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the Regions - Accounting for land use, land use change and forestry
(LULUCF) in the Union's climate change commitments

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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**Accounting for land use, land use change and forestry (LULUCF) in the Union's climate
change commitments**

1. THE NEED TO ACT ON CLIMATE CHANGE NOW

At the end of 2010, in the context of United Nations Framework Convention on Climate Change (UNFCCC), it was recognized that global warming must not exceed the temperatures experienced before the industrial revolution by more than 2° C¹. This is vital if the negative consequences of human interference with the climate system are to be limited. This long-term goal requires global greenhouse gas emissions to be reduced by at least 50% below 1990 levels by 2050².

Developed countries as a group should reduce their emissions by 80 to 95% by 2050 compared to 1990 levels³. In the medium term, the EU has committed to reduce its greenhouse gas emissions by 20% below 1990 levels by 2020, and by 30% if conditions are right. This commitment forms part of one of the EU's five headline targets in the *Europe 2020 Strategy*.⁴ Additionally, both the European Council and the European Parliament have agreed that all sectors of the economy should contribute to reducing emissions⁵.

Land use, land use change and forestry (LULUCF) has a positive and significant impact on the EU's greenhouse gas emissions. The sector removes the equivalent of 9% of greenhouse gases emitted in other parts of the economy⁶. Although emissions and removals from LULUCF are reported under the UNFCCC and partially accounted under the Kyoto Protocol, the sector was left out of the EU's climate commitments under the Climate and Energy Package⁷ due to the recognition of serious deficiencies in international accounting rules of emissions from this sector.

Also, the expectation at the moment of setting the EU emission reduction target was that the climate summit in Copenhagen in 2009 would deliver an international agreement on climate change, including revised accounting rules for LULUCF, which could then be adopted by the EU. This did not happen, and despite the progress achieved through the Copenhagen Accord and the Cancun Agreements an international agreement on revised accounting rules for LULUCF as of a second commitment period under the Kyoto Protocol was only achieved at the 17th Conference of the Parties to the UNFCCC meeting in Durban in December 2011.

This Communication outlines how the LULUCF sector increasingly could be integrated in the EU's climate policy using a step-wise approach. As a first step, it is proposed to establish robust common accounting, monitoring and reporting rules. In view of the sector's specific emission profile, the Commission proposes a dedicated legal framework, rather than including

¹ Decision 1/CP.16 of the Conference of Parties to the UNFCCC (the "Cancún Agreements").

² Based on the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

³ Conclusions of the European Council of 29/30.10 2009 and European Parliament Resolution of 4.2 2009 (2008/2105(INI)).

⁴ COM(2010) 2020 final.

⁵ Directive 2003/87/EC and Decision 406/2009/EC.

⁶ National total excluding the LULUCF sector.

⁷ Unlike non-CO₂ greenhouse gases from agricultural activities e.g. methane and nitrous oxide from ruminants and fertilisers.

it in the EU Emissions Trading Scheme⁸ or as part of the rules created by the Effort Sharing Decision⁹.

Setting solid accounting rules for emissions and removals in the EU that take into account the specific profile of the LULUCF sector would bring multiple benefits. Most importantly, it would complete the accounting of anthropogenic greenhouse gas emissions from all economic activities within the EU¹⁰ by capturing important fluxes currently ignored. As part of that, it would increase the visibility of mitigation efforts in agriculture, forestry and related industries (e.g. pulp and paper, wood processing) and provide a basis for designing adequate policy incentives, for example in the Common Agriculture Policy (CAP) and in view of the *Roadmap to a Resource Efficient Europe*¹¹. Laying down common EU accounting rules would also level the playing field between different Member States. Most notably, it would capture the changes in carbon stocks due to the use of domestically produced biomass, thus completing the accounting of bioenergy at the level of the economy, as stipulated by the Intergovernmental Panel on Climate Change (IPCC)¹² as a condition for assuming bioenergy as carbon neutral in the energy sector. This would strengthen the environmental integrity of the EU's climate policy. Lastly, it would be an important and necessary move towards a cost effective pursuit of more ambitious climate targets.

The second step would be to formally include LULUCF in the EU's greenhouse gas reduction target. It is proposed to take this step when the Member States have implemented the accounting framework and it has proven to be robust.

As the LULUCF sector's positive impact on the EU's emissions decreases over time, there is an urgent need for coherent action. Therefore, the Commission proposes as part of the first step that the Member States prepare LULUCF action plans setting out a long-term strategy for the sector across different policies.

2. THE ROLE OF LAND USE AND FORESTRY IN CLIMATE CHANGE

In the LULUCF sector carbon is removed from the atmosphere and stored in growing trees and other plants, soils and wood products. Carbon is emitted as a result of deforestation and forest degradation (due to e.g. infrastructure development, agricultural expansion, conversion to pastureland and fires) or of agricultural practices (e.g. ploughing).

Different LULUCF elements have different characteristics in terms of carbon stocks and potential emissions and removals. The soil carbon content (0-30 cm) of forestry is relatively high compared to agricultural soils. In the EU, it is estimated at around 90 tC/ha, whereas the soil carbon content from cropland and grassland is around 65 and 90 tC/ha respectively (Figure 1). Still, there are significant variations both across and within Member States. In European organic soils/peat lands the carbon soil content can be up to 1000 tC/ha. Different land uses and management activities in agriculture and forestry and uses of harvested wood products can affect carbon stocks, and emissions to and removals from the atmosphere.

⁸ Directive 2009/29/EC.

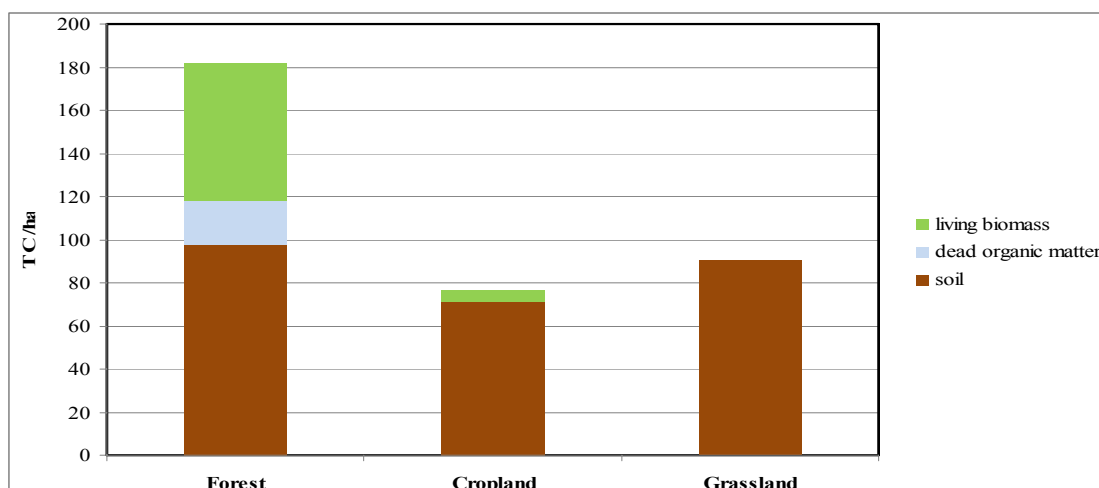
⁹ Decision No 406/2009/EC.

¹⁰ Except for international aviation and maritime transport.

¹¹ COM(2011)571 final.

¹² IPCC 2006 Guidelines.

Figure 1. Average carbon stocks (t C/ha) in different land use in the EU



Note: For peat land, estimates can be as high as **1000 tC/ha** with variations depending on type of peat.

Source: Elaborations done by the Joint Research Centre of the European Commission, based on various sources¹³.

The global biomass and soil carbon stock is immense (compared to the annual greenhouse gas emissions). But, globally LULUCF accounts for about 15 % of greenhouse gas emissions¹⁴ due to substantial deforestation. This is more than the emissions from the entire global transport sector and second only to the energy sector.

Therefore it is crucial to preserve and enhance the carbon stock and reduce LULUCF emissions from it. The EU's objective is to halt global deforestation by 2030¹⁵. Reducing Emissions from Deforestation and Forest Degradation (REDD) in *developing* countries is a mechanism developed in the UN to counter this trend.

In *industrialised* countries the LULUCF sector represents in most cases a net sink (i.e. removals are higher than emissions). However, the capacity of this sink is decreasing for reasons such as increased demand for biomass, ageing forests in certain countries and a trend

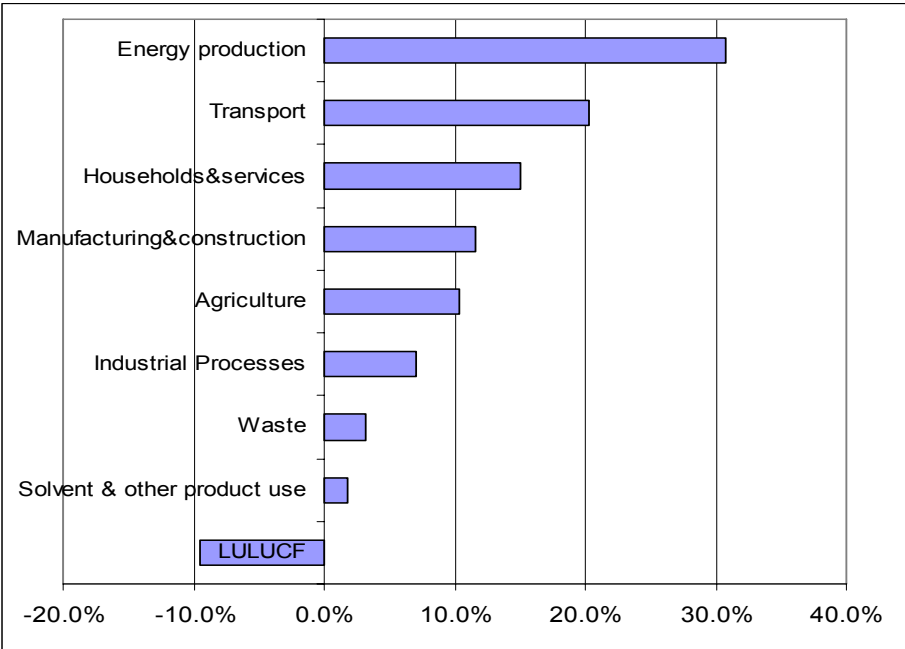
¹³ The sources used include: Forest Europe, UNECE and FAO (2011): State of Europe's Forests 2011; Status and Trends in Sustainable Forest Management in Europe; FAO, Global Forest Resources Assessment FRA 2010, <http://www.fao.org/forestry/fra/fra2010/en/>; GHG National Inventory Submissions to UNFCCC (2011) http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php; IPCC Guidelines for National Greenhouse Gas Inventories (2006), Volume 4, Agriculture, Forestry and Other Land Use; Pan et al. (2011) A large and persistent carbon sink in the world's forests. Science DOI: 10.1126/science.1201609; Hiederer et al. (2011) Evaluation of BioSoil Demonstration Project; <http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/15905/1/lbna24729enc.pdf>; FAO/IIASA/ISRIC/ISS-CAS/JRC, 2009. Harmonized World Soil Database (version 1.1). FAO, Rome, Italy and IIASA, Laxenburg, Austria; Schulze et al. (2009) Integrated assessment of the European and North Atlantic Carbon Balance (results of CarboEurope-IP), DOI 10.2777/31254; Smith et al. (2005) Projected changes in mineral soil carbon of European croplands and grasslands, 1990–2080. Global Change Biology DOI: 10.1111/j.1365-2486.2005.001075.x.

¹⁴ Intergovernmental Panel on Climate Change Report IV (2008).

¹⁵ Conclusions of the European Council of 4.12.2008.

towards intensification of forest use. In the EU, greenhouse gas emissions come mainly from energy production, transport and buildings (see Figure 2).

Figure 2. Emissions and removals per sector in the EU-27 as share of the total excluding LULUCF (2009)



Note: (1) Negative numbers denote net removals and positive numbers net emissions. (2) Emissions from "Agriculture" include methane (e.g. from livestock production) and nitrous oxide (e.g. from fertilizer use). CO₂ emissions and removals associated with agricultural land use are included in the LULUCF sector.

Source: EEA (2011)

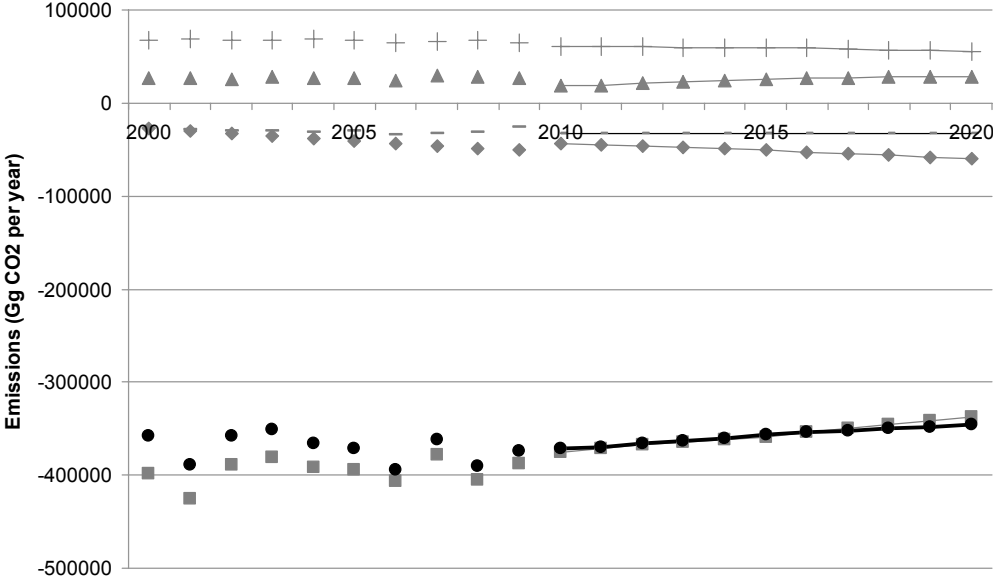
The sink in the LULUCF sector is projected to decrease in the EU by 2020 under a business-as-usual scenario¹⁶. For the LULUCF sector as a whole, a decline of about 10% is expected in 2020 compared to the period 2005-2009, equivalent to emitting 33 MtCO₂ more per year. This is roughly equivalent to all greenhouse gas emissions in Latvia and Lithuania combined, or twice those of Estonia in 2009.

A closer look at this projection shows that there are big differences between individual activities within the sector. The decrease is expected to be very pronounced in forest management, for which net removals are expected to fall by about 60 MtCO₂, i.e. roughly the equivalent to the total greenhouse gas emissions of Bulgaria, Denmark, Ireland or Sweden in 2009. This is partly compensated by the plantation of forests (afforestation). Emissions and removals from agricultural activities such as cropland management and grazing land management are expected to remain fairly stable or to improve. But pressure on land use, such as the conversion of permanent grassland into cropland due to increased need of biomass (e.g. for biogas production based on maize) and continued cultivation of organic soils may reduce soil carbon content and contribute to emissions.

¹⁶ In this context "Business as Usual" assumes that Member States will reach their 20% reduction targets, including the targets for renewable energy.

According to projections, as shown in the *Roadmap for moving to a competitive low-carbon economy in 2050*¹⁷, this negative trend is expected to continue in the long run. But the real results for the sector will depend greatly on incentives given under various policies.

Figure 3. Projected emissions and removals in LULUCF as a whole and in pre-1990 forests (2000-2020)



Notation key: ●—●—● LULUCF (sum of all activities), ▲—▲—▲ Deforestation, +—+—+ Cropland management, — Grazing land management, ◆—◆—◆ Afforestation, and ■—■—■ Forest management. Unconnected points show reported / historical data.

Note: A negative number indicates that removals are greater than emissions for that activity.

Source: Böttcher et al. (2011) and JRC (2011b)

3. AGRICULTURE, FORESTRY AND THE EFFICIENT USE OF LAND RESOURCES ARE KEY TO MEETING THE CLIMATE CHALLENGE

Agriculture, forestry and related industries can contribute to reducing emissions in the LULUCF sector in several ways.

Agricultural measures should focus on reducing the conversion of grassland to cropland and carbon losses from cultivated organic soils. They could include improving agronomic practices such as using different crop species (e.g. more leguminous crops), extending crop rotations and avoiding or reducing unplanted fallow (e.g. through green cover or ecological set-aside). Agro-forestry practices that increase soil carbon stocks by keeping livestock or growing food crops on land where also trees are grown for timber, energy or other wood products would also help cut emissions. Returning or leaving adequate amounts of organic material (e.g. farmyard manure, straw, crop residues) on the land can improve the productivity of croplands and grasslands, while rewetting, setting aside or not draining organic soils, including peat land, and restoring degraded soils can have significant mitigation and biodiversity benefits. Including cropland and grazing land management into accounting would

¹⁷ COM(2011) 112.

be a necessary step towards the full recognition of the contribution of these activities to meet the climate challenge.

Forestry also has much potential to boost mitigation. This includes practices such as converting non-forest land to forest (i.e. afforestation)¹⁸, avoiding the conversion of forest land to other types of land (i.e. deforestation), storing carbon in existing forests through longer rotation periods of trees, avoiding clear-felling (e.g. forest management decisions on thinning or selective logging) and conversion to undisturbed forests, and more widespread use of prevention measures to limit the impacts of disturbances such as fires, pests and storms. It is of equal importance to enhance production in forests for example by adjusting rotations closer to the productive maximum, producing more from low-production forests, increasing the harvest of timber off-cuts and branch-wood (provided biodiversity, soil fertility and organic matter can be maintained). Changing species composition and growth rates can also make a difference.

In addition to the opportunities directly linked to forestry and agriculture, there are potential mitigation benefits in related **industries** (e.g. pulp and paper, wood processing) and **renewable energy sectors** if agricultural land and forests are managed for the production of timber and energy. Whilst carbon is stored in trees and in other plants and soils, it can also be stored for several decades in products, e.g. construction wood. Industry and consumer oriented policies can make a significant contribution to increasing the long term use and recycling of wood and/or production of pulp, paper and wood products as substitutes for more emission-intensive equivalents (e.g. concrete, steel, fossil-based plastic). The bio-based industry can make use of crops grown for material substitution (e.g. hemp and grass for insulation instead of glass fibre, straw for furniture production, car door panels made from flax or sisal plants, bio-plastics) or energy (e.g. using biomass instead of fossil fuels). Studies show that for each tonne of carbon in wood products substituted for non-wood products an average greenhouse gas emission reduction of approximately two tonnes carbon can be expected¹⁹.

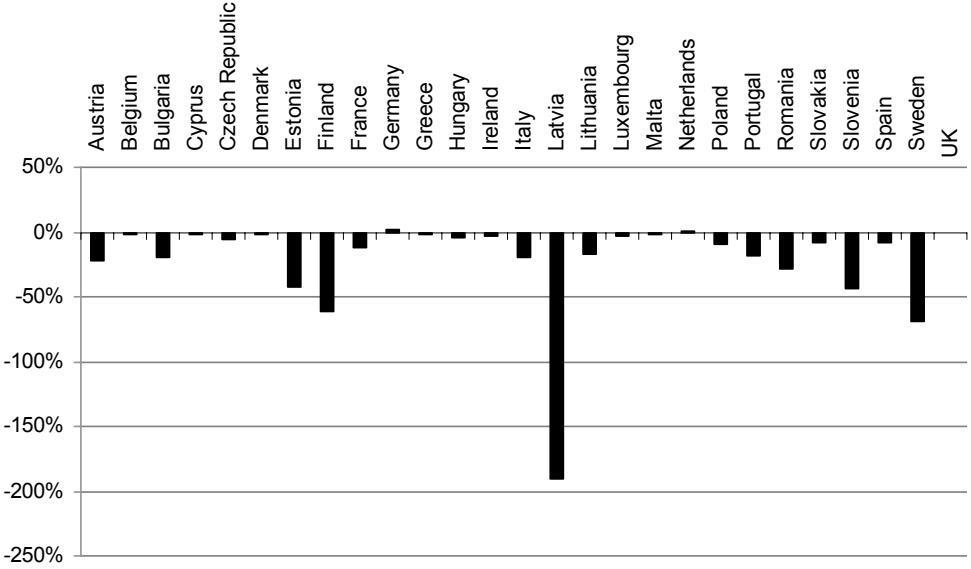
Expanding mandatory accounting to include forest management, cropland management and grassland management would improve the visibility of action taken by farmers, foresters and forest-based industries and provide the basis for designing policy incentives to increase their mitigation action. If such efforts are being accounted for, their overall greenhouse gas impact is more correctly reflected and the cost-efficiency of reaching emission reduction targets would be improved.

Considering that agricultural land use, forestry and related industries are very different in terms of mitigation potential within the EU-27, a single policy will not fit all. A tailored approach is needed to tackle the range of different forms of land use and forestry practices. For instance, in Sweden and Finland, net removals in LULUCF are more than half the total emissions in other sectors and in Latvia net removals are almost double (Figure 4), while in other Member States such as Malta the significance of the sector is marginal. This highlights the importance of considering national circumstances when developing policy for the sector to meet climate change commitments.

¹⁸ There is also a trade-off: conversion should not induce "carbon leakage", i.e. replacement of domestically produced food by imported food that has a more negative carbon footprint.

¹⁹ See e.g. Sathre R. and O'Connor J. (2010), A synthesis of research on wood products and greenhouse gas impacts, 2nd edition, Vancouver, B. C. FP Innovations, 117p. (Technical Report No. TR-19R).

Figure 4. Relative importance of LULUCF in Member States: emissions and removals of the sector relative to total greenhouse gas emissions in other sectors (2009).



Note: A negative number indicates that removals are greater than emissions in LULUCF for that Member State. Due to inter-annual variations in emissions and removals the share varies between years.

Source: Based on EEA (2011)

The fundamental pre-condition for protecting and enhancing carbon stocks and the rate of removals is to provide a level playing field between different types of measures (e.g. grazing land management or bio-energy production), sectors (e.g. forestry or forest-based industry) and Member States by ensuring that emissions and removals from different land management practices and uses of resources are accurately reflected in accounting. This will also improve the environmental integrity of the EU's climate change commitments.

4. CURRENT POLICIES ARE NOT ENOUGH

4.1. Setting robust and harmonized accounting rules

Although LULUCF does not yet count towards the Union's emission reduction target for 2020, it counts towards the Union's commitment under the Kyoto Protocol to the UNFCCC for the period from 2008 to 2012²⁰. However, the existing accounting rules, which are a mix of voluntary and mandatory practices, have significant drawbacks. During the international negotiations held in recent years, there was a consensus that improvements were needed.

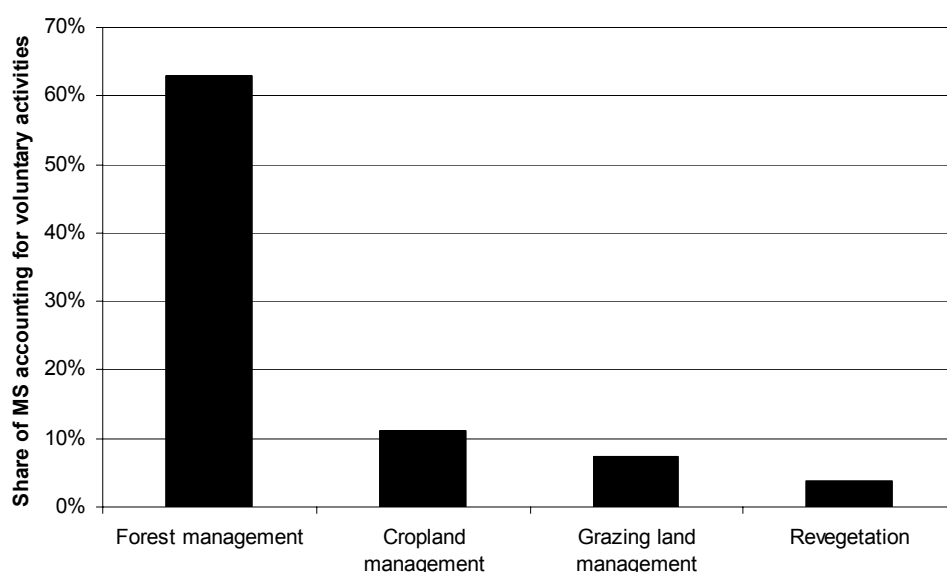
Under the existing accounting rules, accounting is voluntary for most LULUCF activities, notably for forest management (which represents about 70% of the sector) and cropland and grazing land management (17%). It is only mandatory for some land use change activities (afforestation, reforestation and deforestation). As a result, accounting in the Member States is currently highly variable (Figure 5). Less than two thirds of the Member States account for

²⁰ Council Decision 2002/358/EC.

forest management, only three for cropland and/or grazing land management and one for revegetation.

Another drawback is the lack of incentives provided for climate change mitigation in forestry. Current rules for forest management essentially guarantee countries an amount of credit, regardless of the action taken. Incentives to improve practice are limited by a cap on emissions and removals, beyond which point action no longer counts. This creates distortions between different sectors and land uses and improvements are necessary to create a level playing field within the forestry, agricultural and energy sectors in the Member States, to provide a fair distribution of effort and to ensure a consistent treatment of agriculture, forestry and related industries within the Union's internal market.

Figure 5. Share of Member States that have chosen to voluntary account for the various practices



4.2. Improving monitoring and reporting

Robust and harmonised estimation of emissions and removals in agriculture and forestry requires investment in monitoring and reporting capacity. Member States are obliged to report annually to the UNFCCC and there are additional reporting requirements under the Kyoto Protocol. Monitoring and reporting have started to improve in recent years and will most likely continue to do so. Definitions, modalities, and rules relating to LULUCF for the second commitment period of the Kyoto Protocol were revised and improved during the 17th Conference of the Parties of the UNFCCC meeting in Durban in December 2011²¹. In particular accounting for forest management activities, including harvested wood products, will be mandatory and definitions for "natural disturbances" and "wetland drainage and rewetting" have been established.

Nonetheless, there are still significant gaps and more must be done to improve the level of accuracy and completeness of the reported data, especially data on agricultural soils. The

²¹ Decision -/CMP.7 of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

current level of uncertainty is relatively high (about 35%, meaning that 1 tonne of CO₂ could be either 1.35 or 0.65 tonnes). Improvements will not only support accounting, it would also provide a robust, clear and visible indicator of progress in agriculture and forestry²².

4.3. Fostering synergies with wider policy objectives

Incentives exist to promote the use of bio-energy²³ but currently there is no coherent approach to climate change mitigation in the LULUCF sector via measures in agriculture, forestry and related industries.

Indeed, climate change mitigation could play an increasingly important role in the CAP. Under the CAP reform, the so-called "Health Check"²⁴ of 2008, climate change mitigation and adaptation were flagged as "new challenges". To prepare the CAP for 2014-2020, the Commission has outlined how the environmental and climate performance of agricultural policies could be improved through mandatory "greening components"²⁵ addressing climate change and environmental goals²⁶. In addition, in the post-2013 EU rural development policy, climate change mitigation and adaptation could be tackled by offering better incentives for carbon sequestration in agriculture and forestry. Some of them would at the same time enhance and protect carbon stocks and generate co-benefits for biodiversity and for adaptation by increasing water holding capacity and reduced erosion. Mandatory accounting of associated carbon fluxes would make the positive contribution of these measures more visible and ensure their full contribution towards meeting the climate change challenge.

Accounting for LULUCF would also clarify the benefits of sustainable bio-energy by better reflecting related emissions, in particular resulting from the combustion of biomass, which is unaccounted for at the moment. This would strengthen the incentives provided by sustainability criteria in the context of renewable energy targets.

4.4. Accommodating the special features of the sector

LULUCF is, however, not like other sectors. Removals and emissions of greenhouse gases in this sector are the result of relatively slow natural processes. It can take decades before measures such as afforestation have a significant effect. Therefore, action to increase removals and reduce emissions in forestry and agriculture should be considered over the long-term.

Moreover, emissions and removals are reversible. Reversals can be caused by extreme events such as fires, storms, droughts, pests having an impact on forest and land cover or they can be a result of management decisions (e.g. to harvest or plant trees). In addition, annual fluctuations of emissions and removals in forests are high and can amount to as much as 35%

²² Only emissions of methane and nitrous-oxides are currently accounted in agricultural activities, while CO₂ emissions and removals associated with agricultural land use are not (soil carbon emissions and removals). The obligatory accounting of these measures through legal proposals would complete the assessment of emissions and removals associated with agricultural activities.

²³ Directive 2009/28/EC.

²⁴ Council Regulation (EC) No 72/2009, Council Regulation (EC) No 73/2009 and Council Regulation (EC) No 74/2009 related to the CAP "Health Check".

²⁵ Payment for agricultural practices beneficial for the climate and the environment.

²⁶ COM(2010) 672.

of the total annual emissions in some Member States as a result of natural disturbances and harvesting. This would make it difficult for Member States to comply with annual targets.

5. WAY FORWARD: A GRADUAL APPROACH

To prepare for taking advantage of the mitigation potential of LULUCF through its formal inclusion in the EU's climate commitments, the inadequacies in the current accounting framework, special features of LULUCF, and circumstances of Member States must be addressed appropriately. A gradual approach is therefore needed.

Firstly, frameworks for robust accounting and monitoring need to be in place. Together with this Communication, the Commission is putting forward a legal proposal for robust accounting rules. It involves inclusive accounting of emissions and removals from both forestry and agricultural activities and gives equal weight to mitigation action, whether in forestry, agriculture, in related industries or the renewable energy sector.

Monitoring and reporting on the LULUCF carbon balance needs to be further improved to underpin the accounting framework and the EU indicators tracking progress in agriculture and forestry. The Commission proposes to improve monitoring and reporting through a revision of the Monitoring Mechanism Decision²⁷ and the further development of existing land use monitoring systems like the Land use/cover area frame survey (LUCAS).

High variability of emissions and removals in forests and the lower frequency of gathering the fundamental data needed for the inventories mean that it is inappropriate to require the sector to comply annually with the emissions reduction targets that apply for other sectors. The long lead times needed for mitigation measures to take effect also set LULUCF apart from most other sectors. The Commission therefore proposes to establish a separate framework designed to address the special circumstances of LULUCF.

Secondly, once a harmonised and robust accounting framework is established within the EU, consideration could be given to formally include the sector in the EU's climate commitment.

However, this must not mean that mitigation action in the LULUCF sector should be put on hold. In view of the trends in the sector and to kick-start the necessary mitigation efforts, the Commission proposal requires Member States to prepare LULUCF action plans. This will provide a strategic perspective for LULUCF as well as an intermediate step towards full inclusion of the sector and its integration into the EU's climate policies.

In conclusion, there are good reasons to gradually integrate LULUCF in the EU's climate change policy. The Commission's legislative proposal for a step-wise approach would:

- draw up robust rules for accounting for emissions and removals in land use, land use change and forestry and, through a separate act, improve monitoring and reporting;

²⁷ Commission proposal for a Regulation of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change, (COM)2011 789 final - 2011/0372 (COD).

- improve the visibility of, and provide the basis for designing policy incentives for a range of mitigation measures in agriculture, forestry and the production and sustainable use of harvested wood products;
- strengthen the environmental integrity of the commitments made by ensuring that emissions and removals are correctly reflected;
- foster synergies with existing policies on renewable energy and the wood industry by promoting sustainable and climate-friendly production in the EU;
- generate significant co-benefits for biodiversity, soil protection and climate change adaptation (e.g. Natura 2000) by enhancing and preserving carbon stocks;
- improve economic efficiency in the pursuit of more ambitious targets by allowing all sectors to contribute.