

# **Information on LULUCF actions**

## **FINLAND**

### **Progress Report December 2016**

Progress report based on Article 10 of DECISION No 529/2013/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities

*18.1.2017*

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## **Introduction**

This report is a progress report on the information requirements set out in Article 10 of Decision (529/2013/EU) on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities (“LULUCF decision”).

The progress report follows the structure of the previous report. The chapter 1 includes updated information on the LULUCF sector. Chapter 2 is an update on past emissions and removals from four different activities (afforestation/reforestation, deforestation and forest management) and harvested wood products according to the latest greenhouse gas inventory submission and covering years 1990-2014. Updated projections for the accounting period 2013-2020 are included in the Chapter 4. Chapter 5 provides an overview of the latest national measures taken in agriculture and forestry sectors. And finally, Chapter 6 describes the existing and planned policies having an impact on the forest and agriculture sectors.

The report has been prepared by experts at the Ministry of Agriculture and Forestry, together with other relevant ministries and Natural Resources Institute Finland. The information provided in this report is mainly based on Finland’s 6<sup>th</sup> National Communication, the 2nd Biennial Report (2016) and the 2014 National Inventory Report to the UNFCCC and the Kyoto Protocol. The progress report will be made available to the public.

Helsinki, January 2017

Ministry of Agriculture and Forestry

## 1. National circumstances, an update on the recent developments on the LULUCF -sector

Forest land dominates Finland's land area, followed by wetlands and croplands. Overall land use changes have been quite small. There has been an increase in settlement and cropland areas. The areas of forest land, grassland and wetlands have decreased (Table 1).

Table 1. The land-use change matrix for IPCC land-use categories (1000 ha) from 31.12.1994 to 31.12.2014 together with percent uncertainty twice the relative sampling error. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016.

Final	Initial								Total (Final)
	Forest land	Cropland	Grassland	Wetlands	Settlements	Other land	Inland waters		
Forest land	21 781 (1%)	33 (21%)	48 (20%)	17 (55%)	15 (35%)	1 (141.6%)	0	0	21 894
Cropland	107 (17%)	2 352 (4.4%)	10 (50.6%)	18 (55.4%)	3 (89.8%)	0	0	0	2 489
Grassland	14 (37.6%)	47 (20%)	174 (10.4%)	5 (80%)	1 (122.8%)	0	0	0	241
Wetlands	31 (31%)	1 (141.4%)	1 (119%)	2 958 (5.2%)	1 (200%)	0	0	0	2 992
Settlements	193 (10.8%)	23 (26%)	13 (39%)	3 (107.2%)	1 226 (5.6%)	2 (103.6%)	0	0	1 460
Other land	0	0	0	0	0	1 311 (12.8%)	0	0	1 311
Inland waters	1 (200.2%)	0	1 (115.8%)	2 (115.6%)	0	0	3 452 (0%)	0	3 456
Total (initial)	22 126	2 456	246	3 002	1 247	1 313	3 452	33 843	
NET change	-232	33	-5	-10	213	-2	3	0	

The Land Use, Land-Use Change and Forestry (LULUCF) sector as a whole acts as a sink in Finland (Figure 1). In 2014 the LULUCF-sector was a CO<sub>2</sub> sink for 20.8 million tons of CO<sub>2</sub> equivalent (Mt CO<sub>2</sub> eq.) The sink in 2014 was 35% of the total national emissions, not including the LULUCF sector. Between 1990–2014 the net sink has varied between 15.3 and 39.5 million tons CO<sub>2</sub> eq.

Forests (trees and soil) absorb a significant proportion of the carbon dioxide (CO<sub>2</sub>) emissions. The forest sink varied between 20 and 51 million tonnes CO<sub>2</sub> equivalent (CO<sub>2</sub> eq.) during the years 1990–2014 (Figure 4). The proportion has varied considerably due to fluctuating trends in emissions and forestry activities.

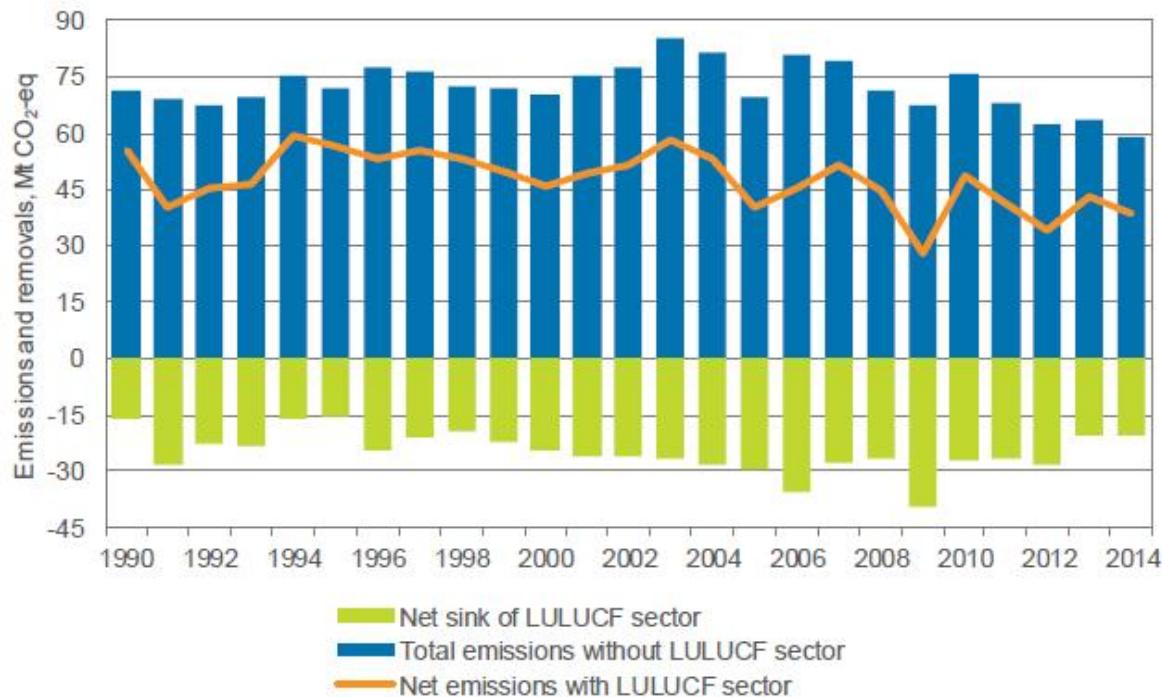


Figure 1. Finland's greenhouse gas emissions and removals 1990-2014, with (orange line) and without (blue bars) the LULUCF sector sink, based on UNFCCC reporting. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016.

## Forestry

In Finland, forestry land covers 26 million hectares, which 77 per cent of the total area (incl. inland waters).

The total volume of Finland's forest stock in 2014 was 2,357 million m<sup>3</sup> (2,306 million m<sup>3</sup> in 2013). The growing stock volume has been increasing for a long time, mainly because the growth in forest volume has exceeded the harvesting volumes and natural drain (Figure 2). In 2014, the total drain was 79 million m<sup>3</sup>, while the total increment of the growing stock of 105 million m<sup>3</sup>. The total drain includes cutting removals, harvesting losses and natural mortality. Of the total area undergoing harvesting annually, thinning accounts for roughly one half, while other cutting, e.g. clear felling and seed and shelter wood felling, accounts for the other half.

The growing stock has increased by 80 per cent since the 1960's due to investments made in sustainable forest management. In 2014 around EUR 302 million is invested in forest regeneration, young stand management and other silvicultural practices. More than two thirds of this amount is financed by private, non-industrial owners and the rest is covered by forest industries and state subsidies.

More than 50 per cent of Finland's forests are owned by private individuals, 35 per cent by the state, about 8 per cent by private forest companies and the rest by other owners. The average size of a forest holding owned by private individuals is approximately 28 hectares. There are about 632 000 forest owners in Finland.

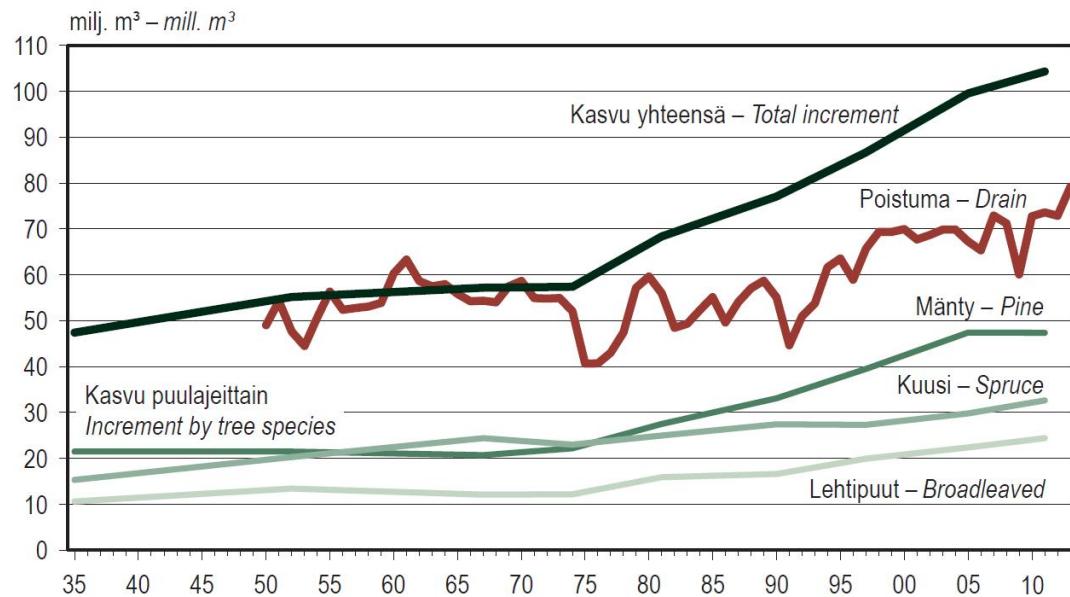


Figure 2. Annual total increment of growing stock, increment by tree species and drain. Source: Finnish Forest Research Institute/Natural Resources Institute Finland.

In 2014, the total use of roundwood (raw, unmanufactured timber) in Finland was 73.9 million m<sup>3</sup>. Approximately 87 per cent (64.5 million m<sup>3</sup>) of this was used in the forest industry and 9.4 million m<sup>3</sup> was used for energy production (Figure 3). The imports accounted for 10.2 million m<sup>3</sup>.

The raw material value of wood harvested annually was between EUR 1,200 and 2,500 million in the period 2007–2014, of which approximately 80 per cent was paid to private forest owners as stumpage earnings. More than 95 per cent of Finland's forests are certified according to the national forest certification standards.

Finland's forest policy aims at sustainable forest management. The objective is to ensure welfare that is founded on the sustainable management and use of forests, and diversity of the forest nature. Policy measures include the Forest Act and other legislation, Finland's National Forest Strategy 2025, financing and public forest advisory organizations.

A new National Forest Strategy (NFS) 2025 was adopted by the Government in February 2015. The strategy continues the long tradition of holistic sustainable forest management in Finland and sets out objectives and strategic projects for the Finnish forest sector for the forest sector

until 2025. The National Forest Strategy replaced the National Forest Programme 2015 as the main national forest policy document (*more detailed description on the objectives and actions of the NFS in chapter 5*). Biodiversity in commercial forests have received a growing attention in forest management.

Numerous forest protection programmes and decisions have contributed to a threefold increase in the area of protected forests over the last 30 years. Twelve per cent of the forest area (forest land and poorly productive forest land), a total of 2.7 million hectares, is protected or in restricted forestry use. The National Forest Strategy 2025 and national policies on nature and biodiversity conservation are mutually supportive and consistent with each other (*see chapter 5 and 6 for more information on forest policy in Finland*).

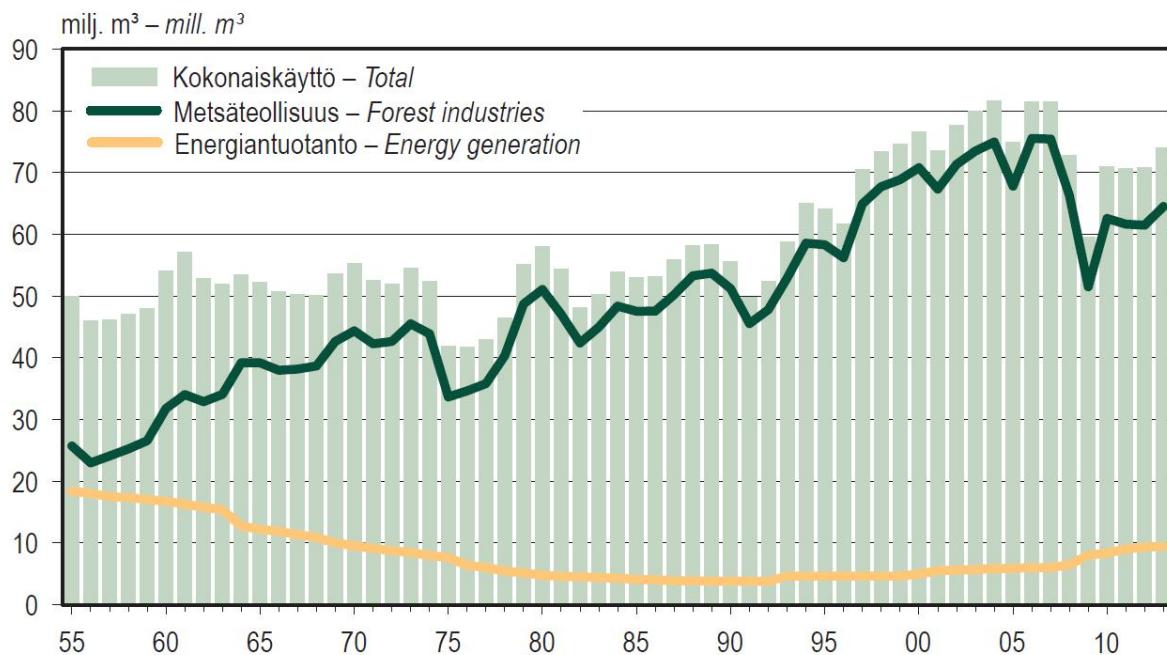


Figure 3. Roundwood consumption by category of use 1955-2013. Source: Finnish Forest Research Institute/Natural Resources Institute Finland, Finnish Forest Industries Federation

## Agriculture

The current farming practices in Finland are made possible by the warming effect of the Gulf Stream, which results in 3–4°C higher temperatures than would otherwise be expected at these latitudes. Climatic conditions are a decisive factor affecting the possibilities for crop production.

Finnish agriculture is based on family farms. About 86 per cent of farms are family-run farms and eight per cent farming syndicates, less than three per cent are heirs, and less than two per cent limited companies. In 2015 there were 50,999 agricultural and horticultural enterprises in Finland. The number of farms has been decreasing by 1,800 farms from 2014. The average

utilised agricultural area of the farms is 44 hectares. The average size has grown by 1.5 hectares compared to year 2014.

Finland's greenhouse gas emissions reported in the Agriculture sector were 6.5 million tonnes CO<sub>2</sub> eq.<sup>1</sup> in total in 2014. Agriculture is the second largest greenhouse gas emission source sector after the energy sector with around 11% share of the total greenhouse gas emissions. As a member of the EU, Finland follows the Common Agricultural Policy (CAP).

The Climate Programme for Agriculture, “Steps towards environmentally-friendly food”, was published in November 2014. The Climate Programme for Finnish Agriculture aims to further enhance the sustainability of the Finnish food system, which is founded on profitable food production and responsible consumption. The objective is to improve the energy and material efficiency and reduce emissions per litre or kilogram of production (*more information on the Climate Programme for Agriculture in chapter 5*).

## **Peatlands**

Peatlands cover one third of the total land area in Finland, approximately 9.3 million hectares. Approximately 6.3 million hectares of peatlands have been drained for forestry and about 0.3 million hectares for agriculture. The total area of undrained peatlands is approximately 4 million hectares.

Peat represents approximately 6 per cent of the total primary energy supply. In view of its employment impact, it is also significant from the regional policy perspective. The area used for the harvesting of energy and environmental peat is approximately 60 000 hectares, and the amount of extracted peat was 12 million m<sup>3</sup> in 2015. The emissions from peat extraction areas were a source of 2.3 million tonnes CO<sub>2</sub> eq. in 2014.

The revised Environmental Protection Act (527/2014) became valid 1.9.2014. According to the law, the peat extraction must be situated in a place where it does not cause damage to a nationally or regionally significant nature value. Peat extraction site should be situated to peatlands that have been drained or whose natural state has otherwise been significantly changed. The significant change of natural state is described more detailed by the Environmental Protection Decree (713/2014).

Almost 13 per cent of Finnish mires and peatlands, about 1.2 million hectares, are protected. They consist mainly of areas under the national mire protection programme, areas in national parks and nature reserves, and old-growth forest conservation programme and wilderness areas.

The Mire Conservation Group (4.9.2012–30.9. 2015) identified the mire areas that are nationally the most valuable in terms of their natural value and that best complement the current network of conservation areas. The working group presented 16 proposals for action to enhance the state of mire conservation in Finland. During 2015-2016 around 36 000 hectare state-owned mire land

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<sup>1</sup> Excluding emissions from the energy use in agriculture and agricultural emissions reported in the Land Use, Land Use Change and Forestry sector.

both in Southern and Northern Finland were protected based on the proposal by the Mire Conservation Group.

## 2. Past emissions and removals, an update

The Land Use, Land-Use Change and Forestry (LULUCF) sector as a whole acted as a CO<sub>2</sub> sink for 20.8 million tons of CO<sub>2</sub> equivalent (Mt CO<sub>2</sub> eq.) in 2014 (Figure 4). The sink in 2014 was 35% of the total national emissions (excluding LULUCF sector). Between 1990–2014 the net sink has varied between 15.3 and 39.5 million tons CO<sub>2</sub> eq., which equals of approximately 21% to 58% of the annual emissions from other sectors.

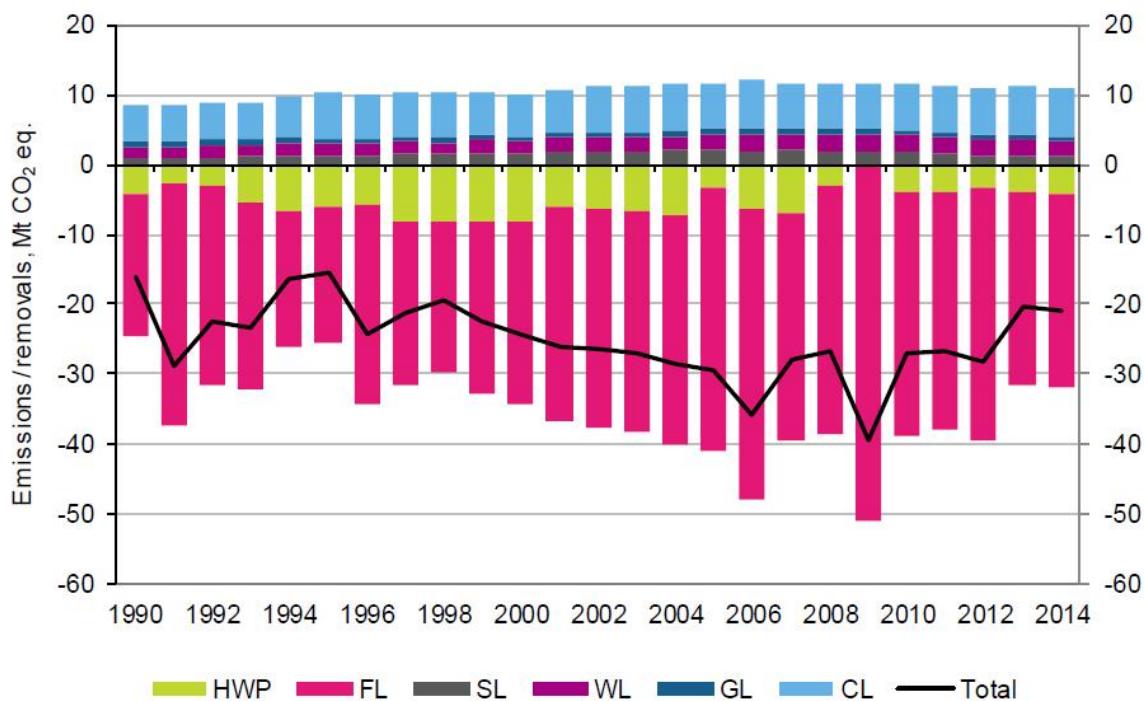


Figure 4. Net emissions and removals in the LULUCF sector by land-use category and harvested wood products, Mt CO<sub>2</sub> eq. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016.

Forest Land has been a net sink, whereas the other land-use categories have comprised net sources. Living biomass comprises the most of the Forest land sink. The soil organic matter (SOM) and the dead organic matter (DOM) pools in mineral forest soils together are also a sink. Organic soils act as a source including also CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from drained soils. Other, minor emission sources of the Forest land category are N fertilisation and biomass burning.

Harvested Wood Products have totaled a net sink even though the paper sub-category has in some years acted as a source.

The level, trend and the inter-annual variability in the sink for the whole LULUCF sector are determined by the forest land sink. The annual volume increment has grown quite steadily, which means that the CO<sub>2</sub> uptake has also grown. According to the National Forest Inventory, the annual increment of growing stock has been increasing since the 1970s, reaching its current level of 105 million cubic metres, of which more than 90 percent million cubic metres is in commercially managed forests.

The high fluctuation in net biomass removals in the Forest Land category during the period 1990-2014 is mainly caused by the changes in the international market of forest industry products, which affect the amount of domestic commercial roundwood fellings. In 2014, the roundwood removals stayed at the same, high level as the previous year at 65 million m<sup>3</sup>. The other significant factor affecting the removals trend in forest land is the increase in the annual volume increment. It rose from 78 million m<sup>3</sup> at the beginning of the 1990s to its present level of 105.5 million m<sup>3</sup>.

## **The 2nd period of Kyoto Protocol**

Under Article 3, paragraph 3, Finland reports emissions and removals from activities Afforestation/ Reforestation (AR) and Deforestation (D), and under Article 3, paragraph 4, from Forest Management (FM) and harvested wood products.

In 2014, Article 3.3 activities acted as a net source of 3.3 Mt CO<sub>2</sub> eq., of which a net emission of 3.82 Mt CO<sub>2</sub> eq. was from Deforestation (Figure 5) and a net removal of 0.57 Mt CO<sub>2</sub> eq. from Afforestation and Reforestation (Figure 6).

In the end of 2014, the area of AR activity was 170,189 ha. It is small compared to the total KP-forest area (0.8%). In the 1990's, the AR area increased more than 10,000 ha per year, but since then the annual increase in the area has decreased continuously being just 1,316 ha in 2014. One reason to this development is that since 2008 the state subsidies are not paid anymore for the new projects for forestation of arable lands.

The land area under D activity in 2014 was 384,201ha, of which 1,419 ha were reforested and hence actually forest. The deforestation rate was in its highest in the first decennial of the 2000's. The economic downturn is presumably the main reason to the reduced deforestation area during the latest years.

Land-use change from forest land to other land uses is difficult to avoid in a country where forests and other wooded land cover 75 per cent of the land area. Most of the change is driven by settlements and infrastructure (e.g. roads and transmission lines) (see Table 1). The emissions and removals from ARD lands vary substantially between the years. This variation is due to the fact that the timing and quantity of land-use changes vary depending on the economy and different incentives. The estimations still include high degrees of uncertainty and will become more accurate as the calculation methods are further developed.

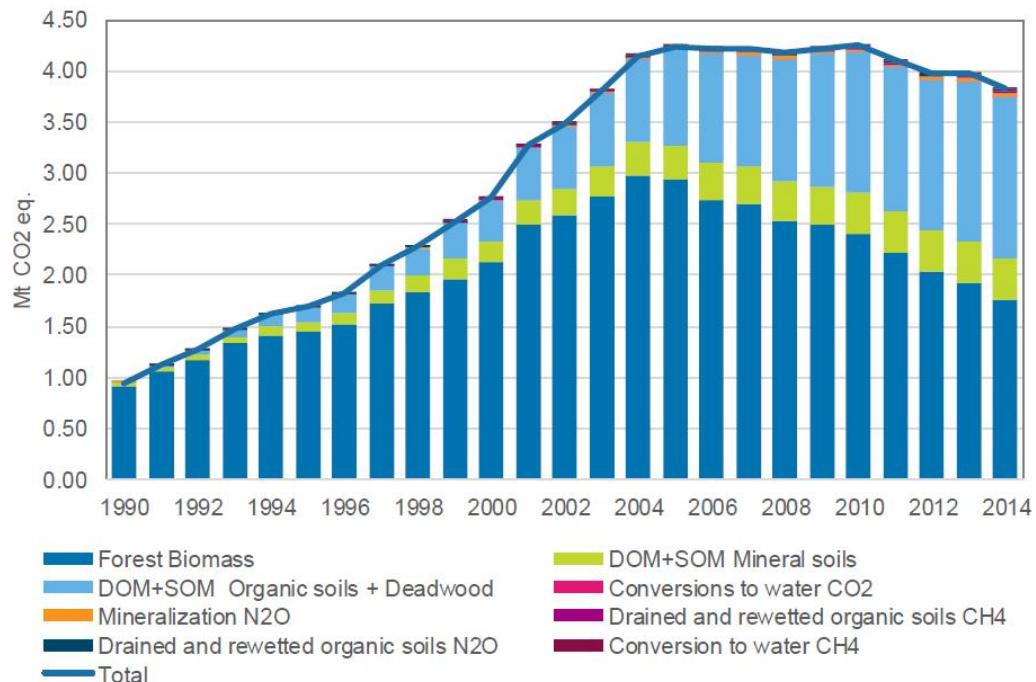


Figure 5. Net emissions and removals from Deforestation, Mt CO<sub>2</sub> eq. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016

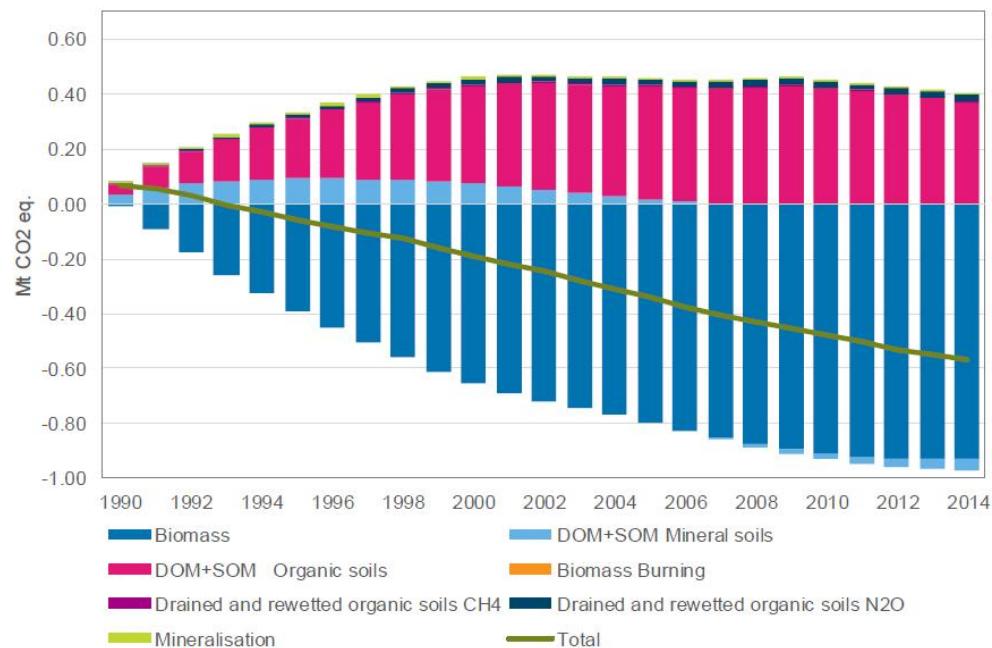


Figure 6. Net emissions and removals from Afforestation and Reforestation, Mt CO<sub>2</sub> eq. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016

Article 3.4 Forest Management was a net sink of 45 Mt CO<sub>2</sub> eq. including the carbon stock change in the Harvested Wood Products pool HWP (Fig 7). The area of FM has decreased 2% since 1990. The inter-annual variation in the sink is mostly a reflection of the changes in commercial round wood markets and the economic situation.

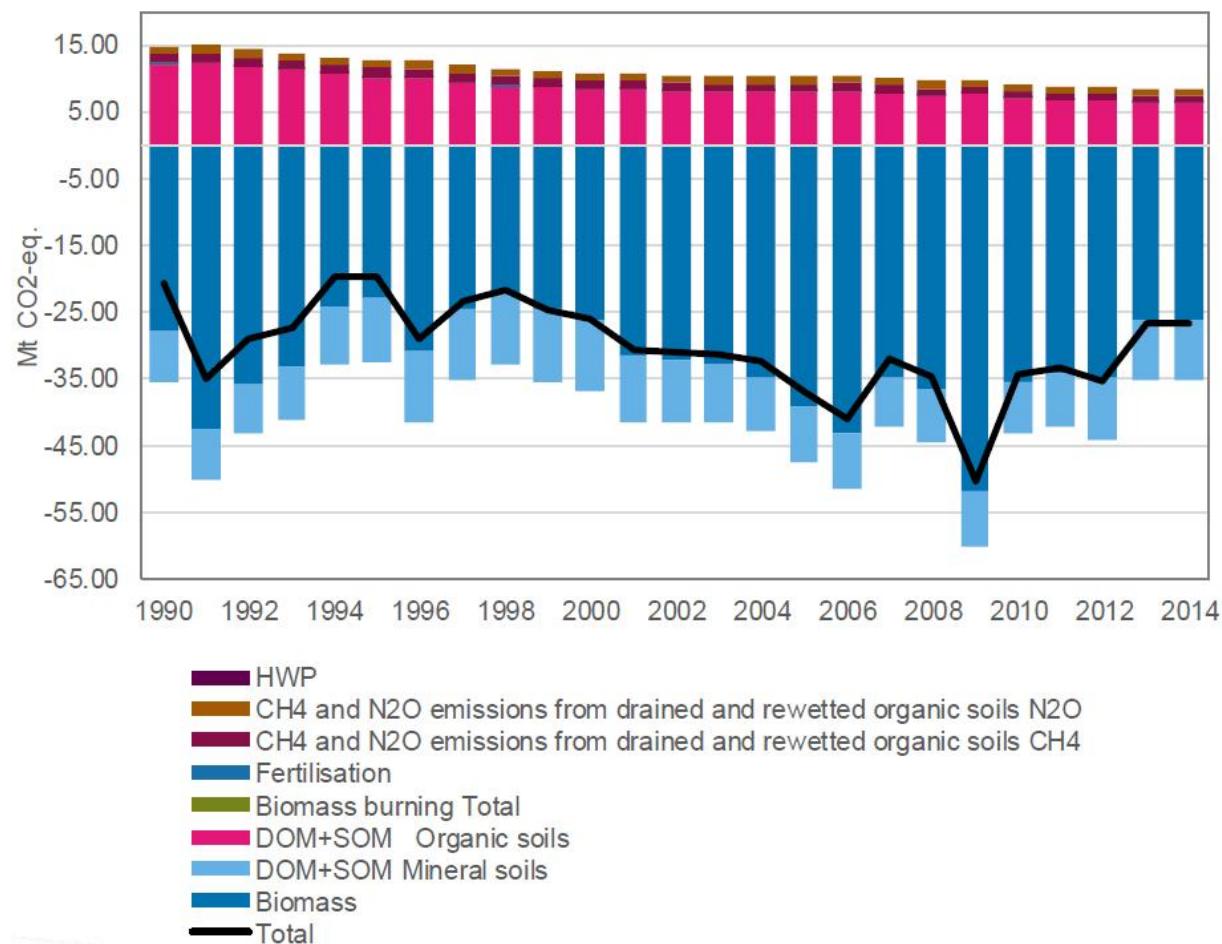


Figure 7. Net emissions and removals from Forest Management, Mt CO<sub>2</sub> eq. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016.

HWP is reported as a carbon stock change in production based HWP stocks originating from wood harvested in Finland including exported HWP. HWP comprise of solid wood products (sawn wood and wood panels) and paper products (wood pulp). The production quantity of pulp was used as a proxy for paper and paperboard production. In Finland, 98.7% of wood pulp is used for paper and paperboard production, and 1.3% (part of dissolving wood pulp) for textile and hygiene products which are exported (percentages are for 2013). Wood pulp production for other purposes than paper and paperboard has started mainly in 2012.

Harvested Wood Products (HWP) pool was a net sink of 4.2 Mt CO<sub>2</sub> in 2014 (Figure 8). HWP

has been a net sink for the whole reported time series. The most important component of the HWP sink was sawn wood. The sink of sawn wood has been at its lowest level in 2009 being 2.0 Mt CO<sub>2</sub> and its highest in 2000 6.6 Mt CO<sub>2</sub> due to changes in the international market. Wood panels has been a sink in 1990–2014 but less than 0.7 Mt CO<sub>2</sub>. Paper and paperboard has acted both as a sink and as a source. Paper and paperboard category is sensitive to the changes in production, since the lifetime of paper is much shorter than of sawn wood and wood panels

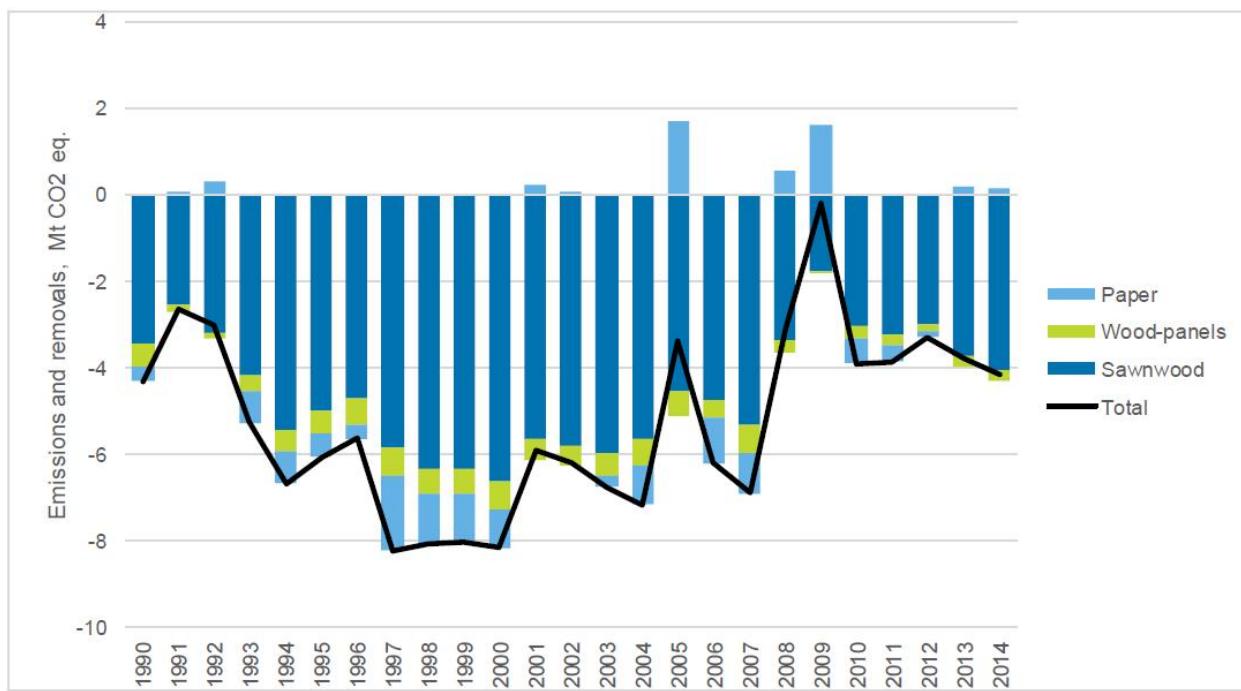


Figure 8. Emissions and removals from HWP categories sawn wood, wood panels and paper products. Source: National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016.

### Information on methodology

Since the 2015 submission, the methodologies included in the IPCC 2006 Guidelines and the KP Supplement have been implemented and the reporting has been developed to fulfil the requirements of the Kyoto Protocol reporting in the second commitment period.

- The projections for croplands and grasslands were compiled using the Dremfia model.
- The development of the tree stock and drain (m<sup>3</sup>) for the LULUCF sector projection is estimated using the MELA model. MELA is a forestry model consisting of two parts: 1) a forest simulator based on individual tree growth and development models, and 2) a linear optimisation package. The information on forest resources, which is based on the national forest inventory, is used as a basis for MELA. The model utilises the roundwood demand and information on stump prices produced by the SF-GTM model. The SF-GTM model is a partial equilibrium model depicting Finland's forestry sector: forestry, the forest industry and the forest product market. The MELA model also provides the input data for

the Yasso model, which is used to project the changes in carbon stocks in mineral forest soils.

- The MELA model is described in the document on forest management reference level calculations for Finland: [http://unfccc.int/files/meetings/ad\\_hoc\\_working\\_groups/kp/application/pdf/awgkp\\_finland\\_2011.pdf](http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_finland_2011.pdf)
- The emissions by sources and removals by sinks and non-CO<sub>2</sub> emissions for ARD and FM were estimated with the same principles and methods as for the UNFCCC reporting. The same QA/QC-procedures were also implemented.
- For the projection of CO<sub>2</sub> emissions/removals from HWP the data from the FAOSTAT database, national forestry statistics and from the Long-term Climate and Energy Strategy were used.

### **3. Update on the projections for emissions and removals for the accounting period,**

The land use, land-use change and forestry sector (LULUCF) as a whole is expected to be a net sink in the future (Table 2), which is also supported by other projections estimated by the Natural Resources Institute Finland (Luke).

Table 2. Historical (1990-2013) and projected (2020-2030) greenhouse gas emissions and removals from the LULUCF sector based on the latest greenhouse gas inventory and the WM projection, respectively. Source: Finland's 2<sup>nd</sup> Biennial Report under the UNFCCC, 17 December 2015.

	Historical							WM Projection		
	1990	1995	2000	2005	2010	2011	2012	2013	2020	2030
Total emissions and removals, million tonnes CO <sub>2</sub> eq.	-15.8	-15.5	-24.5	-29.6	-26.7	-26.2	-27.9	-20.4	---	---
CO <sub>2</sub>	-18.6	-18.2	-27.2	-32.1	-28.9	-28.4	-30.1	-22.6	-10.1	-6.4
CH <sub>4</sub>	1.5	1.5	1.4	1.2	1.0	0.9	0.9	0.9	---	---
N <sub>2</sub> O	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	---	---

\* WM projections do not include CH<sub>4</sub> and N<sub>2</sub>O emissions as they are reported for the first time in the inventory submitted in 2015. Exported harvested wood products (HWP) are included in the historical changes in carbon storage as recommended by the new reporting guidelines but are not yet included in the projections.

### **Forest Management Reference Level**

Projections of emissions and removals from Forest Management for 2013–2020 were produced to construct a Forest Management Reference Level. Finland's FRL is an average value of the projected removals and emissions for the period 2013–2020 and it is based on the long-term Climate and Energy Strategy as well as the National Forest Programme (NFP 2015). Under Kyoto Protocol's 2<sup>nd</sup> Commitment Period (2013-2020) the Forest Management Reference Level

(FMRL) for Finland is -19.3 Mt CO<sub>2</sub> Eq and -20.4 including harvested wood products (HWP).

To estimate the FM area in 2013-2020, the deforestation area was predicted based on the historical deforestation rate. Separate projections compatible with FMRL for activities Afforestation, Reforestation and Deforestation were not produced. A detailed description of the different elements of the Reference Level (etc. policies included, pools, gases, approaches, methods and models) can be found in Finland's FMRL submission to the UNFCCC ([http://unfccc.int/files/meetings/ad\\_hoc\\_working\\_groups/kp/application/pdf/awgkp\\_finland\\_2011.pdf](http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_finland_2011.pdf)).

National Forest Strategy (NFS) 2025 was approved by the Government in February 2015 replacing the National Forest Programme 2015. NFS sets the targets for sustainable forest management and the use of timber. NFS also contains sets of necessary actions to achieve the targets. The impacts on greenhouse gas emissions of the implementation of the NFS have not been included in the WM projection. Estimated decrease of the forest sink is largely due to anticipated increase in demand for wood based energy and products.

### **Estimates for future emissions from Cropland and Grassland**

Estimates of the future emissions from croplands and grasslands are included in the total LULUCF scenarios (Table 2). The future trend has been estimated based on the past development of land use and known changes in agricultural policies. The calculation is based on the current GHG inventory methods.

Cropland and grazing land management has not been accounted by Finland under the Kyoto Protocol. Therefore related figures and scenarios are not yet available. In practice the calculation of cropland management under the KP would be done using the same methods as in the present LULUCF calculations for the purposes of the Convention reporting, and the surface area would also be the same. At present the reporting covers changes in carbon stocks, emissions from the decomposition of peat and emissions from liming as well as nitrous oxide emissions from arable land cleared from forest for a period of one year.

With regard to agricultural soils, CO<sub>2</sub> emissions from croplands and grasslands are not expected to be subject to large changes by the year 2020 according to the existing WEM projection. Emissions from grasslands were projected to remain close to the current level. In 2011 the total arable land area in Finland was about 2.4 million ha. Of this 2.1 million ha was mineral soil and 364,458 ha was organic soil. In 2000 about 15,000 hectares of new arable land was cleared, of which 18% was peatland. The total area cleared has decreased but the share of peatland in the cleared area has grown, reaching a peak level of 40% in 2005 (14,000 ha). Since then the clearing of new arable land has decreased considerably to only 3 – 4 000 hectares a year, of which about a third has been peatland.

The observed increase in farmland area in central and western parts of Finland is linked to targets of increasing farm size and productivity in Finnish agriculture, and to developments in the Common Agricultural Policy since 2000, which have resulted in increasing farmland prices. On the basis of the EU Accession Treaty of Finland, national aid is paid per litre of milk and per

livestock unit, in addition to other CAP payments, of which approx. 90% are payments per hectare of farmland, and only 10% is linked to livestock production. The national payments for milk and cattle animals are higher in the more northern regions where the conditions for production are more difficult than in the southern parts of the country. Milk production has remained quite stable in the central and northern parts of the country but it has gradually decreased in southern Finland, while structural change in other livestock farms has been rapid in all regions (number of livestock farms has approx. halved in 10 years). The proportion of peat soils is also high in northern regions. The aid payments, together with investment aid paid from EU Structural Funds, have encouraged the farms to increase their animal numbers, which leads to a need for additional arable area. It is cheaper for farmers to increase the farm size by clearing forest than by buying or renting. The need for more field area is linked to both better cost efficiency and the need for larger areas for spreading manure due to stricter nutrient limits per hectare.“

#### **4. An analysis of the potential to limit or reduce emissions and to maintain or increase removals**

##### **Forest Management**

Land use, land-use change and forestry (LULUCF sector) contributes to the mitigation of climate change in three different ways: by protecting and increasing existing carbon stocks and sinks; by creating new carbon stocks and sinks; by replacing fossil-based energy, raw materials and products with biomass.

Active management and use of forests maintain their growth potential and carbon sequestration capacity. Forest management and harvesting have direct impacts on the development of forest carbon sinks, with the level and structure of wood harvesting as the most significant factor. This is why in assessing the trend in the forest carbon sink attention is drawn, in particular, to the impact of the different harvesting levels on the size of the carbon sink. The sink in the forest soil develops in line with that in the growing stock. Historically mineral soils have been a sink and organic soils (peatland) a source of carbon. As a whole forest land soil has in recent years been either a minor source of emissions or almost emissions neutral. The emission and sink figures for the soil involve a great deal of uncertainty, including the changes caused by the future climate.

In Finland forests are managed and used in a sustainable manner – forests yield many different benefits and products at the same time and contribute to reaching multiple objectives in a balanced way. The coherence of different policies and objectives on forests is ensured in national forest strategy. A new National Forest Strategy (NFS) was adopted by the Government in February 2015 and it sets main objectives for the forest sector until 2025 (*see chapter 5 for more information on the planned actions*). Forests are an essential part of the Finnish bioeconomy and therefore the NFS aims to increase the use of wood to replace fossil resources with renewable biomass. At the same time the objective is to keep the climate mitigation role of forest sinks by maintaining the level of at least 10-17 Mt CO<sub>2</sub> eq. yearly sequestration in Finnish forests. The government and stakeholders will continue to carry out joint initiatives to promote the use of wood as a renewable material that also contributes to climate change mitigation.

The new long-term energy and climate strategy was published in 24.11.2016 (*see chapter 5 on more information on the Energy and Climate Strategy*). The objectives and measures in energy and climate strategy are consistent with the policy defined in the National Forest Strategy regarding the increase in the use of industrial roundwood and energy wood, and they will help achieve the target set by the directive on promoting the use of energy from renewable sources.

### **Cropland and grassland management**

The potential of mitigation in cropland management and grazing land management activities has been assessed by Natural Resources Institute Finland (Table 3). Increase in grass cultivation (from 54 to 80 per cent) on the current area of organic cropland would reduce the emissions. Since the need for fodder in the country scale is not increasing, the motivation to increase grass cultivation could arise from growing markets of bioenergy (grass for biogas production). This could be achieved e.g. by subsidising bioenergy production from grass biomass.

Afforestation of organic soils would lower the emissions compared to cultivation. However, if it is done by leaving the drainage as such, the peat above the drainage depth is prone to decomposition and the difference in soil emissions will not be large. A more beneficial land use change would be to block the drains and select tree species that can grow in wet conditions (paludisilviculture).

Table 3. Predicted net effect of the different mitigation measures in Cropland (WAM scenario) in 2020–2030, million tonnes CO<sub>2</sub> eq.<sup>2</sup> Source: Natural Resources Institute Finland.

Activity	Reduced emissions (Mt CO <sub>2</sub> eq.).
Favouring grass crops on organic soils	0.32
Controlled drainage on organic soils	0.43
Afforestation of organic soils	0.26
Paludisilviculture	0.13

## **5. A list of national measures related to forestry and agriculture**

### **National Forest Strategy 2025 (2015)**

A new National Forest Strategy (NFS) 2025 was adopted by the Government in February 2015 and it sets main objectives for the forest sector until 2025. The Strategy continues the long tradition of holistic sustainable forest management in Finland and sets out objectives and strategic projects for the Finnish forest sector. The NFS replaced the previous National Forest Programme 2015 as the main national forest policy document.

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<sup>2</sup> Ibid.

The vision of the NFS is "Sustainable forest management is a source of growing welfare". The three strategic objectives of the NFS are: 1) Finland is a competitive operating environment for forest-based business, 2) Forest-based business and activities and their structures are renewed and diversified and 3) Forests are in active, economically, ecologically and socially sustainable, and diverse use. According to the NFS, climate change mitigation and adaptation in forestry are supported by diverse management and use of forest resources. The long-term goal is to adapt forest management practices to meet changing climate conditions.

The NFS is implemented by eleven strategic projects. Those to be considered as the key projects include the development of electronic information and customer services for private forest owners and creating new incentive schemes for promoting entry of timber to the market. The key projects include also improvement of nature management in commercial forests. Forests will play a key part of the Finnish bioeconomy and therefore the NFS aims to increase the use of wood to replace fossil resources with renewable biomass. At the same time the objective is to keep the climate mitigation role of forest sinks by maintaining the level of at least 10-17 million tonnes CO<sub>2</sub> eq. yearly sequestration in Finnish forests. In addition, the government and stakeholders continue to carry out joint initiatives to promote the use of wood as a renewable material contributing also to the climate change mitigation.

The NFS is implemented and monitored in broad cooperation between the public and private sectors. The Ministry of Agriculture and Forestry, supported by the Forest Council, has the overall responsibility for the programme. The Forest Council includes representatives from different administrative sectors, industries, NGOs and interest groups.

In addition, regional forest programmes include development plans for the whole forest sector of the regions concerned. They define the needs and objectives for the management of forests, forest-based businesses and the multiple uses of and protection of forests, and they also suggest the measures and necessary funding for reaching the objectives.

Stakeholder and public participation of the NFS was carried out in several phases of the preparation. Public participation was organised through open stakeholder meetings at the national and sub-national regional levels as well as formal circulation of a proposal for comments.

### **Climate Programme on Agriculture (2014)**

The Climate Programme for Agriculture -"Steps towards environmentally-friendly food" was finalized in November 2014. The Climate Programme for Finnish Agriculture prepared by the Ministry of Agriculture and Forestry aims to further enhance the sustainability of the Finnish food system, which is founded on profitable food production and responsible consumption. By improving sustainability in a comprehensive way it is also possible to increase the profitability of production. The objective is to improve the energy and material efficiency and reduce emissions per litre or kilogram of production.

The Climate Programme for Finnish Agriculture presents a total of 76 measures to facilitate the adaptation of food production and consumption to climate change and/or to mitigate the change.

Key measures identified in the climate programme for Finnish agriculture:

- Carbon sequestration into soil
- Measures relating to the use of peatlands
- Plant breeding
- Plant and animal health and preventing the spread of invasive alien species
- Handling and treatment of manure and more accurate nitrogen fertilisation
- Energy efficiency and the production and consumption of renewable energy
- Reducing food loss all through the food system
- Changes towards a more plant-based diet

Stakeholder consultations were coordinated during the preparation of the programme. Also public consultations were organized before the programme was finalized.

### **The Medium-term Plan for Climate Change Policy (2017)**

The medium-term plan for climate change policy is under preparation (*see chapter 6 for information on the Climate Change Act and medium term plan for climate change policy*). In medium-term plan for agriculture measures to cut down GHG- emissions includes:

- cultivation of organic soils on a multiannual basis without tillage,
- lifting of groundwater level (controlled subsurface drainage) on organic agriculture lands,
- afforestation of organic soils and
- promotion of biogas production.

Both stakeholder consultations and public hearings have been and will be arranged during the process.

### **National Energy and Climate Strategy (2016)**

Finland's long term target for climate policy is to have a carbon neutral society. The concrete actions to reach 2030 objectives and the long-term climate target are included in the national energy and climate strategy (2016). Energy and climate strategy is in line with the Government Programme<sup>3</sup> as well as with the commonly set EU targets. To be able to reach the 2030 objectives and long term target, additional actions are needed in all the sectors.

The approach in the energy and climate strategy is that the policies in the different sectors are coherent taking into consideration both climate and energy policies as well as the economic growth and the employment. When drawing up the national energy and climate strategy, attention were paid to special characteristics of Finland, such as cold climate, sparse population, long transport distances, energy intensive industry and to the own supply of raw materials.

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<sup>3</sup> Finland, a land of solutions; Strategic Programme of Prime Minister Juha Sipilä's Government 29 May 2015

In the energy and climate strategy actions aimed at increase sinks as well as decrease emission in the LULUCF -sector are:

- Ensuring the sustainable use and management of forests (incl. biodiversity), especially through balanced implementation of the National Forest Strategy emphasizing forest health, growth and carbon sinks.
- Investigating possibilities to increase afforestation.
- Defining and implementing measures to reduce deforestation.
- Developing farming to increase sinks and launching a pilot project to increase sinks on farms. Developing measures to monitor soil carbon sequestration in agricultural soils.
- Studying the influence of CAP to soil carbon. Preparing proposals how in the renewal of CAP, farmers could be encouraged to increase sinks.

The actions in the energy and climate strategy also include enhancing long term carbon storages in HWP through promoting the use of wood in construction.

## **6. Existing and planned policies and their impact, an update**

The **Climate Change Act (609/2015)** entered into force on the 1<sup>st</sup> of June 2015. The Act provides the basis for a long-term and cost-efficient planning and follow-up for Finland's climate policy aiming at reduce anthropogenic greenhouse gas emissions, mitigate climate change and adapt to change. The Act sets the minimum 80 percent objective to reduce greenhouse gas emissions by the year 2050 compared to the level of emissions in 1990. With the act the participation of the parliament and the public were strengthened in the planning process. The Climate Change Act is a framework regulation concerning the state authorities and it does not contain substance regulations for sectors. The Act regulates on the planning system of the climate policy including 1) medium term climate policy accepted by the government in an electoral period; 2) the long-term climate policy plan/roadmap at least once every ten years, and 3) the national adaptation plan to the climate change.

**Strategic Programme of the Government** was approved on the 29<sup>th</sup> of May 2015. One of the strategic, long-term objectives is enhancing bioeconomy, circular economy and cleantech. Key project for the government term includes for instance 1) enhancing carbon-free, clean and renewable energy cost-efficiently; 2) wood on the move and new products from forests, 3) breakthrough of a circular economy, getting waters into good condition; 4) Finnish food production will be profitable, trade balance on the rise; 5) nature policy based on trust and fair means.

The goal of the Finnish Government is to increase the yield of the bioeconomy from the present €60 billion to €100 billion and to create 100,000 new bioeconomy jobs by 2025. These targets are included in **the Government Resolution on Bioeconomy** on the 5<sup>th</sup> of May 2014, which is aimed at spurring renewal in Finnish business and industry, and spurring economic growth in the new important fields of the bioeconomy and cleantech. The four focal points of the strategy are 1) creating a competitive operating environment for growth in the bioeconomy, 2) creating new bioeconomy business activities through risk financing, bold experiments, and transcending boundaries between different sectors, 3) upgrading the bioeconomy knowledge base by

developing education and research activities and 4) securing the availability of biomass, a functioning market for raw materials, and the sustainability of use. Wood is expected to be more in demand in the production of renewable forest energy, biofuels, in new bioeconomy products such as clothing, fiber packages, composites, pharmaceuticals, cosmetic and in wood construction.

### **Existing legislation and policies on forestry**

The Forest Act sets requirements for felling as well as for regeneration and the conservation of certain forest habitats. **The Forest Act** was revised in 2015 allowing for more diversified management methods, such as uneven aged forest management, and to encourage the natural regeneration of forests. The biological diversity is safeguarded in commercial forest through preserving key habitats and by leaving dead wood after final harvesting in commercial forests. The list of key habitats (habitats of special importance for preserving diversity) included in the Forest Act (§10) were also revised and additional habitats were included in this section.

The Forest Act is complemented with the Guidelines for Good Forest Management, which have been compiled and promoted by public forest advisory organisations. The Guidelines for Good Forest Management have been renewed, parallel to the Forest Act process.

The **Forest Biodiversity Programme for Southern Finland** (the METSO Programme) is an important instrument to preserve biodiversity in managed forests. The policies and measures outlined in METSO Programme is an integral part of the range of instruments in the National Forest Strategy implementation to protect biological diversity of forests in the future. The METSO programme is being implemented jointly by the Ministry of Agriculture and Forestry and the Ministry of the Environment. METSO targets both private and state-owned land. The programme is being implemented through ecologically efficient, voluntary and cost-effective means. A revised Government resolution on METSO was approved 5.6.2014 and it will set goals up to 2025.

Forestry is a significant income source for forest owners, while it also provides benefits to society at large. **Private and public organisations** provide guidance and advisory services for forest owners. A private forest owner may also receive financial support from the state for forest management and improvement work. State support encourages measures with long-term impacts. Managing the natural environment in commercial forests is promoted through environmental support and forest nature management projects.

Public funding for forestry is based on **the Act on Financing of Sustainable Forestry**. The Act was revised in 2015. In the preparation the new EU State aid guidelines have been taken into account to the extent this has been possible on the basis of the draft guidelines available during the preparation process. The measures supported under the act include forest regeneration (9 934 ha), tending of young stands (63 790 ha), remedial fertilization (10114 ha), preventing annosus root rot (41 182 ha), management of peatland forests, private road improvement and construction of new forest roads.

Funding could also be granted for environmental support and nature management projects as

well as support for nature values, if this will be allowed by the State aid guidelines. Environmental aid may be granted for additional costs and income losses due to the preservation and management of habitats of special value. The state also finances forest nature management projects. The works to be designed and implemented in these projects are defined in further detail in the legislation. Most of the forest nature management projects have special regional importance. In 2015 a total of 1.735 million euros were used for environmental support and 1.337 million for nature management projects.

## **Existing and planned policies Agriculture**

Finnish agricultural policy is based on the view that the competitive disadvantage due to natural conditions (such as the short growing period, low temperatures, frosts and problematic drainage conditions) must be compensated for in order to have profitable domestic production and to make agriculture sustainable and multifunctional. The objectives of sustainable and multifunctional agriculture include taking into account greenhouse gas emissions, the possible need for adaptation measures and other environmental and socio-economic aspects. These objectives can be reached through the Common Agricultural Policy (CAP) of the EU as well as through national measures. According to conclusions also made by the European Council, agricultural production should continue in all areas of the Community.

The most effective climate policy measures can conflict with agricultural policy objectives and measures, such as securing the availability of food and animal welfare and reducing the load on waters. If Finnish consumption patterns remain unchanged, a reduction in domestic agricultural production would probably not reduce global greenhouse gas emissions because domestic production would be replaced by production elsewhere.

The cultivated area, selection of crops and animal numbers are largely driven by the Common Agricultural Policy: Common rules for direct support schemes under CAP. Changes in agricultural policy and farming subsidies have had a significant influence on the economic structure of Finnish farms. The amount of farms and livestock has decreased by almost half while average farm sizes have doubled. The CAP has been renewed for the time period 2014-2020 (Regulation (EC) No 1307/2013 and 1305/2013). As from 2015 new environmental requirements will be incorporated into the direct payments under the Common Agricultural Policy of the EU. It was decided that 30 per cent of the direct payments are tied to the so-called greening measures. There are three greening measures that the farmers must implement in their eligible area.

1) Crop diversification: at least two cultivated crops on farms with an area of 10-30 hectares of arable land and three crops on farms with over 30 hectares of arable land. By derogation, only two crops are required on farms with over 10 ha on farms located in support area C. The rule does not concern farms with over 75 per cent of grass and/or fallow if the arable area in use is not more than 30 hectares.

2) Preserving permanent grassland; in the whole country the area of permanent grassland may not decrease by more than 5%; also preservation requirement for grasslands in the Natura areas.

3) Requirement concerning ecological focus area: the minimum of 5% of the area of the farm must be so-called ecological focus area (e.g. fallow, nitrogen-fixing plants and short-rotation

energy wood). The required share may increase to 7% in 2018. Possible derogations for areas and farms that meet certain requirements (e.g. areas dominated by forest and farms with mostly grassland and/or fallow).

The Rural Development Programme for Mainland Finland 2014-2020 has been approved by the Commission in December 2014. In the Programme there are several measures for climate change mitigation and adaptation: environment payment for incorporation of slurry, recycling of nutrients and organic matter, environment management of grassland, plant cover on arable land in winter and use of organic mulch for horticulture crops and seed potato to increase the amount of carbon in arable soil. Agricultural investment aid may be targeted to controlled subsurface drainage and more efficient handling, storage and use of manure. Whether there is enough funding available for the different purposes depends on the number of applications submitted. Implementation has started in 2015. The rural development program measures also promote water protection in agriculture, manages nutrient run-off and improves farmland biodiversity. These measures help agriculture in climate change mitigation because climate change is supposed to increase the water protection challenges and increase the speed of biodiversity losses.

Nitrates directive (1991/676/EEC) is a part of cross-compliance which is implemented in whole Finland. The reduced use of nitrogen fertilisers and improved manure management resulting from the measures defined in the directive has decreased not only nutrient losses to water systems but also the greenhouse gas emissions. For example, the use of mineral fertilisers has decreased by 39 % (based on sales statistics) between 1990-2012.

## 8. Literature and links

- 6th National Communication of Finland to the UNFCCC

[http://unfccc.int/national\\_reports/annex\\_i\\_natcom/submitted\\_natcom/items/7742.php](http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/7742.php)

- Second Biennial Report of Finland to the UNFCCC, December 2015

[http://unfccc.int/files/national\\_reports/biennial\\_reports\\_and\\_iar/submitted\\_biennial\\_reports/application/pdf/fi\\_br2\\_tk\\_20151217\\_final.pdf](http://unfccc.int/files/national_reports/biennial_reports_and_iar/submitted_biennial_reports/application/pdf/fi_br2_tk_20151217_final.pdf)

- National Inventory Report under the UNFCCC and the Kyoto Protocol, 15 June 2016

[http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/9492.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9492.php)

- Submission of information on forest management reference levels by Finland

[http://unfccc.int/files/meetings/ad\\_hoc\\_working\\_groups/kp/application/pdf/awgkp\\_finland\\_2011.pdf](http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_finland_2011.pdf)

- The National Forest Strategy 2025

<http://mmm.fi/documents/1410837/1504826/National+Forest+Strategy+2025/197e0aa4-2b6c-426c-b0d0-f8b0f277f332>

- The Climate Programme for Finnish Agriculture

[http://mmm.fi/documents/1410837/1890227/Climate\\_programme\\_agriculture\\_WEB\\_03072015.pdf/](http://mmm.fi/documents/1410837/1890227/Climate_programme_agriculture_WEB_03072015.pdf/)

- National Energy and Climate Strategy 2016

<http://tem.fi/strategia2016> [in Finnish and Swedish]

- The Rural Development Programme for Mainland Finland 2014-2020

<https://www.maaseutu.fi/en/rural-development-programme/objectives-of-the-program/Pages/default.aspx>

- Finland, a land of solutions; Strategic Programme of Prime Minister Juha Sipilä's Government 29 May 2015

[http://valtioneuvosto.fi/documents/10184/1427398/Ratkaisujen+Suomi\\_EN\\_YHDISTETTY\\_netti.pdf/8d2e1a66-e24a-4073-8303-ee3127fbfcac](http://valtioneuvosto.fi/documents/10184/1427398/Ratkaisujen+Suomi_EN_YHDISTETTY_netti.pdf/8d2e1a66-e24a-4073-8303-ee3127fbfcac)

- The Finnish Bioeconomy Strategy

[http://biotalous.fi/wp-content/uploads/2014/08/The\\_Finnish\\_Bioeconomy\\_Strategy\\_110620141.pdf](http://biotalous.fi/wp-content/uploads/2014/08/The_Finnish_Bioeconomy_Strategy_110620141.pdf)

- Greenhouse gas scenarios for agriculture, forestry and other land use (GAF) – project 2013. MTT Agrifood Research Finland.

[https://portal.mtt.fi/portal/page/portal/mtt/tutkimus/Hankehaku/Hankkeentiedot?p\\_kielikoodi=FI&p\\_hanke\\_seqno=381664](https://portal.mtt.fi/portal/page/portal/mtt/tutkimus/Hankehaku/Hankkeentiedot?p_kielikoodi=FI&p_hanke_seqno=381664)