was from an agricultural trade association, two were from certification scheme operators, and one was a retailer. Six stakeholders were from academic or training services (e.g., Senior Lecturer in Farm Management at the University of Reading), and ten work in government positions. The affiliation of one respondent was not indicated. The number of stakeholders from each country was fairly equally distributed, with seven stakeholders from the Netherlands, four or five stakeholders each from the United Kingdom, Spain, Slovenia, Denmark, Sweden, and Germany, and another three from Poland.

³ In the UK, more than 60% of all farmers are currently in some form of agri-environment scheme, so self-selection bias based on agri-environment scheme membership will be less of an issue in this case.

Table 1. Number of farmer and stakeholder respondents to the policy options survey by case study countries

Case study country	Nº of farmer questionnaires completed	Nº of stakeholder questionnaires completed
Germany	12	4
Poland	10	3
Slovenia	12*	4
United Kingdom	5	5
Spain	4	4
Netherlands	7	7
Sweden	5	5
Denmark	5	5
Total	60	37

* Including five part-time farmers who are also agricultural advisors.

3. Results of consultation on policy options

The results that follow are presented largely in the order that issues appeared in the questionnaire. The respondents were first asked questions to discern whether they were familiar with any programmes requiring implementation of farming practices with a climate change mitigation effect (Section 3.1). Section 3.2 reports on farmer and stakeholder willingness to use a carbon calculator, while Section 3.3 deals with the different policy options which could be used to increase adoption of the carbon calculator. Subsections 3.3.1 through 3.3.3 specifically outline the qualitative feedback from stakeholders and farmers on the three policy options' strengths and weaknesses for implementation of the carbon calculator to achieve low-carbon farming in the EU-27.

Data analysis was completed at an aggregate level without comparisons between the countries. This is due to a limited possibility to partition the survey dataset into subsets. This limit comes in the form of a requirement for a minimum number of observations in each of the sub-groups that are generated. Sub-groups with very small numbers of observations are unlikely to generate representative results, i.e., they have a high risk of unreliability due to the disproportionately large impact of outliers, or even a single outlier. There are no hard and fast rules about the minimum number of observations required to generate reliable results in any sub-group, but it is widely accepted that N values of less than ten would not produce reliable results. With just 60 observations in the farmer dataset, spread over eight countries, there is very limited potential to subset into sub-groups. While it would have been interesting to sub-set the dataset by country, only three of the eight countries have ten observations of more, while five have N values of seven or less. Smaller N values for sub-groups are more likely to be acceptable if there is observably a good deal of homogeneity within in the observations. In this case, however, with farms being (as a matter of intention) drawn from a variety of farm systems and disparate case study regions within each country, there is likely to be considerable heterogeneity in the within-country data. For the above reasons, it was concluded that presentation of results for individual countries for the

purpose of cross-country comparison, both in the case of the farmer and stakeholder datasets, was not possible. Nonetheless, the very heterogeneity of the data that makes sub-setting difficult provides a marked benefit in a more holistic analysis. EU agriculture contains a wide diversity of agro-ecological systems and socio-economic conditions; thus, a stratification approach to the sample selection has been employed that captures this diversity to a significant extent. The aggregate results generated from the analysis can therefore be considered representative of EU agriculture as a whole, to a level of confidence that would not be possible for the national-level results.

3.1 Experience with environmental and certification schemes

Three quarters of farmers agreed that their participation in agri-environment schemes has contributed to improved awareness of environmental issues. Over 80% of farmers see financial compensation as a fair way to offset additional costs, with 65% of farmers reporting that participation in agri-environment schemes has increased their farm income, presumably by aid payments being greater than opportunity costs. However, many farmers are of the view that aid payments are less secure, due to the unpredictable nature of government policy commitments, than market-based income streams. There was no consensus on whether the administrative burden of such schemes is unacceptable.

Whereas the majority of farms have experience with agri-environment schemes, a smaller share (25 out of 60) have experience with certification schemes with an environmental focus. Certification is seen by around half of farmers with experience in such schemes to have increased their revenues and made them more aware of environmental issues. The administrative burden of certification is perceived to be greater than for agri-environment schemes, with 60% of respondents reporting that the administrative burden of the scheme was unacceptable.

Experience with certification schemes without an environmental focus is slightly smaller (22 out of 58 farms answering the question). Participation in these is also seen to have improved revenues and increased awareness of relevant issues, but doesn't seem to be associated as strongly with the perception of unacceptable administrative burden.

Cross-compliance is perceived on the whole to be a fair way (44 of 60) to justify CAP payments, and the environmental objectives of the carbon calculator are mostly clear to farmers. Just over half of farmers also responded (35 of 60) that cross-compliance has increased awareness of what they can do for the environment. This is a somewhat surprising result. However, the increased awareness that is highlighted by respondents may also be linked to the characteristics of the sample, which included a large number of farms participating in agri-environmental schemes.

Farmers' opinions are more divided on whether changes to farming practices actually occurred as a result of cross-compliance, as well as whether compliance with the rules is easy or not, and whether farmers should face such constraints on farming practices. Nonetheless, there was a small majority in favour of these propositions. Finally, a good majority of respondents was of the view that the administrative burden associated with cross-compliance is too high to be acceptable.

In terms of perception of climate change, the great majority of farmers in the sample accepted that climate change is related to human activities, that it will affect agriculture in their countries, and that farmers can do something to mitigate and adapt to climate change. Around two-thirds of farmers (38 of 60) indicated that they do try to mitigate emissions in their current management decisions and the majority generally knows what types of practices are effective in this regard. Around half of farmers have confidence that mitigation measures will be successful in mitigating climate change. However, a large majority of farmers were not certain, or did not know, their farm's carbon footprint (only four indicated that they did). It was not clear from their answers how these four farmers obtained this carbon footprint or how precise it was.

3.2 Willingness to use a carbon calculator

Experience with some type of computer-based software tool is quite widespread (45 of 60 respondents), though roughly half of farmers reported requiring assistance to use them. None of the participating farmers uses a carbon calculator yet.

Most farmers would be willing to use a carbon calculator if it was available free of charge (44 of 60) and was easy to use (50 of 60). Obtaining financial benefits from its use were seen as an important motivation by 49 of 60 farmers.

Many farmers believed that some of the data required by the carbon calculator would not be easily available, although data are already available in existing databases used for other purposes (for example, in the Integrated Administration and Control System used for administering subsidy payments under the CAP). There was less certainty on whether the carbon calculator can propose relevant actions suitable to their farms, but there was a positive outlook on the future use of mitigation measures if technical advice to help with implementation were available. However, this uptake would be contingent on the mitigation measures being economically beneficial or associated with compensation payments. There was no clear view on whether better market prices would result from implementation of mitigation measures, or whether implementing measures is a 'civil responsibility' of the farming sector.

The following barriers to use of the carbon calculator and uptake of mitigation options were cited by farmers:

- limited time available
- difficult, complex and time-consuming data entry, which increases administration burden on farmers without the possibility for additional financial compensation
- lack of knowledge and understanding of issues
- unclear benefits of the use of the carbon calculator
- unfamiliarity with computer use
- increased production costs
- requirement for additional investment

- lower farm income due to increased labour or reduced yields
- scepticism that certification related to climate change would increase farm income

Stakeholders also commented on barriers to farmers' use of a carbon calculator and uptake of mitigation practices. They confirmed the barriers identified by farmers, i.e., additional time and resource requirements, poor availability and access to data, as well as costs associated with mitigation measure implementation, and lack of perceived financial incentives as barriers. Moreover, some additional barriers to the effective promotion of carbon calculator use and implementation of mitigation practices were also identified:

- lack of clarity on the scope of the carbon calculator
- use of carbon calculators are not effective in reducing GHG in themselves; policy support and technical changes are also needed
- concern that questions or efficiency per hectare and costs are not addressed sufficiently by the calculator⁴
- GHG reductions would be better presented (to farmers) as a way to save costs, rather than focusing on reduced farm emissions
- lack of awareness and understanding among farmers: only when farmers are negatively impacted by climate change impacts are they likely to become more receptive to engaging on the issue. Even then, the 80 / 20 rule applies, i.e., only 20% are likely to take up practices and respond – the challenge is engaging the remaining 80%.
- the broader environmental perspective (protection of water, soil, and biodiversity) may be lost if climate is over-emphasized
- biophysical limitations (small size and physical dispersal of farm-holding parcels, for example, which makes data entry for individual fields and crops more difficult)
- lack of adequate advisory services
- lack of visibility of mitigation actions among the general public

3.3 Analysis of views on policy options

A number of different carbon calculators/carbon foot-printing tools are currently available. These are generally operated by private consulting organisations and their use by farmers is generally voluntary. There is some interest among policy makers in the use of the new EU carbon calculator as a possible means to increase farmer awareness of carbon mitigation measures. It is argued that the more widely the calculator is used, the more awareness will

⁴ Since most stakeholders did not see the calculator itself (only the data requirement list) it is possible that this comment refers more broadly to carbon calculators in general, and not solely the carbon calculator being tested in this project.

be increased. Therefore, policy makers are interested to know which of a number of alternative ways of providing the carbon calculator will lead to the greatest level of uptake.

Three alternative policy options for promoting the use of the carbon calculator were discussed with farmers and stakeholders. These were:

1. **Regulation** – use of the carbon calculator would be made a requirement, either by regulation, or by incorporating it into CAP cross-compliance conditions.
2. **State-funded voluntary incentive schemes** – use of the carbon calculator would be voluntary and incentive-based under a state-funded agri-environment scheme.
3. **Certification or assurance schemes** – use of the carbon calculator would be a requirement of one or more privately operated, or state operated, assurance or certification schemes

Farmers and stakeholders were asked only about the use of the carbon calculator and not about the uptake of any mitigation options that the carbon calculator might suggest.

Respondents ranked each of the three options above (one being the best option and three being the worst) to reflect the relative benefits that each would provide to farmers, based on a number of different criteria. The responses are compiled in Table 2 below.

Table 2. Farmer and stakeholder ranking of the benefits of different policy options for farmers (the most beneficial option is indicated in green and the least is indicated in red)

	Farmers			Stakeholders		
	Regulation	Voluntary	Certification	Regulation	Voluntary	Certification
Enhancing attitude towards low carbon farming	2.5	1.4	2.1	2.7	1.6	1.6
Increasing awareness of agriculture's +/- contribution to climate change	2.3	1.5	2.1	2.4	1.7	1.8
Least administrative burden	2.5	1.9	2.0	2.5	1.9	1.7
Least requirement for additional advisory services	2.6	1.6	1.7	2.5	1.8	1.7
Penalties for infringements of rules will be least severe	2.2	1.7	2.0	2.6	1.8	1.6
Lower total additional costs	2.6	1.8	1.4	2.5	1.7	1.8
Possibilities to obtain market-based benefits	2.5	1.8	1.4	3.0	1.9	1.2
Higher farm Net Margin	2.5	1.6	1.8	2.8	1.5	1.7

Values are mean rank scores (1-3), where lower scores indicate greater benefits (positive)

There is some variation between farmers and stakeholders in assessing which option would be the most beneficial for farmers. However, there is clear agreement that the regulatory approach would provide the fewest benefits. Farmers and stakeholders agreed that the voluntary incentive-based agri-environmental approach would be the most beneficial to farmers in leading to higher net margins, having the lowest administrative burden,

increasing environmental awareness, and enhancing attitude to low carbon farming. Farmers overwhelmingly indicated that the regulatory approach would be the least beneficial to them, though they recognized that cross-compliance has increased their environmental awareness and might have the potential to do so in the future (see also Table 4). This apparent contradiction might be explained by the distinction between increased awareness and increased engagement. Case in point, regulation was rated lowest by farmers (as well as stakeholders) in terms of its ability to enhance farmer attitude toward low carbon farming. Nonetheless, it is accepted that basic awareness-raising may be a necessary first step to increasing adoption of, and improved attitudes towards, beneficial management practices. Stakeholders thought that regulation offered the least requirement for additional advisory services, but also provided the least opportunity to exploit market-based benefits.

Overall, the state-funded agri-environmental voluntary incentive approach was the policy option indicated by farmers as offering the most potential benefit to them. The responses were more mixed among stakeholders, with both of the voluntary approaches considered to provide more benefits to farmers than regulation.

Additionally, the stakeholder survey asked respondents to rank the three policy options (one being the most beneficial and three being the least) in terms of their ability to deliver wider societal benefits (see Table 3). The most beneficial option on each of the evaluation criteria is indicated in green and the least beneficial option is indicated in red.

Table 3. Views of stakeholders on the approach that would deliver the most societal benefits

	Regulation	Voluntary	Certification
Coherence with other EU tools (such the EU organic certification label or ECOLabel)	1.7	2.2	2.0
Coherence with EU climate change policy	1.3	2.1	2.5
Make use of mitigations deeper and more widespread	1.8	2.2	1.9
Greater likelihood of use of the carbon calculator	1.8	2.2	1.9
Feasibility of monitoring and control to check compliance with rules	2.0	2.2	1.7
Lower societal administrative cost	2.3	2.4	1.3

Values are mean rank scores (1-3), where lower scores indicate greater benefits (positive)

Regulation was the policy option indicated by stakeholders to have the potential to deliver the most societal benefits overall, although the certification scheme approach was thought to have the potential to perform better on the issue of feasibility of monitoring and control, and to have the lowest societal administrative costs. The approach indicated to offer the least potential to provide societal benefits overall was the voluntary incentive approach by some margin.

Farmers were asked to indicate the strengths and weaknesses of the three different policy options in accomplishing certain objectives via promoting the use of the carbon calculator.

Table 4 presents these results with the strongest options indicated in green and the weakest options indicated in red.

Table 4. Farmer views on the strengths and weaknesses of policy options for promoting the use of the carbon calculator, increasing environmental awareness and driving mitigation

	Regulation	Voluntary	Certification
Encourage use of CC	2.0	1.7	2.0
Increasing environmental awareness	1.9	1.8	2.1
Driving GHG mitigation	1.7	2.4	1.6

Values are mean rank scores (1-3), where lower scores indicate greater benefit (positive)

Farmers responded that the voluntary agri-environment approach was, broadly, the best option for encouraging use of the carbon calculator and increasing environmental awareness. The certification approach was thought best for driving GHG mitigation. However, the voluntary approach was considered weakest in being able to drive GHG mitigation, presumably because of the more limited geographic coverage.

The stakeholders were asked the same question regarding the strengths and weaknesses of each policy option in delivering benefits via use of the carbon calculator; unfortunately, rather than quantitatively ranking the strongest to weakest on each issue, they gave qualitative responses. The main findings are discussed in the following subsections. Additionally, both farmers and stakeholders were asked to make general comments on the policy options (e.g., relating to the main barriers to use of the carbon calculator by farmers regardless of policy option). These comments are also incorporated into the subsections below, which examine the perceived strengths and weaknesses (from both the farmer and stakeholder perspective) of each policy option in turn.

3.3.1 Strengths and weaknesses of regulation or cross-compliance-based obligations

Summary

In general, farmers and stakeholders highlighted the following strengths with regard to regulation as a policy option to encourage use of the carbon calculator and drive GHG mitigation:

- coherence with EU climate change policy
- its ability to ensure broad farmer participation; and
- wide application of mitigation practices

This increased uptake would be accomplished independently of additional financial incentives as well. The weaknesses of the regulatory approach centred upon:

- its limited ability to increase environmental engagement due to farmers seeing it as just another environmental compliance obstacle (in fact, farmers might actually be

less personally engaged with the issue of climate change mitigation if the carbon calculator were forced upon them)

- high societal administrative cost

Additionally, implementation of the carbon calculator may be too difficult or financially infeasible for small farmers, thereby potentially taking small low-income farming operations out of the CAP system due to non-compliance.

Detailed analysis

Table 5. Strengths and weaknesses of cross-compliance based obligations (views by farmers and stakeholders) based on different evaluation criteria

	Strengths	Weaknesses
<i>Encouraging use of the carbon calculator</i>	<ul style="list-style-type: none"> • High rates of farmer participation • Not dependent on additional financial resources • Rapid uptake (once the policy implemented) 	<ul style="list-style-type: none"> • Seen as imposed or just another “environment-related constraint” • Additional costs of uptake may be prohibitive for small low-income farmers • Coverage and effectiveness may be reduced by the large number of small-scale specialty farmers outside of CAP system (although the other two options are unlikely to perform better on this point)
<i>Increasing environmental awareness</i>	<ul style="list-style-type: none"> • More potential to increase the overall awareness of agriculture’s contribution to climate change 	<ul style="list-style-type: none"> • Seen as too complex and just fulfilling the legal requirement • A requirement is not a motivation (may not increase environmental engagement)
<i>Driving GHG mitigation</i>	<ul style="list-style-type: none"> • Broadest potential scope for carbon mitigation • Can be used to provide a clear baseline for improvements 	<ul style="list-style-type: none"> • If standards are set too low, real environmental improvements may not be gained

Strengths

- Making carbon measurement a mandatory part of cross-compliance would ensure high rates of farmer participation. Regulation would fill the gap in action between farmers already employing climate-friendly practices and those cynical about the benefits of carbon foot-printing.
- Adoption of the carbon calculator would not be dependent upon the provision of additional financial resources by the state (beyond compliance monitoring and administration) but rather the cost of compliance would fall on the farmer.

- With the broadest scope of participation, regulation may have more potential to increase the overall awareness of agriculture's contribution to climate change. However, as indicated above, stakeholders commented that requiring farmers to complete certain actions does not equate to farmers independently wanting to address the problem.
- Regulation through cross-compliance would provide the highest level of coverage (number of farmers and total land area) and therefore more potential scope for carbon mitigation.
- Provides a clear formal basis from which to set targets, implement requirements, and monitor change across the EU⁵.

Weaknesses

- Reluctance from farmers if use of the carbon calculator is seen as imposed or just another “environment-related constraint”; thus, disengagement from the issues and increased motivation for avoidance.
- May be seen as too complex and just fulfilling the legal requirement (or completing one more “tick the box” activity) rather than increasing environmental awareness.
- Because all farmers wishing to receive direct CAP payments would need to use the carbon calculator, the additional costs of uptake may be prohibitive for small low-income farmers, thereby reducing their support and possibly jeopardizing their business due to non-compliance with CAP cross-compliance standards.
- Many farmers (e.g., small-scale horticulturalists) do not receive CAP direct aid and therefore are not subject to cross-compliance conditions. This would potentially reduce coverage and effectiveness since farmers outside the scheme would not be incentivized to use the carbon calculator.
- If the cross-compliance standards are set too low (e.g., for political feasibility reasons), then implementation of the carbon calculator could end up making no real environmental improvements.

3.3.2 Strengths and weaknesses of state-funded agri-environmental voluntary incentive scheme

Summary

Farmers and stakeholders generally pointed to the strength of the agri-environmental voluntary incentive schemes to encourage use of the carbon calculator through connecting a financial benefit to its use and to the uptake of mitigation measures. Also, they identified its ability to increase environmental awareness of farmers who participate, though since it is voluntary this would likely be a smaller group of farmers that are already somewhat

⁵ However, target setting can also be done in the voluntary approaches.

interested in the environmental effect of their practices. The weaknesses of this policy option focused on the fact that extra financial resources are necessary to encourage the calculator's use and for mitigation measures to be adopted, as well as the fact that any mitigation achieved may be reversed if the provision of resources stops in the future. Again, the fact that those already interested in environmental issues may be those voluntarily participating would raise concerns that the "problem cases" are not being addressed.

Detailed analysis

Table 6. Strengths and weaknesses of state-funded agri-environmental schemes (views by farmers and stakeholders)

	Strengths	Weaknesses
<i>Encouraging use of the carbon calculator</i>	<ul style="list-style-type: none"> • Incentive increases acceptance • Demand from use comes from farmers themselves • Allows for step-by-step implementation of the carbon calculator 	<ul style="list-style-type: none"> • Contingent on additional financial resources (incentive) • If incentive too low, may not justify additional burden on business • Potentially low rate of participation
<i>Increasing environmental awareness</i>	<ul style="list-style-type: none"> • Fewer users but higher interest and potentially greater impact • Allows for a multi-functional approach to reduce environmental impact of farming • Lower requirement for additional advisory services 	<ul style="list-style-type: none"> • Participants may be those already 'engaged' with the environment • Farmers could simply sign up for another income stream
<i>Driving GHG mitigation</i>	<ul style="list-style-type: none"> • Fits with other farmer support mechanisms 	<ul style="list-style-type: none"> • Risk of reversed practices if incentives cease (gains may not be permanent) • Less land covered so less potential for mitigation • Incentive to claim GHG reductions in a non-optimal way

Strengths

- Incentives would offset the costs of using the carbon calculator and increase acceptance.
- Demand comes from the farmers wanting to "green" their operations themselves rather than a compulsory norm.
- The voluntary approach allows for introduction of the carbon calculator step-by-step (e.g., creates GHG champions that can have a trickle-down effect on peers).
- May result in a smaller circle of users, but they will be more interested and effects may be greater than if users are just meeting a mandatory baseline.

- Agri-environmental voluntary incentive schemes could take a multi-functional approach and offer the best potential to emphasize increasing the efficiency of farming (increased outputs with simultaneously reduced inputs and lower environmental impact) in light of the increasing shortage of land and resources.
- Farmers would need support to understand the benefits behind the carbon calculator, but may potentially require less additional advisory services since those participating would likely already use advisory assistance for agri-environmental scheme participation.
- Fits with other farmer support mechanisms, so the uptake of mitigation measures will not be in conflict with other agri-environmental commitments.

Weaknesses

- Participation might be driven by financial incentives rather than a desire to see GHG emission reductions, so the availability and provision of additional financial resources would be necessary.
- Financial incentive may be too small to justify additional administrative burden on the business (in which case participation rates will be very low).
- Participation is voluntary, so for the reason identified above, participation rates might be low.
- Participants would likely be farmers already aware of, and engaged with, climate change, thereby reducing the effectiveness of this option at increasing awareness amongst farmers more widely (“problem cases” are excluded).
- Risk of reversed mitigation practices if incentives cease.
- The area of land covered by use of the carbon calculator will necessarily be less than under the cross-compliance approach since participation is voluntary, so the potential amount of GHG mitigation would be lower.
- May be an incentive to use the carbon calculator in a non-optimal way in order to maximize scheme benefits and claim more emissions reductions.

3.3.3 Strengths and weaknesses of certification

Summary

Stakeholders and farmers identified the main strengths of the certification scheme policy option as being that: (i) participation is voluntary; and (ii) use is encouraged through demonstrated benefits connected to use of the calculator and adoption of GHG mitigation measures. Because there would be measurement and tracking of some kind in order to achieve certification, the respondents also highlighted that this has strong potential to drive actual GHG mitigation. The weaknesses are that it is dependent upon market demand for environmental goods in order to provide enough incentive for farmers to adopt different

practices and invest in certification. Increasing environmental awareness of farmers may be limited in voluntary schemes since those likely to participate are either already interested in the environmental effects of their production or simply participating for the financial benefit.

Detailed analysis

Table 7. Strengths and weaknesses of certification (views by farmers and stakeholders)

	Strengths	Weaknesses
<i>Encouraging use of the carbon calculator</i>	<ul style="list-style-type: none"> • Certification scheme benefits are familiar to farmers • Participation is voluntary rather than compulsory • Best at engaging farmers positively and increasing consumer awareness of agriculture's role in reducing environmental impact 	<ul style="list-style-type: none"> • May be cost-prohibitive for low-income farmers • Lower rates of participation (areas of land covered) • Dependent on market demand for environmental goods • May conflict with or provide less incentive than private supply chain schemes • Additional costs with uncertain financial return from market
<i>Increasing environmental awareness</i>	<ul style="list-style-type: none"> • Fewer users but higher interest and potentially greater impact 	<ul style="list-style-type: none"> • May only participate for financial incentive • Participants may be those already implementing good practices so no increased awareness • Retailer/buyer might demand it
<i>Driving GHG mitigation</i>	<ul style="list-style-type: none"> • Participation could be increased due to peer/public pressure • More farmer initiative and potential for greater impact in the long term • Offers a way to see changes and contribute to lessening the impact of the farming sector through market demand for environmental goods 	<ul style="list-style-type: none"> • May not be feasible for all producers and thereby reduce scope of coverage

Strengths

- Certification schemes are known and understood by farmers, especially the market-based benefits offered, so acceptance of the carbon calculator may be increased.
- Participation is voluntary and thus farmer-driven.
- May engage farmers positively on climate change as a way to be part of the solution rather than problem, it is the best at disseminating farmers' environmental awareness to the broader market, and certifications may raise awareness among consumers as well.

- Those participating may be more engaged; this would result in more extensive use of the carbon calculator and mitigation options than if use was a mandatory requirement.
- Since scheme participation is a matter of public record (i.e., farmers' products are labelled or not), feedback from peers or the public could drive further mitigation and increase the number of users.
- Farmers would be the ones driving GHG mitigation forward in the long-term (not reliant on availability of funds, or public bodies setting ever-higher targets).
- Offers a mechanism through which the wider society can drive increasing change since certifications allow consumers to see implementation and changes in farming sector's impact. This would depend, however, upon clear communication of the mitigation practices and benefits behind the certification so that it does not just become another logo among many, i.e., differentiation would be lost.

Weaknesses

- Costs behind certification schemes may prevent low income farmers from participating.
- Since participation is voluntary, the number of farms participating and land covered by the scheme would be limited, subject to the demands of the market and consumer awareness; so if there is insufficient market demand, there is no incentive for farmers to participate and add burden or cost to business.
- May conflict with private sector demands from retailers/suppliers for their own certification schemes.
- Certification would likely pose additional costs for farmers in private and unsubsidised state-run schemes.
- May be seen as a “tick the box” exercise if farmers just participate for the market incentive and do not receive environmental awareness support.
- May include participants who already implement practices good for GHG mitigation, thereby excluding the “problem cases”.
- Excessive numbers of different certifications (e.g., European, national, regional, local, public/private) risk confusing consumers.
- Certification schemes may not be viable for famers engaged in bulk commodity production but instead favour premium producers, thereby reducing the scope of coverage and mitigation potential.

3.4 Potential design of an effective certification scheme involving use of the CC

Farmers and stakeholders were asked to think about a number of issues relating to the use of certification schemes in order to ascertain what would be the best possible design for a low carbon farming certification scheme, i.e., assuming that this was the policy option chosen by policy makers to increase use of the carbon calculator and uptake of GHG mitigation measures. A series of statements, or propositions, were made about a certification scheme-backed carbon calculator, and farmers and stakeholders were then asked to indicate the extent to which they agreed with each proposition using a five-point Likert Scale. The detailed farmer and stakeholder rankings are presented below, in table form, together with a summary of the outcomes.

Level of farmer interest in a low carbon farming certification scheme

Of the 60 farmers that provided an answer, ten strongly agreed and 25 somewhat agreed that they would prefer to use a low carbon farming certification scheme as a means to implement mitigation measures. The 33 responding stakeholders mirrored farmer preferences. However, this question did not allow farmers to express a preference for certification in comparison with voluntary or regulation approach. The result, i.e., the lack of universal support for the certification approach, suggests that certification is not the overwhelming preference for farmers, but that they would be willing to consider it.

Table 8. Level of farmers' interest in a low carbon farming certification scheme (number and percentage of the 60 farmers and 33 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	I would prefer to use a low carbon farming certification scheme in order to implement mitigation measures	10 17.0%	25 42.0%	14 23.0%	9 15.0%	2 3.0%
Stakeholder	In order to implement mitigation measures, a low carbon farming certification scheme is the approach farmers will prefer (frequency selected)	11 33.3%	8 24.3%	6 18.2%	5 15.2%	3 9%

Missing: farmers = 0; stakeholders = 4.

Who should run the certification scheme?

A large majority of farmers and stakeholders who responded to this question indicated that any certification scheme involving the use of the carbon calculator should be voluntary.

Table 9. Who should run the certification scheme (number and percentage of the 58 farmers and 25 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Any certification scheme involving the use of the calculator should be voluntary.	27 46.6%	21 36.2%	3 5.1%	4 6.9%	3 5.2%
Stakeholder		14 56.0%	4 16.0%	1 4.0%	4 16.0%	2 8.0%

Missing: farmer = 2; stakeholder = 12.

There was more variation in responses from both groups regarding whether the certification scheme should be privately operated rather than state run. Thirty-one of the 60 farmers responding to this question agreed it should be privately run. Stakeholders were split with 16 of the 28 respondents agreeing it should be privately run whereas ten disagreed.

Table 10. Operation of the scheme (number and percentage of the 58 farmers and 28 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Any certification scheme involving the use of the calculator should be privately operated rather than state run.	15 25.9%	16 27.6%	13 22.4%	7 12.1%	7 12.1%
Stakeholder		12 42.9%	4 14.3%	2 7.0%	5 17.9%	5 17.9%

Missing: farmers = 2; stakeholders = 9.

Would farms of all economic scales have equal access to a certification scheme?

Around half of farmers responded that low income farmers would not be able to afford to participate in certification schemes for low carbon farming. This mirrored the responses of stakeholders, who were also fairly evenly distributed across the board on this issue, with a slight majority agreeing that low income farmers might be disadvantaged.

Table 11. Equal access to the scheme (number and percentage of the 59 farmers and 27 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Low income farmers cannot afford to participate in certification schemes for low carbon farming.	13 22.1%	17 28.8%	10 16.9%	13 22.1%	6 10.1%
Stakeholder		4 14.8%	8 29.7%	7 25.9%	4 14.8%	4 14.8%

Missing: farmers = 1; stakeholders = 10.

The role of public subsidy in the certification scheme

Farmers are strongly in agreement that farmers should receive some type of compensation for participation in a certification scheme. The statement that farmers should receive a one-off capital grant to cover the start-up costs needed to join a certification scheme involving the use of the carbon calculator received 45 positive responses from 57.

Table 12. The role of public subsidy in the certification scheme (number and percentage of the 57 farmers and 27 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Farmers should receive a one-off capital grant to fund the start-up costs of joining a certification scheme involving use of a carbon calculator.	23 40.4%	22 38.5%	3 5.3%	5 8.8%	4 7.0%
Stakeholder		3 11.1%	8 29.6%	7 25.9%	6 22.3%	3 11.1%

Missing: farmers = 3; stakeholders = 10.

The proposal that farmers should be paid on an ongoing basis to compensate for additional administrative costs of certification was also heavily subscribed to with 48 responses of 58.

Table 13. Basis of compensation – administrative costs (number and percentage of the 58 farmers and 30 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Farmers should be paid on an ongoing basis to compensate for the additional administrative costs of certification.	30 51.7%	18 31.1%	6 10.3%	3 5.2%	1 1.7%
Stakeholder		5 16.7%	7 23.2%	5 16.7%	8 26.7%	5 16.7%

Missing: farmers = 2; stakeholders = 7.

The proposition that farmers should be paid compensation for any mitigation options they undertake under a certification scheme received 50 positive responses. Stakeholder responses were also broadly in favor of ongoing compensation for additional administrative costs or mitigation options undertaken.

Table 14. Basis of compensation – mitigation actions (number and percentage of the 58 farmers and 29 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Farmers should be paid compensation for any mitigation options that they undertake under a certification scheme.	26 44.8%	24 41.4%	5 8.6%	2 3.4%	1 1.8%
Stakeholder		10 34.5%	5 17.2%	8 27.6%	3 10.3%	3 10.3%

Missing: farmers = 2; stakeholders = 8.

A low carbon farming logo

A little over half of farmers agreed that certification schemes for low carbon farming should be accompanied by a new EU-wide low carbon farming logo. For stakeholders, 19 of the 32 respondents agreed that a new EU-wide logo should be created for the certification schemes.

Table 15. Low carbon farming logo (number and percentage of the 60 farmers and 32 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Certification schemes for low carbon farming should be accompanied by a new EU-wide low carbon farming logo.	12 20.0%	21 35.0%	14 23.3%	10 16.7%	3 5.0%
Stakeholder		16 50.0%	3 9.4%	6 18.8%	4 12.4%	3 9.4%

Missing: farmers = 0; stakeholders = 5.

A significant majority of farmers agreed that certification schemes for low carbon farming should, where possible, use existing national logos recognized at European level. For stakeholders there was no clear decision on whether certification schemes should use national logos, with 15 disagreeing and 11 agreeing. These last two sets of data suggest that neither farmers nor stakeholders have strong preferences for either EU-level or national logos. Of much more importance would be that whoever supplies the logo, it is understood and accepted by consumers.

Table 16. Role of national logos (number and percentage of the 59 farmers and 31 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Certification schemes for low carbon farming shall where possible use existing national logos recognised at European level.	10 16.9%	23 39.0%	19 32.2%	4 6.8%	3 5.1%
Stakeholder		3 9.7%	8 25.8%	5 16.1%	5 16.1%	10 32.2%

Missing: farmers = 1; stakeholders = 6.

Advisory service support

The large majority of farmers agree that farmers will require help from advisory services to use the calculator or meet the requirements of the certification scheme, and almost all farmers were of the view that advisory services should be free at point of use (i.e., publicly supported). Twenty-four stakeholders (out of 27) also agree that farmers will require help from advisory services.

Table 17. The role of advisory services (number and percentage of the 58 farmers and 27 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Farmers will require help from advisory services to use the calculator or meet the requirements of the certification scheme.	19 32.8%	28 48.3%	5 8.6%	5 8.6%	1 1.7%
Stakeholder		11 40.7%	13 48.1%	2 7.4%	1 3.7%	0 0.0%

Missing: farmers = 2; stakeholders = 10.

Of the 28 stakeholders who responded to the question regarding whether the advisory services should be free at point of use, 17 responded that they strongly agree, or somewhat agree, with only four suggesting that it should not be free.

Table 18. Cost of advisory services (number and percentage of the 59 farmers and 28 stakeholders who responded to the question)

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer	Advisory services should be free at point of use (i.e., publicly supported).	34 (57.6)	21 (35.6)	2 (3.4)	1 (1.7)	1 (1.7)
Stakeholder		10 (35.7)	7 (25.0)	7 (25.0)	4 (14.3)	0 (0.0)

Missing: farmers = 1; stakeholders = 9.

Basis for qualifying for certification

Of the 58 farmers that responded to the question of whether certification should be based on comparison of the farm's carbon footprint with a reference level specific for different types of farms, 47 agreed it should be. Slightly fewer farmers (44) responded positively to the suggestion that certification should be based on adoption of specified farming practices (mitigation options). Only 34 farmers responded positively to the notion that certification should be based on a minimum decrease of emissions from the level observed at the point of joining the scheme. Thus, the share of farmers showing no preference was much higher in for the last proposition.

Table 19. Basis for qualifying for certification – farmers

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer <i>Missing = 2.</i>	Certification should be based on comparison of farm carbon footprint with a reference level specific for different types of farm.	21 36.2%	26 44.8%	7 12.1%	4 6.9%	0 0.0%
Farmer <i>Missing = 1.</i>	Certification should be based on adoption of specified farming practices (mitigation options).	28 47.5%	16 27.1%	11 18.6%	4 6.8%	0 0.0%
Farmer <i>Missing = 2.</i>	Certification should be based on a minimum decrease of emissions from the level observed at the point of joining the scheme.	14 24.1%	20 34.4%	16 27.6%	5 8.6%	3 5.1%

The majority of stakeholders agreed with the suggestion that certification should be based on a comparison of the farm's carbon footprint with some specified reference position. Approval was even more marked for the notion that certification should be based on adoption of specified farming practices or mitigation options. However, stakeholders were evenly split over whether certification should be based on a minimum decrease of emissions from the level observed at the point of joining the scheme.

Table 20. Basis for qualifying for certification – stakeholders

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Stakeholder <i>Missing = 9.</i>	Certification should be based on comparison of farm carbon footprint with a reference level specific for different types of farm.	10 35.7%	9 32.1%	5 17.9%	2 7.1%	2 7.1%
Stakeholder <i>Missing = 7.</i>	Certification should be based on adoption of specified farming practices (mitigation options).	11 36.7%	12 40.0%	4 13.3%	1 3.3%	2 6.7%
Stakeholder <i>Missing = 4.</i>	Certification should be based on a minimum decrease of emissions from the level observed at the point of joining the scheme.	3 9.1%	8 24.2%	7 21.2%	9 27.3%	6 18.2%

General

The general question of whether certification of the farm (i.e., verifying the farm carbon footprint) should be done by an independent third-party organization was accepted by the vast majority of farmers and stakeholders. Farmers also agreed that a standalone farm-based certification scheme is preferable to a scheme covering the whole food chain (i.e., a “farm to fork” scheme). Similarly, 33 farmers of 58 agreed that a certification scheme can generate additional income for the farmer.

Table 21. Certification general characteristics – farmers

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmer <i>Missing = 2.</i>	The certification of the farm (i.e., verifying the farm carbon footprint) should be done by an independent third-party organisation.	28 48.3%	21 36.2%	5 8.6%	4 6.9%	0 0.0%
Farmer <i>Missing = 3.</i>	A stand alone farm-based certification scheme is preferable to a scheme covering the whole food chain, i.e., “farm to fork”.	22 38.6%	16 28.1%	13 22.8%	4 7.0%	2 3.5%
Farmer <i>Missing = 2.</i>	A certification scheme can generate additional income for the farmer	12 20.7%	21 36.2%	13 22.4%	9 15.5%	3 5.2%

Of the 29 stakeholders responding to the question of whether a standalone scheme is preferable to a farm-to-fork scheme, there was a slim majority in favour of the proposition. On the question of whether a certification scheme could generate additional income for the farmer, the great majority agreed it could with 31 stakeholders were in agreement and only seven stakeholders disagreeing.

Table 22. Certification general characteristics – stakeholders

		Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Stakeholder <i>Missing = 11.</i>	The certification of the farm (i.e. verifying the farm carbon footprint) should be done by an independent third-party organisation.	16 61.5%	6 23.1%	1 3.8%	2 7.7%	1 3.8%
Stakeholder <i>Missing = 8.</i>	A stand alone farm-based certification scheme is preferable to a scheme covering the whole food chain, i.e., “farm to fork”.	7 24.1%	8 27.6%	5 17.2%	6 20.7%	3 10.3%
Stakeholder <i>Missing = 6.</i>	A certification scheme can generate additional income for the farmer	4 12.9%	11 35.5%	9 29.0%	4 12.9%	3 9.7%

4. Conclusions

The survey shows significant variation in the attitudes towards, and perceptions of, different policy options in terms of their potential to promote the use of the carbon calculator and low carbon farming practices. This is not surprising given the diversity and geographic spread of the survey sample. Some conclusions are presented below, drawing on the results discussed above and further suggestions that were made by respondents in the final open-ended question of the questionnaires.⁶

Promoting the carbon calculator through cross-compliance, i.e., a mandatory requirement for receipt of CAP payments, is not a preferred option among farmers. Both agri-environment schemes (supported through rural development programs) and voluntary low carbon farming certification schemes, are seen, when supported by sufficient technical advice, to be offering greater benefits to the farmer. Because of this, these two approaches are perceived as being more effective in changing farmer management practices through demonstrated business benefits of improved environmental practice. Such practices can include increasing soil organic matter, water management, biodiversity, carbon storage, and prevention of nutrient losses. Nonetheless, it is accepted that many farmers may not adopt the carbon calculator under the voluntary approaches for a number of reasons, including that the additional cost burdens outweigh the benefits, a high level of cynicism about the benefits of carbon foot-printing, and the perception that greenhouse gas accounting is generally incomplete, for example, due to lack of knowledge of soils' carbon cycles.

There is a strong opinion that the burden imposed by use of the carbon calculator and implementation of mitigation options is too great for smaller farms. It is therefore proposed that, where use of the carbon calculator is linked to cross-compliance, a farm size threshold could be applied to make the carbon calculator use compulsory (e.g., obligatory for farms over 100 or 200 hectares and voluntary for smaller farms).

Given the diversity of opinions, a wider consultation may be needed to discern the preferred policy option. Moreover, the responses towards individual options may differ based on the actual detailed design of each approach (for example, how the baseline is set within cross-compliance, and how the additional requirements in agri-environment measures are defined). In this survey, respondents were not able to respond to such a detailed design and some stakeholders pointed out that a lot of critical issues depend strongly on the exact design of the different policy options.

It may also be that a combination of approaches, each with a different focus, could address the disadvantages while making the most of strengths of the different options. For example, the cross-compliance mechanism could be used for focusing on selected practices which are proven to have significant effects across the EU (many of these are already effectively incorporated in the current or proposed Good Environment and Agricultural Condition standards). The carbon calculator could be compulsory for farms over a certain size, or farms which receive a larger sum of CAP payments. To complement this, the agri-environment scheme approach could be used for promoting the carbon calculator among the smaller farms, or to increase awareness and target priority sectors or geographic areas

⁶ Question 20 of the farmer questionnaire and Question 15 on stakeholder questionnaire.

(e.g., the methane emissions in the dairy sector, or arable farms in areas with carbon rich soils). Certification schemes could be encouraged (and partially supported once established) but allowed to develop independently, perhaps driven by the retail sector. A key issue here would be the setting of the size threshold(s) under cross-compliance, which would need to consider some combination of area coverage (in ha) as well as economic intensity (economic size units) to account, for example, for highly intensive farming, e.g., indoor-reared livestock, or horticulture under glass.

In the case of a low carbon farming certification, the survey shows that certification would need to be voluntary and run privately in order to achieve acceptance. In terms of the role of public subsidies in the certification schemes, one-off establishment grants and ongoing compensation for administrative costs and mitigation action should be put in place. An EU-wide low-carbon farming logo, in conjunction with existing national logos should be used. Advisory support is strongly emphasized, including the need for these to be publicly supported (free at point of use). The basis of certification should be comparison with a reference level of performance specific for different types of farms, or as an alternative it should be based on adoption of specific practices – the latter would be less contested. Basing certification on a minimum decrease of emissions from the level observed at the point of joining the scheme is the least preferred option as this tends to favour the poorer performing farms. The certification evaluations should be carried out by an independent third-party. A farm-to-fork certification scheme is not preferred, but rather it was preferred to be farm-based. A large number of new certifications, as well as compulsory benchmarks on the market (e.g., European, national, regional, local, public/private), may inhibit product differentiation by consumers, so cooperation amongst the different scheme operators, aiming at increasing clarity, would make the certification option more effective. It may also be that some form of a public-private cooperation in setting benchmarks may be beneficial in driving clarity on the market and increase the effectiveness of certification schemes.

Regardless of which of the three proposed policy options is chosen, the coverage should be EU-wide to maximize the benefits of the calculator and reduce any objections among farmers about potential discriminatory effects. However, achievement of such coverage is less likely in the case of a voluntary scheme. Moreover, in all policy options, farm advisory services (preferably free of charge) are seen as essential to increase awareness and the uptake of the carbon calculator, as well as to help increased use of low carbon farming practices. The potential for the use of the calculator and the benefits of the low carbon farming practices need to be promoted. If farmers can see a clear added value in using the calculator, willingness to use this tool would strongly increase. The topic of carbon management is new in many EU countries, even among advisory services, so there is a need to facilitate capacity building among advisory services as well (see Ingram et al., 2012).

To the extent that this is possible without compromising the comprehensiveness of calculations, the data entry for the calculator should be optimized (see also Elbersen et al., 2013) to reduce the administrative burden and increase the uptake among farmers. Facilitating the transfer of existing farm yield data into the carbon calculator is one of the most promising solutions to this challenge.

The carbon calculation needs to be part of a package of conscious improvement of environmental practices among farmers, which also leads to added value that can be

captured by the farmer. An integrated resource protection approach, including water, soil and biodiversity protection (rather than promoting only climate change as a single issue) would be preferable. There is a need to promote farming measures which are multifunctional, i.e., delivering multiple policy objectives. The promotion of the carbon calculator should be undertaken therefore in a broader environmental and economic context, including issues related to soil management, water, and resource use (efficient use of inputs). The approach to promote a carbon calculator and low carbon farming needs to consider potential trade-offs that could occur if GHG mitigation measures were the sole focus, so newly implemented measures must take into account existing obligations (e.g., preservation of biodiversity). This may require further add-ons in the calculator itself to illustrate effects on environmental parameters beyond GHG emissions. Ideally, the calculator would capture some optimization functionality allowing trade-offs of both monetary and non-monetary outputs to be assessed.

It may also be beneficial to focus on opportunities for farms to capture market benefits associated with an improvement in their public image, for example, creating an image of farmers as "climate farmers" (Landwirt als Klimawirt) similar to the image of farmers as energy farmers (Landwirt als Energiewirt). This would require a change in the language used to promote the carbon calculator, emphasising resource efficiency and farm resilience planning as opposed to solely a GHG mitigation focus. Moreover, potential cost savings from mitigation actions and resource use efficiency improvements can be emphasised.

Beyond the three policy options presented in the survey, stakeholder responses also included suggestions for alternative options that would increase ambition for action. Specifically, expanded reporting on greenhouse gas emissions to account for all agriculture-related greenhouse gas emissions and clear policy mandates/targets in the form of binding national or EU reduction targets for all greenhouse gas emissions from agriculture—these would specifically increase the pressure on Member States to take action on agricultural emissions, and by extension also increase the relevance of a carbon calculator. Emissions from land use changes, and cropland and grassland management, are excluded to date in greenhouse gas targets (i.e., land use, land use change and forestry or LULUCF).

Since the completion of the survey, the first step in the direction of more complete monitoring has been taken with the adoption of accounting rules for LULUCF by the European Parliament in March 2013⁷. LULUCF Action plans, however, need to be developed at Member State level. The monitoring requirements might increase the relevance of the carbon calculator in the short-term as it can provide a fundamental basis for monitoring GHG and reducing land-based emissions. No binding targets will be set until sufficient experience is gained with the accounting process and methodology. When these targets are being set, one possible option is to set reference levels and a general framework for implementation of the carbon calculator and corresponding GHG mitigation measures. Specific standards could be adapted for each subsector (e.g., dairy sector versus the grain producing sector).

The survey also raised the issues of the need to create a level playing field between EU and imported products and to not offset emissions abroad.

⁷ http://ec.europa.eu/clima/news/articles/news_2013031201_en.htm

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Annex 1: Description of methodological approaches in case study countries

In all countries the farmers that were approached for the testing of the carbon calculator were also asked to participate in the survey of policy options. The survey of policy options was administered either after farmers had already supplied data for the calculator, or at a workshop to describe the calculator, or by means of separate email or telephone interview. The sections below describe the approach used for both the testing of the calculator and the administration of the policy options survey in each study country.

Germany

In order to identify potential farmers in Brandenburg, five farm advisors (which give advice to conventional and/or organic farms) were consulted. About 15 contacts were provided by these farm advisors. Further contacts were identified through previous research projects, recommendations from the farmers themselves, and a web search (e.g., organic farming associations).

In total, 35 farmers were contacted via e-mail and telephone; only 12 agreed to participate in the surveys and/or workshop. In addition to the telephone interviews, a workshop was organised in Berlin on 25 October 2012. At the workshop the calculator was presented to and intensively discussed with the participants. In total, eight farmers registered, but only four farmers attended (despite the fact that the farmers confirmed their participation via telephone shortly before the meeting). In order to achieve the maximum of ten farmer surveys, the farmers not present at the workshop were interviewed by telephone. Overall, 12 farmer surveys were completed. Of those 12, only two provided the data requested to fill in the carbon calculator. The carbon calculator was only presented to those farmers participating in the workshop. The farmers interviewed by telephone received the list of data requirements and a description of the carbon calculator beforehand.

The reasons given by farmers for not wanting to participate in the testing of the calculator and the policy survey were: lack of time (due to current agricultural activities, marketing, vacation, etc.), or lack of interest in the topic; some other farmers were overwhelmed by surveys and thus not motivated to participate in another survey. The main reason farmers did not want to provide the data for the carbon calculator was the lack of time to fill in the data requirement document (25 pages translated into German).

The willingness of farmers to participate in the survey was much higher among the contacts given by the farm advisors or other farmers.

The consulted farmers represented those which are more advanced in sustainable soil management as well as other members of the farming community who are generally interested in the topic and already aware of climate change and its possible effects in Brandenburg. The farmers cited the more pronounced dry and rainy periods as well as an increasing intensity of precipitation in recent years as evidence of existing climate change impacts. They also revealed that reducing GHG emissions is not of relevance in Brandenburg and that the implementation of suggested measures to improve the GHG balance are linked to increased costs and time investments. It was also mentioned that farms are oriented towards the market and respond to economic demands rather than focusing their efforts on

soil fertility and maintaining the basis for successful soil management. This priority is compounded by the fact that product prices do not reflect increasing costs for the producers, which require the farmer to increase their production levels.

Four stakeholders responded from Germany.

Poland

Farmers in Poland were identified through farm advisors and other personal contacts in the Voivodship of Zachodnio-pomorskie and Wielkopolskie . Farm advisors provided contacts to several farmers and in two cases (in the Voivodship of Wielkopolskie) a farm advisor assisted with the interviews and helped fill in the calculator. Farmers themselves also provided further contacts. Farmers were called by telephone and interview dates were agreed. In addition, contacts from the Baltic Deal project were identified and one farmer who participates in the Baltic Deal project was interviewed.

A total of 14 farmers were contacted by telephone and through the farm advisors. In the end, ten farmers agreed to participate in the survey by means of face-to-face interviews on their farms. Two trips to the two voivodships were organised (one trip to each region) during which farms were visited and farmers were interviewed. During the interviews, the concept of the calculator was presented, and the stakeholder's as well as the farmer's questionnaire were conducted.

All ten farmers took the time to look at the calculator and answer the surveys. Although most farmers (seven out of ten) went through the list of data requirements in detail and were able to express their opinions on the carbon calculator's usefulness and applicability to their farm, only two farmers agreed to provide data on their farm and spend the time to fill in the calculator. This was done with the two farmers in the Voivodship of Wielkopolska, where a farm advisor was present and supported this process (e.g., questions were not clear or estimates had to be provided). The presence of farm advisors was crucial for the willingness of the farmers to provide data and was helpful in understanding and filling in the sometimes complex fields / definitions in the calculator. Unfortunately, on the day of the interview, no results could be produced from the calculator, as some data sets required conversion.

Most farmers refused to fill in the carbon calculator mainly due to time constraints and because they did not see how the calculator would create an added value for their farm. Even those farmers who participated had difficulty understanding the benefit of applying the carbon calculator on their farm and said they would only be willing to use it in the future if financial compensation were given. Only one farmer was interested since he grows mainly energy crops and exports them to countries which partly require CO₂ certification (Germany and the US). The willingness to participate and the reasons why farmers were reluctant to participate can be found in the responses from the farmer interview before and after the use / observation of the calculator.

This experience showed that face-to-face contact with farmers and especially the presence of farm advisors made the interview more successful. Contacting farmers by email, inviting them to a workshop, or conducting interviews by telephone would have been difficult in the Polish setting.

Three stakeholders responded to the survey in Poland.

Slovenia

A farmer workshop was organised as the first workshop in the testing phase of the calculator on 10 October 2012 in Celje, Slovenia. This was organised together with a farm advisor from the Slovenian Advisory Services. At the beginning of the workshop, 17 people were present, some of whom left after the initial presentation. Twelve remained for the whole duration of the workshop. Initially, 12 farmers confirmed attendance (after they were invited and called twice by the advisor); on the day of the workshop, seven of those farmers were present. In addition, five advisors who are also part-time farmers themselves attended as well. The workshop lasted four and a half hours. At the end of the workshop, the farmers also filled out the policy questionnaire.

When farmers were invited to the workshop, they were also asked to indicate if they would be willing to fill out the carbon calculator data and were interested in getting a calculation for their farm. The farmers who attended were relatively interested, or more ‘progressive’ farmers that have established good working relationships with advisers. Six of the 12 farmers that agreed to participate initially said that they were interested in doing a test run with the calculator. Once they saw the data list, however, only one farmer, who was also an advisor (though not specialist advisor) with an organic farm provided the data. The data was very sparse and limited and was improved upon during a subsequent ‘phone call. This was the data set that was used to present the calculator at the workshop. It should be noted that this was also at the stage where the calculator was still proving itself to be unreliable and was not giving clear results, so it was not producing any information on mitigation options.

In general, farmers showed interest in the topic and the calculator itself. They could not use the calculator on their own, but would require the assistance of an advisor. The topic itself is relatively new for the advisors themselves, so in practice a first round of awareness raising would need to take place at the national and regional levels to train the advisers themselves. Translation into Slovenian is an absolute necessity, and some type of fine-tuning to the Slovenian situation if possible as well (to allow for integration with already existing farm data systems).

United Kingdom

For the United Kingdom, a comprehensive sample of 18 farm data sets was collected by means of an on-farm interview. The farm data was directly entered, with the farmer, into the carbon calculator, and to the extent possible, the calculation results were viewed and discussed with the farmer on the farm. Due to technical problems with the carbon calculator performance, for many farms it was not possible to derive (appropriate) mitigation options.

As part of this process, five farmers were willing to respond to the surveys regarding their willingness to use the carbon calculator in the future and the proposed policy options.

Five stakeholders responded to the survey in the UK. One stakeholder was from the agricultural department of the University of Reading. Another stakeholder was classified as providing general agricultural advisory services as Head of Farm Management for SmithsGore. Two other stakeholders were classified as providing specialized agricultural advisory services as Heads of the Environment Division of Promar International and the Director of Increment Ltd, while the fifth provided specialist environmental services to the wider food chain.

Spain

On the basis of the interview outcomes in phase 1 (LOT1), farmers were identified in Castilla y León and Andalucía. In Castilla y León, a case-by-case approach was adopted, while in Andalucía farmer contacts were identified with the help of existing cooperatives. Due to time constraints and overlap with farming activities (sowing), it was extremely difficult to identify and engage farmers to participate.

Since the carbon calculator was not, at the time, fully operative, and anticipating that many farmers would not have the data/would not be willing to participate, interviews were made to collect the required data using a paper questionnaire. During these interviews, the list of questions and possible recommendations was gathered.

In total, the policy option survey was completed by four farmers. Four stakeholder surveys were completed as well.

Netherlands

In the Netherlands, farmers were identified who participate in farm networks and they were invited to a meeting where the carbon calculator would be presented. In the dairy farmers network “*Gezond Zand*”, a meeting with a group of four farmers (three attended) took place on April 10 2013, and four additional farmers were contacted on an individual basis to complete the carbon calculator and questionnaires. We also scheduled a meeting with a group of six dairy farmers (four attended) in Overijssel to represent a size range of farm systems.

At all meetings we presented the concept, principles, and structure of the carbon calculator in a Powerpoint presentation with English screenshots. Farmers had been requested to complete a list of data required for input into the carbon calculator. In most cases, we completed one carbon calculator per meeting to provide an example. We also translated the list of all mitigation options and discussed this list with the group and farmers. Then, farmers were asked to complete a questionnaire on the use of the carbon calculator and its perceived benefits and a second questionnaire on the policy options. Both questionnaires were provided in Dutch. A total of seven farmers responded to our policy options questionnaire, and a total of ten responses to our carbon calculator questionnaire were returned.

Denmark

The Danish farmers included in the survey were identified from the national database of fertiliser accounts. Farm size and livestock numbers were used as selection criteria for potential participants, covering the most important farm types in the region. These included one large pig farm, one small cattle farm, one medium arable farm, one large organic dairy farm, and one large dairy farm. It was decided in advance that one organic farm would be included and that participation in agri-environmental schemes were used as selection criteria. All farmers were male and ranged from 30 to 60 years of age. In total, seven farmers were contacted and five farmers were willing to participate. The farmers agreed firstly to participate in the policy options survey and the LOT2 interview on the carbon calculator. All farmers were visited and interviewed individually on their farms.

The stakeholders included in the analyses were all (except one) derived from previous contacts. The one exception was identified from information on the internet. The stakeholders included two governmental employees (one in the Ministry of Food, Agriculture and Fisheries and one in the Ministry for the Environment), one employee in an environmental NGO, one in a big retail business, and one agricultural advisor trained in farm-level climate checks. All interviews were done by phone.

In general, the interviews were conducted as planned. However, it was clear that the questions related to detailed assessment of the different policy options (stakeholder questions two to five and farmer's questions nine and ten) caused some problems for the interviewed persons. Many found these questions difficult to answer and a few even refused to give answers. The other parts of the questionnaires were more readily answered.

Sweden

The Swedish farmers in the analyses were approached with the help of an advisory office, who provided contact information. Using this approach, all of the five farmers who were approached agreed to participate in the interviews, initially promising to help with the LOT2 questions on the use of the carbon calculator and the policy option questions. Five different farm types were included: one large organic dairy farm, one medium dairy farm, one small cattle farm, one large conventional dairy farm, and one large arable farm. As in Denmark, efforts were made to include an organic farm, whereas participation in agri-environmental schemes or other certification schemes were not taken into account in the selection. All farmers were male and from 30–65 years old.

Two of the five stakeholder interviews were undertaken using previous contacts, while the remaining three were undertaken using recommendations from the first two interviews. The sample includes two governmental (Swedish Board of Agriculture and Swedish Environmental Protection Agency), one involved in a certification scheme, one retail business, and one academic within agriculture. One interview was done in person, the rest were by telephone.

The participating farmers and stakeholders showed the same reservations as the participants in Denmark towards the detailed questions on policy options (stakeholder questions two to five and farmer questions nine and ten).

Annex 2: Farmer questionnaire – Analysis of Policy options for the administration of the carbon calculator

A. Experience of environmental and certification schemes

1- Agri-environmental schemes

Y / N

1a. Are you currently, or have you in the past taken part in agri-environmental schemes?

If you answered 'No' to Q1a, please go to Q1e.

1b. If you answered Yes to Q1a, please tell us the name and purpose of this scheme?

1c Thinking about the scheme that you were (or still are) a member of, did you take up any measures which might reduce greenhouse gas emissions? Please tick all that apply in the list following.

Mitigation action		Tick all that apply
Reduced tillage		
Diversified crop rotation		
Catch crops		
Conversion of arable land to pastures		
Permanent set-aside		
Lower stocking rates		
Winter plant cover		
Biogas production		
Other (please specify)		

1d. If you answered 'yes' to Q1a, please tell us how your participation has influenced your opinion of agri-environment schemes, by indicating your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Participation made me more aware of what I can do for the environment.					
The financial support provided is a fair way to compensate for added costs					
The participation was useful to increase my income					
Implementation and control increased my administrative burden unacceptably					

<p>I am still in a scheme and have no plans to leave (Y/N?).</p> <p>I am not currently in a scheme and I do not wish to do so in future (Y/N?).</p>	Yes	No

1e. If you answered No to Q1a, please explain why you are not interested in participating in an agri-environment scheme?

2- Certification schemes with an environmental focus

Y / N

2a. Have you taken part in certification schemes that have a specific environmental focus (such as European Union organic farming label, European Union ECO label, LEAF label, Global GAP, ISO environmental labelling standards <ADD NATIONAL SCHEMES HERE>)?

If you answered NO to Q2a, please go to Q2c.

2b. If you answered Yes to Q2a, please tell us how your participation in these environmentally-focussed certification schemes has influenced your opinion of certification schemes by indicating your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Membership increased my revenues					
Membership made me more aware about what I can do for the environment					
Implementation and control increased my administrative burden unacceptably					

I am still in a scheme and have no plans to leave (Y/N?).	Yes	No
I am not currently in a scheme and I do not wish to do so in future (Y/N?).		

2c. If you answered No to Q2a, please explain why you are not interested in participating in such a certification scheme?

3- Certification schemes other than environmentally focussed

Y / N

3a. Have you taken part in certification schemes that are focussed on issues other than the environment, such as animal welfare, or local foods (e.g. Farm Assurance, Freedom Foods etc <ADD NATIONAL SCHEMES HERE>)?

If you answered NO to Q3a, please go to Q3c.

3b. If you answered Yes to Q3a, please tell us how your participation in these non-environmentally-focussed certification schemes has influenced your opinion of certification schemes by indicating your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Membership increased my revenues					
Membership made me more aware of the issues addressed by the scheme					
Implementation and control increased my administrative burden unacceptably					

	Yes	No
I am still in a scheme and have no plans to leave (Y/N?).		
I am not currently in a scheme and I do not wish to do so in future (Y/N?).		

3c. If you answered No to Q3a, please explain why you are not interested in participating in such a certification scheme?

Please read:

In order to receive direct support payment under the Common Agricultural Policy, EU farmers have to comply with certain conditions governing how they manage their farm: this is known as Cross Compliance. Cross compliance includes the respect of public, animal and plant health and animal welfare standards as well as Good Agricultural and Environmental Condition (GAEC) which are requirements set by national governments and can vary between countries, but they are generally require farmers to meet minimum standards of farming practice in areas such as: soil protection, grazing pressure, nutrient management etc. Farmers that do not meet cross compliance requirements have their direct payments reduced by a percentage accordingly to the severity of the infringement.

4. Please tell us your views on the linking of Cross Compliance conditions to CAP support payments by indicating your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
It is a fair way to justify the financial support which is given to farmers by the CAP.					
The environmental objectives of cross compliance are clear to me.					
Cross compliance made me more aware about what I can do for the environment.					
Cross compliance made me change certain farming practices.					
It is easy to comply with cross compliance rules.					
Farmer should not have constraints placed on their farming practices.					
The administrative burden of cross compliance is too high to be acceptable.					
Please use this box to provide any further views you have on cross-compliance conditions.					

5. Please tell us your views on climate change by indicating your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Climate changes are not related to human activities					
Climate change will adversely affect agriculture in my country in the future					
There is nothing a farmer can do to mitigate climate change					
There is nothing a farmer can do to adapt to climate change					
In my management decisions I try to lower the production of greenhouse gases.					
I know which kind of farming practices can reduce greenhouse gas emissions					
Mitigation measures will be successful in reducing future climate change					
I know the carbon footprint of my business accurately					

Please use this box to provide any further views you have on climate change.

B. Your interest in, and willingness to use, a carbon calculator and to implement mitigation measures

Y / N

6a. Do you use computer-based software tools in your farming business? (for example, these may include farm records software, fertilizer planning software etc.)

6b. If 'No', why is that?

6c. If you answered 'Yes' to Q6a, which computer-based software tools do you use?

6d. What is the main reason that you to use such tools?

Y / N

6e. Do you require the assistance of a paid/free of charge advisors or technician etc. to use them?

Y / N

7a. Do you already use a carbon calculator on your farm?

If 'Yes' go to Q8

7b. If you are not already using a carbon calculator, please indicate your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I would be happy to use a carbon calculator to get the precise carbon footprint of my farm and identify mitigation options					
I would be happy to use a carbon calculator if one was available for me to be used free of charge					
I would be happy to use a carbon calculator if it was easy to use					
I would be happy to use a carbon calculator if I had a financial benefit for doing so					
If the above conditions for using a carbon calculator are not the most important for you, please tell us what your most important requirements is:					

8. Please tell us your views on the use of a carbon calculator and mitigation measures by indicating your level of agreement with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
A carbon calculator needs data that are not easily available and therefore its use would be time consuming					
I am already supplying data that could be used in a carbon calculator for other purposes, such as official surveys, certification schemes, agri-environment schemes etc.					
I do not think that a tool such a carbon calculator can propose mitigation actions suitable for my farm					
I am already making changes to management practice in order to reduce my carbon footprint					
I would take up mitigation measures if I could get a technical advice on how to implement them					
I would take up mitigation measures only if they are economically feasible or					

if financial support is given to cover added costs					
If I implement mitigation measures I could be rewarded by the consumer and gain better prices					
Implementing mitigation measure is a "civil responsibility" for farmers					

C. Comparing different policy options to increase the use of the carbon calculator and the spread of mitigation measures

A number of different carbon calculators/carbon foot-printing tools are currently available. These are generally operated by private consulting organisations and their use by farmers is generally voluntary. The use of the new EU carbon calculator is seen as a means to increasing farmer awareness of carbon mitigation measures. The more widely the calculator is used, the more awareness will be increased. Therefore, consideration is being given to alternative ways of providing the carbon calculator to farmers to increase use. We would like to have your views on the relative strengths and weaknesses of three of these alternatives. The alternatives are:

1. **Regulation** – use of the carbon calculator would be made a legal requirement, either by regulation, or by incorporating it into CAP cross compliance conditions.
2. **State-funded voluntary incentive schemes** – use of the calculator would be made a requirement of participation in voluntary schemes funded under national rural development programmes.
3. **Certification or assurance schemes** – use of the calculator would be a requirement of one or more privately operated, or state operated, assurance and certification schemes

9. Which policy option (for using the calculator) would offer the most benefit to you?
(Please rank the three options for each 'impact', where 1- the best option, 3-the worst.)

Benefit	Regulation or cross-compliance-based obligation	State-funded voluntary incentive scheme	Certification or assurance scheme
Enhancing your attitude towards low carbon farming			
Increasing your awareness of agriculture's positive/negative contribution to climate change			
Least administrative burden			
Least requirement for additional advisory services			
Penalties for infringements of rules will be least severe			
Lower total additional costs			
Possibilities to obtain market-			

based benefits			
Higher farm Net Margin			

10. What are the main strengths and weaknesses of the three policy options for delivering the carbon calculator?

		Regulation or cross-compliance-based obligation	State-funded voluntary incentive scheme	Certification or assurance scheme
Main strength for:	Encouraging use of the calculator			
	Increasing environmental awareness			
	Driving GHG mitigation			
Main weakness for	Encouraging use of the calculator			
	Increasing environmental awareness			
	Driving GHG mitigation			

D. What might an effective certification scheme involving the use of the carbon calculator look like?

Please indicate your level of agreement with the following statements – you can add further comments in the box following each question.

11. Level of farmer interest in a low carbon farming certification scheme

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I would prefer to use a low carbon farming certification scheme in order to implement mitigation measures					

12. Who should run the certification scheme?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Any certification scheme involving the use of the calculator should be voluntary.					
Any certification scheme involving the use of the calculator should be privately operated rather than state run.					

13. Would farms of all economic scales have equal access to a certification scheme?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Low income farmers cannot afford to participate in certification schemes for low carbon farming.					

14. The role of public subsidy in the certification scheme.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmers should receive a one-off capital grant to fund the start-up costs of joining a certification scheme involving use of a carbon calculator.					
Farmers should be paid on an ongoing basis to compensate for the additional administrative costs of certification.					
Farmers should be paid compensation for any mitigation options that they undertake under a certification scheme.					

15. A low carbon farming logo?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Certification schemes for low carbon farming should be accompanied by a new EU-wide low carbon farming logo.					
Certification schemes for low carbon farming shall where possible use existing national logos recognised at European level.					

16. Advisory service support

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I would require help from advisory services to use the calculator or meet the requirements of the certification scheme.					
Advisory services should be free at point of use (i.e. publicly supported).					

17. On what basis should qualification for certification be made?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Certification should be based on comparison of farm carbon footprint with a reference level specific for different types of farm.					
Certification should be based on adoption of specified farming practices (mitigation options).					
Certification should be based on a minimum decrease of emissions from the level observed at the point of joining the scheme.					

18. General

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
The certification of the farm (i.e. verifying the farm carbon footprint) should be done by an independent third-party organisation.					
A stand alone farm-based certification scheme is preferable to a scheme covering the whole food chain i.e. "farm to fork".					
A certification scheme can generate additional income for the farmer					

19. What would be the main barriers to your use of the calculator and to uptake the mitigation measures (regardless of policy options)?**20. Do you have any other opinions on this subject that you have not been able to express thus far?**

Annex 3: Stakeholder consultation document – Analysis of Policy options for the administration of the carbon calculator

A. About you

- 1. Which of the following classifications best describes the services that you, or your employer offer?**

	<u>Please tick one</u>
Consultancy services:	
General agricultural advisory services	
Specialist agricultural advisory services	
Specialist environmental services	
Agricultural Trades Association	
Retailer or food chain business	
Certification scheme operator	
Academic or training services	
Government	

B. Comparing different policy options to increase the use of the carbon calculator and the spread of mitigation measures

A number of different carbon calculators/carbon foot-printing tools are currently available. These are generally operated by private consulting organisations and their use by farmers is generally voluntary. The use of the new EU carbon calculator is seen as a means to increasing farmer awareness of carbon mitigation measures. The more widely the calculator is used, the more awareness will be increased. Therefore consideration is being given to alternative ways of providing the carbon calculator to farmers to increase use. We would like to have your views on the relative strengths and weaknesses of three of these alternatives. The alternatives are:

4. **Regulation** – use of the carbon calculator would be made a requirement, either by regulation, or by incorporating it into CAP cross compliance conditions.
5. **State-funded voluntary incentive schemes** – use of the calculator would be made a requirement of participation in voluntary schemes funded under national rural development programmes.
6. **Certification or assurance schemes** – use of the calculator would be a requirement of one or more privately operated, or state operated, assurance and certification schemes

2. Which policy option (for using the calculator) would offer the most benefit to the farmer? (Please rank the three options for each 'impact', where 1- the best option, 3-the worst.)

Benefit to farmer	Regulation or cross-compliance-based obligation	State-funded voluntary incentive scheme	Certification or assurance scheme
Enhanced attitude towards low carbon farming			
Greater awareness of agriculture's positive/negative contribution to climate change			
Least administrative burden			
Least requirement for additional advisory services			
Penalties for infringements of rules will be least severe			
Lower total additional costs			
Possibilities to obtain market-based benefits			
Higher farm Net Margin			

3. Which policy approach (for using the calculator) would deliver the greatest societal benefits? (Please rank the three options for each 'impact', where 1- the best option, 3-the worst.)

Societal benefit	Regulation or cross-compliance-based obligation	State-funded voluntary incentive scheme	Certification or assurance scheme
Coherence with other EU tools (such the EU organic certification label or ECOLabel)			
Coherence with EU climate change policy			
Make use of mitigations deeper and more widespread			
Greater likelihood of use of the carbon calculator			
Feasibility of monitoring and control to check compliance with rules			
Lower societal administrative cost			

4. What are the main strengths and weaknesses of the three policy options for delivering the carbon calculator?

		Regulation or cross-compliance-based obligation	State-funded voluntary incentive scheme	Certification or assurance scheme
Main strength for:	Encouraging use of the calculator			
	Increasing environmental awareness			
	Driving GHG mitigation			
Main weakness for	Encouraging use of the calculator			
	Increasing environmental awareness			
	Driving GHG mitigation			

5. In overall terms, which of the three policy options offers the potential for delivering most benefits? (Please rank the three options for each 'impact', where 1- the best option, 3-the worst.)

Most benefits	Regulation or cross-compliance-based obligation	State-funded voluntary incentive scheme	Certification or assurance scheme
To the farmer			
To wider society			

B. What might an effective certification scheme involving the use of the carbon calculator look like?

Please indicate your level of agreement with the following statements – you can add further comments in the box following each question.

6. Level of farmer interest in a low carbon farming certification scheme

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
In order to implement mitigation measures, a low carbon farming certification scheme is the approach farmers will prefer					

7. Who should run the certification scheme?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Any certification scheme involving the use of the calculator should be voluntary.					
Any certification scheme involving the use of the calculator should be privately operated rather than state run.					

8. Would farms of all economic scales have equal access to a certification scheme?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Low income farmers cannot afford to participate in certification schemes for low carbon farming.					

9. The role of public subsidy in the certification scheme.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmers should receive a one-off capital grant to fund the start-up costs of joining a certification scheme involving use of a carbon calculator.					
Farmers should be paid on an ongoing basis to compensate for the additional administrative costs of certification.					
Farmers should be paid compensation for any mitigation options that they undertake under a certification scheme.					

10. A low carbon farming logo?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Certification schemes for low carbon farming should be accompanied by a new EU-wide low carbon farming logo.					
Certification schemes for low carbon farming shall where possible use existing national logos recognised at European level.					

11. Advisory service support

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Farmers will require help from advisory services to use the calculator or meet the requirements of the certification scheme.					
Advisory services should be free at point of use (i.e. publicly supported).					

12. On what basis should qualification for certification be made?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Certification should be based on comparison of farm carbon footprint with a reference level specific for different types of farm.					
Certification should be based on adoption of specified farming practices (mitigation options).					
Certification should be based on a minimum decrease of emissions from the level observed at the point of joining the scheme.					

13. General

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
The certification of the farm (i.e. verifying the farm carbon footprint) should be done by an independent third-party organisation.					
A stand alone farm-based certification scheme is preferable to a scheme covering the whole food chain i.e. "farm to fork".					
A certification scheme can generate additional income for the farmer					

14. What are the main barriers to use the calculator and to uptake the mitigation measures (regardless of policy options)?

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15. Do you have any other opinions on this subject that you have not been able to express thus far?