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Jersey – Carbon accounting areas of clarification

The States of Jersey require assistance in reaching a position statement for the following areas:

1. Please outline the current methodology for carbon accounting in the LULUCF and Agricultural categories in the Crown Dependencies.

    - What are the current emissions sectors?

Agriculture

Greenhouse gas emissions from livestock farming arise directly from the animals (enteric fermentation), and from manure management. Emissions also arise from pasture and agricultural soils, and are primarily caused by the application of either organic or inorganic fertilisers. There are also other sources, which are typically smaller, arising from e.g. organic soils, the application of limestone to soils for pH management, the loss of soil organic carbon due to management practices and "indirect" emissions resulting from e.g. fertiliser application.

Land Use, Land Use Change, and Forestry

Carbon in the form of CO_2 can be emitted to the air or taken up by vegetation when there is a change to the land use i.e. a change to the vegetation cover. To quantify the CO_2 emission/uptake, inventories quantify the annual net area of land that is changed from one land cover class to another. The following land cover classes are used as the minimum level of detail: Forest land, Cropland, Grassland, Wetlands, Settlements, and Other land. But where data allow, estimates of subcategories within these classes are made.

There are also several ways in which carbon emissions or sequestration can arise even when there is no change in the areas of different land cover classes:

- Land management practices can change, giving rise to a change to the amount of carbon held by the vegetation cover.
- If there is woody crop biomass growth, then this should be accounted for, even if there is no change in the management practices. This is because there is a growth of biomass during a finite time, until a steady state is reached.
- There may be changes to the type of vegetation within a land cover class. This is particularly relevant for cropland where there can be important differences between vegetation types ("annual-woody", "perennial woody", "other woody" etc.). Changes between these vegetation types can significantly change the amount of carbon held in the vegetation.

Consequently, there may be no change in a particular land cover area, but there is a net emission/uptake of CO_2. Emission inventories account for this by reporting whether there is any net

annual emission or update from Forest land remaining Forest land, Cropland remaining Cropland etc.

- To what extent does, or can, the inventory recognise the impacts on carbon of different agricultural practices or changes in agricultural techniques? For example, organic farming, no-till techniques, compared to the impact of modern intensive agricultural practices?

Highly detailed methodologies are available to take into account a wide range of different agricultural practices. Some of these are well established (e.g. emission from organic soils) and some are more at the research stage (e.g. no tillage techniques). However, the accuracy and representativeness of emission estimates very much depends on the detail and quality of the input data that is available for use.

For agricultural emissions in Jersey, it is assumed that farming practices are broadly the same as those of mainland UK. This is a reasonable assumption when considered in the context of the variation in farming practices around the world. For example, it is assumed that the amount of fertiliser applied per hectare of cropland in Jersey is the same as mainland UK. Similarly, parameters that determine the emissions or uptake of CO_2 from vegetation and soils, or when there are changes in the land use, are either taken from mainland UK values or default values from international guidance.

So, whilst methodologies do exist that can take into account farming and land management practices that are specific to Jersey, data of this nature is not currently used in the inventory. But good approximations are used by drawing on other representative sources of information. Establishing regular data collection of this kind for Jersey would be a large undertaking.

- How could improvements be made to the current emissions inventory?

The use of Jersey specific data in the calculation of emission estimates will improve the emissions inventory. In particular, it would be valuable to highlight where practices differ significantly from those on mainland UK. However, collecting relevant datasets on an annual basis may be prohibitively expensive. Alternative options could be considered, such as drawing on expert judgement, and reviewing this every several years. Furthermore, before new data is sought, it is important to understand the extent to which using Jersey specific data might impact on the resulting emissions. This is to make sure that investment in improving the input data for the emissions inventory is targeted at changes that will have the largest impacts on the resulting emissions.

Some specific examples of data that could be collected are included below:

Agriculture: Livestock weights and feed intake, time in pasture/housing and manure management practices (handling, storage etc.). The annual amounts of synthetic fertiliser applied to soils (by fertiliser type).

Land Use, Land Use Change and Forestry: The detail of land management practices would need to be collated and compared to those of the mainland UK. This could be done by drawing on local expertise.

- Could Aether outline in simple terms the role of carbon sequestration from land use and land use changes in emissions accounting with the aim of clarifying any confusion about the net impacts vs changes in land use management practices.

The net emissions of greenhouse gases in Jersey arise from many different sources – industrial fuel use, residential fuel use, road transport, agriculture, land use, waste etc. The net emission each year can be reduced by either reducing emission sources, or increasing sinks.

Emissions in Jersey, and elsewhere are dominated by the use of fossil fuels, and focusing on reducing the use of fossil fuels is therefore a common policy priority. Increasing carbon sequestration through changes to land use management can also be used as part of a suite of policy measures. But to do this effectively, it must first be something that can be quantified (i.e. included in the emissions inventory), also it must be shown to be a sensible option on the basis of cost, impact, and other considerations.

One of the drawbacks of implementing improvements to land management is that it often results in relatively small impacts to carbon emissions across a long time scale when compared to reducing fossil fuel use. By way of illustration, consider a large impact measure, such as converting a hectare of grassland into forest land. This results in capturing carbon across many years, until the new trees reach maturity. However, once the trees reach maturity, the net carbon uptake stops, and the forested area must be maintained to avoid releasing the carbon back into the air as an emission. In contrast, removing cars from the road delivers reduced emissions for all future years.

Nevertheless, it is of course sensible to consider a range of ways in which emissions could be reduced or carbon sequestration increased, and a programme of measures compiled.

2. Can Aether advise if there are any proposed changes to the international accounting methodology to recognise any further categories or land use practices?

National level emissions inventory reporting has recently migrated to methodologies presented in the latest international guidance (referred to as the IPCC2006 guidelines). This now represents the best practice standard to which greenhouse gas emissions inventories are compiled. These guidelines are expected to be used for the next ~10 years before moving to an updated version. As a result, there is unlikely to be any significant step change in the international guidance that supports emissions inventories across the next several years.

However, as explained above, there is flexibility in methodological choice, and there is a continuous drive to improve the emission estimates. Consequently if more detailed data on activities in Jersey were to be made available, then efforts would be made to incorporate the information into the calculation of emission estimates. But, it is particularly important to appreciate that changes will only be made to emissions methodologies if there is robust scientific evidence to support emission calculations that differ from the international guidance. Such country specific information exists for some UK agricultural practices. For example, the UK emissions inventory draws on extensive research programmes that have provided some UK specific information relating to the way in which forest land is managed or the way in which fertiliser run-off is controlled. These research programmes provide clear and robust evidence to the UK Government, and most findings are published in journal papers.

National greenhouse gas emissions inventories are subject to detailed technical reviews each year. All data and methodologies need to be defensible, especially where “country specific” data or methodologies are used. Reference to a strong scientific evidence base is required.

3. Could Aether comment on the scale of carbon sequestration in the Jersey context?

Overall our emissions comprise less than 0.5 giga tonne. The land use change and agriculture sectors comprised c.19ktCO_2eq in 2104. Could Aether assess the potential impact on our emissions if Jersey converted all its' semi-natural, agricultural and managed land to the most advantageous land use from a carbon perspective?

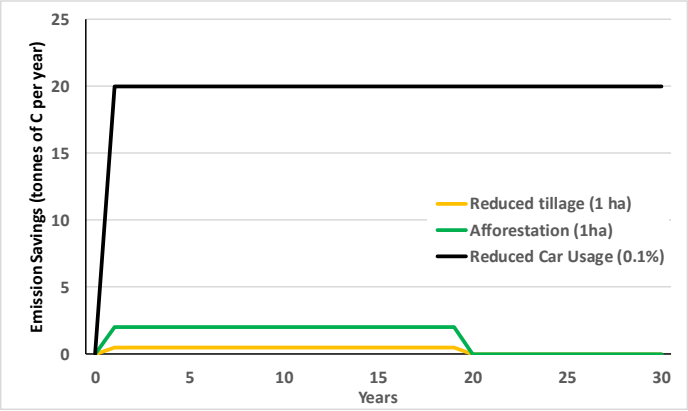
Jersey represents a small fraction of the UK emissions total, and therefore even substantial changes to greenhouse gas emissions have a limited impact at the UK scale. Nevertheless, it is a responsible approach to contribute to reductions in greenhouse gas emissions. In doing so it is important to consider the impact that different options can deliver.

We can consider different measures for reducing the net emissions. The calculations depend on many variables, and should be considered as illustrative only:

1. Changes to Soil Management: Changes to the way in which soils are managed can increase the net amount of carbon that is captured. For example, changing from a "full" to a "reduced" tillage regime[1] captures carbon until the soil reaches equilibrium with the atmosphere. Implementing this for 1 hectare of cropland would capture the order of 0.5 tonnes of carbon per year, for 20 years. A total of approximately 10 tonnes of carbon would be captured after 20 years. Other options include increasing the amount of crop residues that are ploughed back into the soil, or the addition of more organic fertiliser.
2. Afforestation: Afforestation of one hectare of grassland would represent an extreme measure in land management. Carbon would be captured at a rate of the order of 2 tonnes of carbon per year. A total of approximately 40 tonnes of carbon would be captured after 20 years.
3. Reduced car usage: Reducing the car usage in Jersey would result in less fossil fuel use. Reducing car usage from the baseline by 0.1% would give an emissions reduction of approximately 20 tonnes of carbon.

In contrast to the soil management and afforestation options above, reducing car usage would continue to deliver a reduction in the emissions (compared to the baseline) for all future years – as reflected in the figure below.

Figure 1: Emission Savings from Illustrative Emission Reduction Measures



[1] "Full tillage" is characterised as resulting in substantial soil disturbance with full inversion and/or frequent tillage operations, at planting time, little (e.g., <30%) of the surface is covered by crop residues. "Reduced tillage" is characterised as resulting in reduced soil disturbance (usually shallow and without full soil inversion), normally leaving the surface with >30% coverage by crop residues at planting. 2006 IPCC Guidelines for GHG Emissions Inventories, Volume 4, Table 5.5.

4. Conclusions and Recommendations

A wide range of options are available for reducing greenhouse gas emissions, or increasing carbon sequestration. Individual options need to be evaluated in terms of the resulting impact, cost of implementation and other metrics, to decide which should be brought together to form the most effective strategy. Furthermore, options need to be based on defensible scientific evidence.

In Jersey, emissions are dominated by fossil fuel consumption. As a result, policies that help to reduce fossil fuel use e.g. in the road transport and domestic sectors, are typically evaluated as the most effective in reducing net emissions. However, it is appropriate to consider the contributions that can be made from measures implemented in other sectors, such as agriculture and land use. But investment in these measures should only be undertaken where they can be appropriately assessed, and that includes well established scientific evidence that the measure would result in quantifiable emissions reductions or increased carbon sequestration.