

INFORMATION ON LULUCF ACTIONS IN ESTONIA

Progress report under LULUCF Decision 529/2013/EU Art 10

Submission to the European Commission

Tallinn 2020

Introduction

According to the Decision No 529/2013/EU of the European Parliament and of the Council of 21 May 2013 and its article 10, Member States shall draw up and transmit to the Commission information on their current and future LULUCF actions to limit or reduce emissions and maintain or increase removals resulting from the activities referred to in Article 3(1), (2) of the Decision. Member states shall also submit a report describing the progress in the implementation of their LULUCF actions by the date halfway through each accounting period, and by the end of each accounting period. Current progress report is submitted final report for the accounting period from 1 January 2013 to 31 December 2020. The activities referred to in Article 3(1) are afforestation, reforestation, deforestation and forest management. Activities in Article 3(2) are cropland management and grazing land management which Member States shall prepare and maintain annual accounts for. The accounting period for cropland management and grazing land management activities begin on 1 January 2021. Prior to 1 January 2022, Member States shall provide and submit to the Commission each year initial, preliminary and non-binding annual estimates of emissions and removals from cropland management and grazing land management. According to Article 3(3) Member States may also prepare and maintain accounts that accurately reflect emissions and removals resulting from revegetation and wetland drainage and rewetting. The accounts referred to in paragraphs 1, 2 and 3 of the Decision, shall cover emissions and removals of the greenhouse gases like carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O).

The information on LULUCF actions has to cover the duration of the accounting period of 1 January 2013 – 31 December 2020. In the information on LULUCF actions the following information relating to the activities required in the Decision are:

- a) a description of past trends of emissions and removals including, where possible, historic trends, to the extent that they can reasonably be reconstructed;
- b) projections for emissions and removals for the accounting period;
- c) an analysis of the potential to limit or reduce emissions and to maintain or increase removals;
- d) a list of the most appropriate measures to take into account national circumstances, including, as appropriate, but not limited to the indicative measures specified in Annex IV of the Decision, that the Member State is planning or that are to be implemented in order to pursue the mitigation potential, where identified in accordance with the analysis referred to in point (c);
- e) existing and planned policies to implement the measures referred to in point (d), including a quantitative or qualitative description of the expected effect of those measures on emissions and removals, taking into account other policies relating to the LULUCF sector;
- f) Timetables for the adoption and implementation of the measures referred to in point (d).

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Enhanced communication

Ministry of the Environment (MoE) as the ministry responsible for preparing and finalizing the Information on LULUCF actions progress report had several communications with other ministries and departments in order to provide complete and accurate data for submission to the European Commission.

Close cooperation and information exchange was established with the Ministry of Rural Affairs and Estonian Environment Agency. Estonian Environment Agency (ESTE A), a state authority administered by Ministry of the Environment, had main responsibility to provide historical trends and future projections of greenhouse gas (GHG) emissions and removals.

The tasks of the Forest Monitoring Department of the ESTE A are to plan, organize and perform forest monitoring and applied research, National Forest Inventory (NFI), land-use and land use change and carbon cycle monitoring, and to control, process and analyse monitoring data, comply national and international reporting obligations.

In addition to previous, many specialists from various departments of the MoE were incorporated to a process of compilation of the progress report of information on LULUCF actions. The involved departments were Water Department, Climate Department, Forest Department and Nature Conservation Department. Coordination of the work to compile the report was done by Forest Department of the MoE.

Overview of national circumstances

The overview of national circumstances has been described in the initial report of LULUCF actions submitted to the European Commission on 1.07.2014.

According to NIR 1990–2018, in 2018 LULUCF sector acted as a CO₂ sink, resulting in net carbon uptake of 1 990.18 kt CO₂ equivalent. This means that total removals arising from the sector exceeded total emissions.

The area of different land use classes have been updated according to the National Forest Inventory (NFI) and the numbers are as follows (1000 ha):

- Forest land 2 446.3
- Cropland 1 003.3
- Grassland 275.4
- Unmanaged Wetlands 398.9
- Peat extraction areas (included in Wetlands) 18.8
- Flooded wetlands 6.2
- Settlements 347.6
- Other Land 37.5

More information can be found in NIR 1990-2018¹.

Area estimates for land-use categories and land-use changes are obtained from the NFI, carried out by the Estonian Environment Agency. The NFI is a systematic collection of forest information on randomly based sample plots that cover the whole country and all land-use categories. The NFI also provides information on soils, distribution of mineral and organic soils as well as into drained and undrained land

The first National Forest Inventory covering the whole country commenced in 1999. With rather modest means the NFI is able to give a quite precise assessment of forest area, resources and cutting volume. At present, the actual themes of the NFI monitoring system include global carbon cycles and the observation of features related to the protection of biological diversity.

Methodologically, the NFI is designed as an annual research effort, which, using optimal methods, must ensure the continuous updating of information and the forest database. A network of sample plots, covering the whole country, has been planned for five years with 20% or approximately 375 clusters (ca 5 500 sample plots) measured each year, so that permanent plots will be re-measured every 5 years. Point estimates of parameters are calculated using data from the sample plots and form the basis for inferences to the entire population. More detailed information about sampling scheme, design and density of sampling is described in Adermann (2010).

Starting from NFI 2015 average standing volume is calculated for every year based on 15- years trend. Previously it was calculated based on five years measurements. Two consecutive years are independent samples and average standing volume estimates have confidence intervals; therefore, the new methodology is more accurate.

In order to collect data about land-use transitions, additional field studies started in 2009 in the framework of NFI. This methodology follows the example of the Finnish NFI. Collected data provides information on different land-use classes (origins retrospectively 20 years), the year of changes and also soil type. During land category registration, “LULUCF former land category” is registered on every sample plot if the land category has changed after base point (31.12.1989). The year of change is being estimated first directly in the field. Older maps and aerial photographs are used afterwards as supporting material to determine the exact year more accurately. Since

¹ National Inventory Report 1990-2018. <https://unfccc.int/documents/194747>

1999 there has been information available on permanent sample plots. The resulting data set is a matrix with previous and the current land-use classes in the timeline.

The NFI determines more land categories than in the 2006 IPCC LULUCF, therefore some aggregation has been made. Not all national and IPCC land use categories have exact match, few national land-use categories can be forest land or grassland and it is specified in the field.

1. A description of past trends of emissions and removals

Under Article 3, paragraph 3 of the Kyoto Protocol (KP), Estonia reports emissions and removals from Afforestation (A), Reforestation (R) and Deforestation (D), and under Article 3, paragraph 4, emissions and removals from Forest management (FM). In accordance with Article 3.2(b) of decision 529/2013/EU, Estonia has submitted to the Commission also annual estimates of emissions and removals from Cropland management (CM) and Grazing land management (GM) for the base year 1990, and years 2013–2018.

The estimates of emissions and removals are prepared and reported consistently with the 2006 IPCC Guidelines, it's KP Supplement, Wetlands Supplement and the relevant CMP decisions. Methodologies and data sources are described in detail in NIR.

Estonia applies the same forest land, cropland and grassland definitions for both UNFCCC and KP reporting and all forest land, cropland and grassland areas are considered managed. It is assumed that cropland, wetland and settlements conversion to forest land reported under the Convention is directly human-induced land conversion. These areas are summed in order to get the AR area. Conversion of the grassland and other land into forest land is considered as not directly human-induced. Grassland conversion to forest occurs mainly due to natural succession after land abandonment, therefore these areas are not taken into account for Afforestation reporting. The FM area coincides with the total forest land area from which the Afforestation/Reforestation area has been subtracted. All land use changes from forest land to other land-use categories reported under the Convention are considered Deforestation.

CM area corresponds to the area of cropland category reported under the Convention, excluding lands which came from D. CM area also includes croplands that are converted after 1.1.1990 to wetlands, settlements and other land; however, emissions arising from cropland conversions to non-accounted land-use categories are accounted zero. Total land area subject to GM is calculated as for CM.

There are a number of factors that have affected the use of land during the last 20 years. The most important of these is the land reform, but also accession to the European Union, economic rises and falls. Past trends of emissions and removals for the period 1990-2018 are shown in Figure 1.

AR emissions/removals have been quite stable, depending mostly on AR activities, what have been implemented mainly in agricultural lands and exhausted quarries. AR removals reached maximum in 2013, when net CO₂ sequestration of the AR was -259.7 kt CO₂ eq. In 2018, AR activities resulted in net removal of -208.6 kt CO₂ eq.

Emissions and uptake from FM are predominantly determined by changes in forest growing stock. The early 2000s, the rate of logging was higher compared in the previous 10 years, which can be explained by the outcome of land reform and the economic boom taking place. In 1992, 2002 and 2006, extensive wildfires spread, having impact on the annual emissions of these years. After 2002, annual net CO₂ sequestration started to increase, reaching its maximum net removal of -5 098.8 kt CO₂ eq. in 2003 (without HWP). During 2005–2008, annual net CO₂ sequestration of the FM was a lot lower compared to previous years. It is assumed, that 2005 NFI developments and uncertainty from sampling caused such a peak (Figure 1). After 2009, net removal of CO₂

from FM category started to increase again. In 2014-2018 the emissions fluctuated depending mainly on fellings. The net removal from forest land was -2 703.9 kt CO₂ eq. in 2018.

Harvested wood products (HWP) include all wood products in use in Estonia. The net emissions in the HWP category in 2018 were -1 097.1 kt CO₂. Increases in removals in HWP are associated with the increase in the harvest rate. For example in 2003, when was the highest CO₂ sequestration in FM, the HWP net removal was also high, reaching -1 078 kt CO₂. During periods when consumption and harvesting rates were low (1990–1994), the HWP pool became a source of CO₂.

Emissions from D peaked in 2009–2010 at about 580 kt CO₂ eq. and have decreased since then. In 2018, D activities resulted in net emission of 294.7 kt CO₂ eq.

The management intensity of agricultural lands has changed considerably since Estonia re-gained its independence from the former Soviet Union in 1991. The propitious conditions in agricultural sector were abolished and an overall decline characterised Estonia's agriculture from 1991 until 2005, accompanied with the decrease in net CO₂ eq. emissions from CM. As from 2005, managing croplands has been increasing again due to increased investments and subsidies from the European Union to Estonian's agricultural sector, expansion of export opportunities and popularization of organic farming. In 2018, total emissions from CM were 284.9 kt CO₂ eq., mainly originating from cultivated organic soils and partly balanced by C sequestration in mineral soils.

The spatial share of the grassland category is 6.1% of the overall Estonian area, ranking grasslands as the fourth largest land-use category after wetlands. By 2018, the area of grasslands has decreased by 4% compared to 1990s. Due to natural succession, when the tree crown cover of grasslands exceeds 30%, the land is reallocated to the forest land category, which is the reason behind the decrease in grassland area. Grazing land Management has been a small net source of GHGs throughout the period of 1990-2018. Total GHG emissions from GM were estimated at 17.6 kt CO₂ eq. in 2018. As under CM, organic soil has been a significant source of CO₂ while C stock in mineral soils has increased due to land use change to grasslands. Conversions to GM occur chiefly from the croplands category, mostly caused by abandonment of old croplands.

Spatial share of the grassland category is 6.4% of the overall Estonian area, ranking grasslands as the fourth largest land-use category after wetlands. By 2015, the area of grasslands have decreased 5% compared to 1990s. Grazing land Management has been mostly a net source of GHGs throughout the period of 1990-2015 (except the year 2013), depending mostly on the changes of living biomass on grasslands. In the beginning of the 2000s, fast biomass increase characterized grasslands, mostly caused by abandonment of old croplands. Due to natural succession, when the tree crown cover of grasslands exceeds 30%, the land is reallocated to the forest land category, which is the reason behind the decrease in grassland (Grazing land Management) carbon uptake by biomass. The net emissions from Grazing land Management was 37.6 kt CO₂ eq. in 2015.

2. Projections for emissions and removals for the 2016-2035

Current paragraph provides projections for GHG emissions and removals for the period 2019-2035. Projections have been compiled using data from NIR 1990-2018, National Forestry Accounting Plan 2021–2025² and report pursuant to Art 40.4 (b) of Regulation (EU) 749/2014.

The areas under AR, D, FM, CM, and GM activities were expected to remain constant at the 2018 level. It was also assumed that land conversions to and from forest land will continue to occur at the same level as the average of 2014–2018, and related emissions for the period 2019–2035 were estimated at -228.0 kt and 355.0 kt CO₂ eq. for the AR and D, respectively (Figure 1).

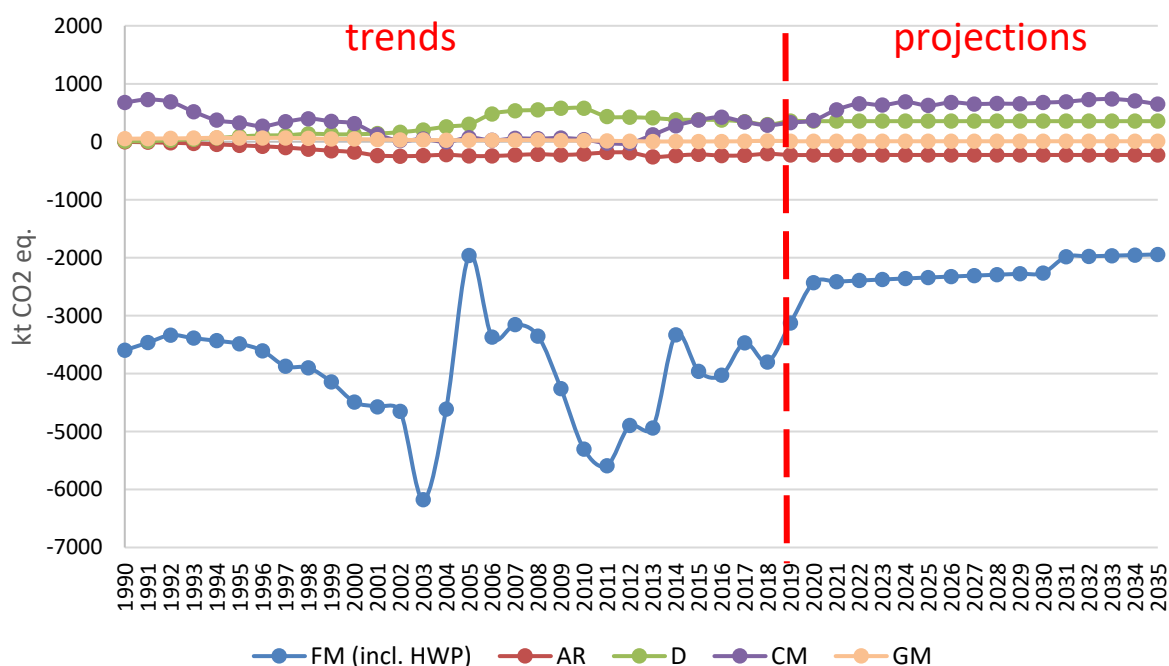


Figure 1. Past trends and future projections of GHG emissions and removals from Afforestation/Reforestation, Forest management, Cropland management and Grazing land management for the period 1990–2035

The projections for FM and HWP are based on the uniform final felling scenario described in the National Forestry Accounting Plan 2021–2025. In this scenario, an average even annual final felling area is assumed during the whole rotation period. The growing stock is expected to increase slightly despite the moderate decrease of annual increment. Carbon stock changes in soils and dead organic matter were estimated as the average of the 2014–2018 period. Non-CO₂ emissions from drained forest and wildfires were estimated with similar approach. According to the projections, areas under FM will continue to sequester carbon, although to a lesser extent than the current level. In 2035, net removal from FM (including HWP) is estimated at -1 943.7 kt CO₂ eq. Main reason behind the declining C sink is the increasing share of very young and old stands where sequestration is lower.

Emissions from CM are expected to increase compared to the current level, even so cropland area,

² National Forestry Accounting Plan 2021-2025 [www]

https://www.envir.ee/sites/default/files/national_forestry_accounting_plan_2019_final.pdf

land use and management practices are expected to remain the same. The reason behind this is that Estonia uses default method with aggregated activity data for calculating C stock changes in cropland mineral soils. According to this methodology, soil organic C reaches a stable value over 20 years given that land use and management practices do not change during that period. Therefore mineral soil C sink starts to decrease. In 2035, projected GHG emissions from the Cropland category are 722.2 kt CO₂ eq.

Net emissions from GM in the period 2019–2035 are estimated at 8.6 kt CO₂ eq., which is the average of the 2014–2018 emissions.

3. Analysis of the potential to limit or reduce emissions and to maintain or increase removals

LULUCF role as a sink or source of GHGs in the future will be determined by the forest management practices, usage of peat soils and practices used in Cropland Management and Grazing land Management.

Total Forest Land area has increased by 3.6% compared to 1990. These changes result mostly in the reallocation of grasslands to the Forest land category: when the tree crown cover of grasslands exceeds 30% due to natural succession, then the land is counted as Forest land. It is expected that the increase in the area of forest land continues, but with limited numbers. However, forest growing stock is one of the most important factors of keeping LULUCF sector GHG emissions and removals balance on a sink side. In 2018, the total forest land area in Estonia was 2.33 million hectares and the total growing stock of stands was 480 million m³. The total growing stock of stemwood, growing stock per hectare of forest area, as well as the annual increment of growing stock has been increasing gradually since 2000. For the last 15 years, the felling volume has been smaller than the increase of growing stock. For example in the period 2007–2017 the average felling volume has been 8,8 million m³ and the average annual increment of growing stock for the period in managed forests was 12.8 million m³. Forest growing stock has raised due to both increase in forest land area as well as its average age. The age structure of managed forests in Estonia are dominated by mature stands. Approximately 39% of forest stands are more than 60 years old. Due to the high proportion of mature forests, management is needed to increase carbon sequestration capacity. Therefore the rejuvenation of forests by regeneration felling in the coming years is reasonable to harmonise the age structure in forest available for wood supply. Although carbon sequestration will temporarily decrease in the coming years, but it will increase in the long run. According to current situation Estonia needs to look forward into the future, plan forestry activities and make our forests fit for climate change.

Taking into account the pattern of growth function of Estonian forests and the structure of forest resources, the renewal of our forests is extremely important. About one third of Estonian forests are mature (meet the criteria of regeneration cuttings) and additional 10% reaches the same state in the next 10 years. Old forests are more prone to storms, diseases and fire, and their ability to sequester carbon is much lower than that of forests in an optimal growing stage. In addition, overgrown forests start to lose their economic value in the course of time. As forest management and timber industry is one of the most important economic sectors in Estonia, there is a great demand for the renewal of forests that have reached the criteria of cuttings. Forestry provides employment, especially in the rural areas, and contributes to state budget. Maintained felling rates will result in decrease of forest carbon stock, but at the same time the Harvested Wood Products (HWP) pool will increase as well. Although negative in respect of carbon balance, part of the wood from felling can be used for heat and electricity production –energetic use, which contributes to renewable energy targets agreed at the EU and the national level. Using renewable

energy sources like wood instead of oil shale will be extremely important for Estonia in a long run.

In Estonia, there are two main strategical documents that set goals for forest biodiversity conservation. These are Nature Protection Development Plan and Forestry Development Plan. These strategies are based on analyses, including strategic assessment of the impact to the environment, as well as on agreements between different stakeholders. Both of these strategies for the period of 2011-2020 have set not only a quantitative goal to strictly protect at least 10 % of the forest area, but as well a goal to improve the quality of the protected areas. Estonia has been very successful in achieving both of these goals: today, approximately 14 % of the forest area is under strict protection (no management) and also, in recent years we have actively improved the quality of the protected areas. To meet the second goal the main actions have been: a) re-evaluating protected areas, including Natura 2000 areas, and if necessary, adjusting the protection measures and b) analysing and taking measures to cover the gaps of protection for different forest types to ensure the preserving of their characteristic biota. These actions also consider older forests as well as other ecologically valuable forests. Shortly, as a result, during last 5 years, the overall protected forest area has increased more than 50 000 ha and more than 75 000 ha of different (mostly forest) habitats have been re-zoned from the limited management zone to strictly protected zone. Protection sites are divided into different zones with different restrictions.

In limited management zones regeneration cutting is forbidden but some activities described in protection management plan are allowed. In addition to preserving biological diversity, also forest carbon stock can be maintained in forest areas under protection. Forest management in the restriction zones of protected areas should fulfil the task of protection of natural values. Considering the large surface area of limited management zones, developing such practice would be purposeful. In the course of preparation of protection rules, it is necessary to analyse the socio-economic impacts occurring with implementation of the protection regime in order to assess alleviation measures.

From 1991, when Estonia regained its independence, arable lands were abandoned due to the reduced demand for local food products, which was caused by the availability of cheap import goods as a result of opened markets. Significant part of abandoned croplands were converted to forests. Due to insufficient forest planting and lack of afforestation of the non-used arable land, there are more than 208,500 ha of grey alder woods, which is 8.9% total forest land area. Grey alder grows on abandoned fields and meadows, but also grows on our most productive forest soils and site types (sorrel, hepatica, goutweed and fern). It is considerably more purposeful to use these areas for growing economically and ecologically more valuable species, especially spruces and broad-leaved tree species.

In order to provide efficient forest management, the development and maintenance of infrastructure is also very important. Appropriate infrastructure for favourable water regime and better access to forests helps to balance production conditions of private forest management in various rural areas. In order to prevent forest fires and other dangerous damages of forests, better biological preventive control systems and monitoring of dangerous invasive alien species can be implemented. Also, the analysis of the economic loss due to dangerous damages of forests need to be conducted.

Further research, analysis and development is needed to better assess opportunities to limit or reduce GHG emissions and increase carbon sequestration in forests while not affecting forest management and substantial revenue from it.

The cost of realizing the potential from forestry sector has not been analysed in Estonia.

The potential to limit or reduce emissions and to maintain or increase removals of GHGs related to agricultural practices in Cropland Management and Grazing land Management can be identified regardless of the lack of GHG removal efficiency analysis based on local conditions.

GHG emissions from CM are mainly related to carbon stock changes soils and conversion of lands to croplands. Therefore, soil protection mechanisms are applied to minimize their degradation and to maintain and raise the content of soil organic matter. Soil protection measures are especially important for organic soils, which have high C stocks and are sensitive to drainage. Since CO₂ emissions from CM in Estonia mostly originate from cultivation of organic soils, also highest potential for emission reduction is related to the management of these soils.

In Estonia, annual precipitation exceeds evapotranspiration, causing calcium and magnesium carbonates to leach out from the surface levels of soil by percolating water. As a result of the leaching carbonates, about 545 000 ha arable land soils in Estonia are calcium-deficient and acidified. Acidification reduces nutrient uptake by plants and limits plant growth. Thus, neutralization of acidic soils would potentially significantly increase organic C content in the soils through maintenance of yields and consequent higher return of plant residues to the soil. Supporting organic farming would also potentially increase C sequestration due to the application of organic fertilizers and other factors, but at the same time larger cultivation area is needed to achieve the same crop production as in conventional farming.

Since accession to the European Union in 2004, land conversion to croplands has intensified, resulting in increased N₂O emissions. To avoid increased N₂O emissions from CM the conversion of grasslands to croplands can be limited by preserving larger areas of permanent grasslands. The potential to reduce the area of cropland and enhance the area of grassland to large extent could be a risk to Estonian food security. Nevertheless, there are co-benefits in terms of limiting and reducing GHG emissions while protecting ecological focus areas, maintaining semi-natural habitats, protecting natural habitats, and wild fauna and flora. Estonia is implementing research and support schemes to advise farmers on environmentally friendly management. Also, to transfer knowledge and know-how to farmers, implementing of efficient advisory systems and services are needed continuously in the future.

Potential to limit and reduce GHG emissions is also related to peatlands. In NIR wetlands land use category includes peatlands and inland water bodies. The area of wetlands cover 9% of Estonia's territory. In Estonia, peat is the third most important indigenous fuel after oil shale and wood. Most GHG emissions from peatlands are related to peat extraction sites. In 2018, the total area of managed peat extractions fields was 18 786 ha. Peat extraction usually proceeds on the same production area during several years. After the extraction the area is restored. There are also numbers of exhausted and abandoned peat extraction sites from Soviet times in Estonia that are sources of GHG emissions due to the removed vegetation layer. Restoring the water regime of those abandoned peat extraction sites would allow recovery of C sequestering bog ecosystems. It is also important to prefer continuation of peat extraction from areas already degraded and that are difficult and expensive to restore. Areas degraded by drainage should be prioritized to identify the needs for and sequence of their rehabilitation and restoration. Also, further draining of natural peatlands should be avoided in order to limit GHG emissions from those areas.

4. Most appropriate measures

The most appropriate measures for Estonia that are planned or are to be implemented, taking into account national circumstances, in order to pursue the mitigation potential, were fully described in initial report submitted in 2014. Detailed list of measures can be found in previously mentioned report. Measures that were introduced through Rural Development Plan 2007 – 2013 and Development Plan for Enhancing the Use of Biomass and Bioenergy 2007 –

² National Inventory Report 1990-2015

³ National Inventory Report 1990-2015

2013 are no longer in effect. All other measures are still being planned or implemented as described in the 2014 report.

5. Existing and planned policies to implement the measures

In this paragraph, existing and planned policies to implement the measures referred to in previous paragraph, taking into account other policies relating to the LULUCF sector, are described. Policies that are no longer in effect are removed in this progress report. However, a new policy had been added and described.

Estonian Rural Development Programme 2014 – 2020

The Estonian Rural Development Programme 2014-2020 was adopted by government on 22 May 2014.

EAFRD functions in member states through rural development programmes. In coordination of Ministry of Rural Affairs the Rural Development Programme 2014-2020 was compiled for the use of EAFRD instruments. Rural Development policy for the program period of 2014- 2020 is involved in integrated strategic planning process together with the EU Structural Funds and European Maritime and Fisheries Fund (EMFF).

The rural development policy has to help find solutions to several common agricultural policy challenges – how to ensure food supply, strengthen sustainable management of natural resources, decrease the pressure of climate change to agricultural production and agriculture impact to the environment, increase competition, exploit diversity of agriculture structure, enhance balanced development of rural areas.

Taking into account challenges that agriculture and rural areas need to face, in the context of Rural Development Plan 2014-2020 the focus was on the following fields: transfer of knowledge, competitiveness, the functioning of the food supply chain, environment and rural business and local initiative.

The objectives of Rural Development Plan 2014-2020 are as follows:

- A functioning cooperation between manufacturer, processor, advisor and scientist, up to date research and development and transfer of knowledge.
- Viable and sustainable food production-oriented agricultural sector is competitive, resource-efficient and its age structure is sustainable.
- Enterprises of agricultural production and processing have engaged in market power, and they are cooperating in agricultural production, processing and marketing.
- The use of agricultural land is environmentally friendly and considerate for regional peculiarities; biodiversity, traditional landscapes and maintenance of forestry and agriculture with high natural value is guaranteed.
- Agriculture and the food industry has made energy saving and energy efficiency investments, greenhouse gas and ammonia emissions are reduced and the conservation and capture of CO₂ has been promoted in agriculture and forestry.
- The rural economy and the rural living environment are diverse, offering alternative employment opportunities for labour released from agriculture, and supporting on the solutions based on local resources and potential.

Rural Development Plan 2014-2020 is implemented through measures that were chosen based on determined needs and objectives during the preparation of the development plan. In total, over 20 (sub)measures are implemented within the framework of the development plan. Directly or indirectly the majority of environmental and investment grants along with different environmental awareness raising activities contribute to climate change mitigation and adaptations.

Common Agricultural Policy - Greening

One of the elements of the new Common Agricultural Policy (CAP) is to imply mandatory „greening“ component of direct payments in order to improve environmental performance. Those payments would back up agricultural practices that are beneficial for the climate and environment applicable throughout the European Union. Member states should use part of their national ceilings for direct payments to grant an annual payment, for mandatory practices to be followed by farmers addressing both climate and environment policy goals as a priority. The practices would be in the form of generalised, straightforward, not contractual and annual actions that are beyond cross-compliance and connected tightly to agriculture, for example crop diversification, maintenance of permanent grassland (including low-density orchards) and ecological focus areas. Farmers who participating in *small farmer scheme* and organic farms are exempted from greening requirement. Additionally they should be applied on the whole eligible area of holding to achieve the objectives of the measures better and to allow efficient administration and control of greening. The present Regulation establishes three greening measures that are explained in more detail below.

Crop diversification measure.

According to crop diversification measure at least two (10- 30 hectares) or three (more than 30 hectares) different crops has to be grown in a farm depending on its arable land area.

While applying obligations under this measure the difficulty of smaller farms to diversify and still lead to an improved environmental protection should be considered, particularly the improvement of soil quality. An exception of this obligation will be granted to farms that are extensively covered by grassland or fallow land, or farms that rotate their parcels each year, or farms that are not able to introduce a third crop due to their geographical location and farms where arable land of the farmers remains under 10 hectares.

Maintenance of Permanent Grassland.

The measure of maintaining permanent grasslands is important against converting grasslands to other purposes. The obligation therefore is to maintain the area of existing permanent grassland that is pointed out in applications submitted by farms and subject to greening obligation.

Determination of Ecological focus areas

Ecological focus areas will be introduced especially in order to safeguard and improve biodiversity on farms. Therefore the focus areas should consist of areas that affect biodiversity directly, for example land lying fallow; different kind of landscape features like terraces, buffer strips, trees in line, filed copies etc; afforested areas and agro-forestry areas; or indirectly through reduced use of inputs on the farm, like nitrogen fixing crops, catch crops and winter green cover where use of plant protection products are forbidden.

According to this measure, all arable land areas in size more than 15 ha and that are eligible for financial support, 5% of the declared arable land has to be determined as ecological focus area. Estonia is also implementing a forest exemption, which means that farmers who defined at

forest exemption were exempted from this obligation

Nature Conservation Development Plan until 2020

The history of nature conservation in Estonia dates back to more than 100 years ago. It is regarded as having begun in 1910 with the establishment of a bird sanctuary on the Vaika Islands. Next to traditional species conservation, modern nature conservation focuses mainly on maintaining the integrity of habitats and promoting the nature awareness of people. Nature conservation aims to maintain biodiversity at all levels of its organisation.

The more there are functioning and biologically diverse ecosystems, the better we are provided with food, natural resources, clean water and air, and the better we will be able to endure environmental pollution and adapt to climate change. With the loss of biodiversity, nature will lose its ability to provide us with various vital benefits; it is therefore essential that natural resources be used in a sustainable manner. Nature conservation restrictions are often regarded as obstacles to economic development, disregarding the fact that natural resources largely constitute the basis for development. To preserve biodiversity and take right decisions on resource utilisation, the current state of natural resources and nature's benefits should be documented. The comparable values of benefits provided by nature have not been assessed in Estonia to date.

The Nature Conservation Development Plan (hereinafter the NCDP) is a strategic base document for the development of sectors related to the conservation and use of nature until 2020.

The strategic goals of the development plan are as follows:

- People are familiar with, appreciate and conserve nature and know how to use their knowledge in their daily lives.
- The favorable conservation status of species and habitats and diversity of landscapes is ensured and habitats are functioning as a coherent ecological network.
- Long-term sustainability of natural resources is ensured and the principles of the ecosystem approach are followed in the use of natural resources.

The development plan is in line with the Global Biodiversity Strategy of the Biodiversity Convention and the ensuing biodiversity strategy of the European Union and its ten-year target: halting the loss of biodiversity and degradation of ecosystem services in the EU by 2020, and restoring them insofar as possible, while stepping up the EU contribution to averting global biodiversity loss. The NCDP is also in line with the Estonian national sustainable development strategy Sustainable Estonia 21 and the Estonian Environmental Strategy 2030 and contributes to achieving their nature conservation objectives.

The government coalition programme has set the objective of developing a responsible attitude towards nature in people and maintaining a clean and biologically diverse living environment supporting the sustainability of the nation; special emphasis is to be laid on developing a sustainable public attitude towards nature and on prudent use of earth resources. The goals of the NCDP are in line with the principles of the above programme.

The goals of the development plan will be achieved through enhancing the nature-awareness of people, through effective conservation management, through ensuring the availability and update of nature information, and through establishing conditions for long-term sustainability of natural resources.

To achieve the goals, the development plan specifies measures and activities, which constitutes an input for budgeting the necessary funds and a basis for drawing up an operational programme.

Forestry Development Plan until 2020

The Forestry Development Plan is based on the concept of sustainable forest management agreed upon at the forest protection process between the European ministers. Sustainable forest management is management of forests in a manner and to an extent that maintains their biological diversity, productivity, capacity for regeneration and vitality as well as potential to fulfil ecological, economic and social functions at the local, national and global levels without damaging other ecosystems now and in the future. On the basis of that, the Development Plan covers the main functions of forestry.

The need for compilation of the Forestry Development Plan results from the Forest Act and Sustainable Development Act. According to the Forest Act, a forestry development plan for directing forestry is to be prepared once every ten years. The Forestry Development Plan lays down the forestry objectives for the years 2011–2020, describes the measures and means for achieving them and presents the implementation methods of the Plan. The Development Plan includes a forecast on the use of timber as a renewable source of energy and on the state of the environment.

As a document of national importance, the Forestry Development Plan is to be approved by the Parliament of Estonia. This is a national programme that involves the framework and principles for developing forestry in accordance with the needs of the country, and serves as a basis for integration of international agreements and policies into development of national forestry.

The main objective of the Development Plan is to ensure forest productivity and vitality, and the diverse and efficient use of this resource. In order to achieve that:

- in the long run, timber will be used as a renewable resource in timber industry and energy sector in the amount of increment;
- to maintain forest productivity, regeneration works will be done on at least half of the regeneration cutting areas;
- in order to preserve good condition of threatened species and the species characteristic to Estonia, at least 10% of the forest land areas have been placed under strict protection and representation of the forests under protection has been improved.

The Forestry Development Plan is based on the 19 resolutions and guiding materials of the Ministerial Conference on the Protection of Forests in Europe, creating a framework for sustainable forestry concept together with the system of criteria and indicators, covering all forest functions.

The Forestry Development Plan includes methods for the protection of natural processes and threatened species which helps to achieve the objectives set out in the Extended Programme

of Work on Forest Biological Diversity, Global Strategy for Plant Conservation and the Programme of Work on Protected Areas of the Convention on Biological Diversity.

By ratification of the Kyoto Protocol of the Framework Convention on Climate Change, Estonia took the obligation to reduce greenhouse gas emissions by 8% in comparison with the year 1990. The Forestry Development Plan covers the methods for improving collection of data related to change in forestation and forest management.

Achieving the objectives of the Forestry Development Plan is supported by the Rural Development Plan for 2014–2020 being enforced by the Ministry of Agriculture, through which most of the private forestry support measures are co-financed.

Implementation of the Forestry Development Plan and increasing the use of timber helps to raise the proportion of renewable energy in final consumption to 25%, renewable electricity to 15% of gross consumption and to increase the proportion of biofuels in transportation to 10%, which are the main objectives of the Estonian Renewable Energy Action Plan until 2020, prepared by the Ministry of Economic Affairs and Communications.

The main criterion for sustainable forest management in the long run is the use of forest resource in as uniform manner as possible in the extent of growth. The sustainable objective for Estonia in the long-term is to use 12–15 million m³ of forest material annually. It is estimated that this is the amount of new timber growing to forests each year. Use of forests in the limits of growth will ensure constant income for the society, at the same time maintaining the ability of forests to offer economic, social, environmental and cultural benefits. In order to ensure constant timber flow, active forest management, that is, reforestation, growth, use and protection of forests, is important. Due to the possible threat of using forest resources at a larger extent than that of growth in the long run, legislation enables to limit the use of forest reserves. Under the Environmental Action Plan reporting, the Ministry of the Environment presents the Government of the Republic overviews on the use of forest resources during the previous 10-year period, together with suggestions on how to increase or decrease the volume of the use of resources, if necessary. The limits provided in legislation shall be changed flexibly in accordance with the fulfilment of the forest use objectives.

Timely cutting of forest stands and fast reforestation with suitable tree species enables to use the forest land reproduction ability in the best possible way. If grown forests that need managing would be left unmanaged for an extended period of time, losses would occur on the sides of the forest owner (revenue foregone, decrease in timber value, reduced investment possibilities), forest sector enterprises (lowered quality of raw timber, increased dependency on imported timber, involving a risk that the forest owners will start losing their interest in taking care of their forests, thus leading to low security of supply) and the state (reduced tax income, additional value and employment, inefficient land use, worsening external trade balance).

Forest Act

Forest Act provides the legal framework for the management of forests in Estonia. The main objective of this is to ensure the protection and sustainable management of forests as an ecosystem. The Act provides legal bases for forest survey, forest planning and forest management. Among other sustainable forest management practices, the Forest Act regulates implementation of forest regeneration and requires forest owner to apply reforestation methods specified in the act in order to ensure the regeneration of forest no later than 5 years after the occurrence of final fellings or natural disturbances.

National Renewable Energy Action Plan until 2020

Compared with 1990, Estonia has reduced its greenhouse gas emissions by more than 50%, and the share of renewable energy sources in total energy consumption in 2005 was 18%. In accordance with Directive 2009/28/EC on the promotion of the use of energy from renewable sources, The main aim of the National Renewable Energy Action Plan until 2020 is to increase the share of renewable energy sources in the whole of energy consumption as compared to the reference year 2005 to 25% by 2020. One of the overall goal is to prefer wood as renewable material and energy source to other materials and non-renewable resources with higher GHG emissions.

At the moment, the use of biofuels in Estonia is still low, but interest in the use of biofuels is constantly increasing. As a result of the period of economic growth lasting until 2007, energy consumption figures in Estonia have also somewhat increased, but at a significantly slower pace than that of economic growth.

Several strategy documents on the use of renewable energy sources have been drawn up and adopted in Estonia. The main “roof strategy” of the energy sector is the National Development Plan of the Energy Sector up to 2020 and the Estonian National Renewable Energy Action Plan up to 2020 among other plans, forms a part of it.

In Estonia, wood is the biofuel with the greatest economic potential for producing both heat energy and electricity. The total volume of different wood sources in 2006 was assessed as 9 399 000 m³ and in 2008 as 7 079 000 m³. The largest import article is unprocessed wood the volume of which in 2006 was 1 809 050 m³ and 564 100 m³ in 2008. According to the Forestry Development Plan up to 2020 the maximum wood use in Estonia’s forests arising from their age distribution could reach on a short-term basis to 22 million m³ a year, while the long-term sustainable objective is 12–15 million m³ a year. The main problems in using biomass include the unstable extent of forest use, sometimes insufficient increment and low profitability of developing biomass used for bioenergy.

Earth’s Crust Act

According to Earth’s Crust Act, entered into force in 2005, the owner of the extraction permit is obliged to restore the land disturbed by mining. The regulation of restauration and requirements for the restoration project⁵ are determined by the Minister of Environment. Restoration conditions for all projects are determined by the Environmental Board.

The objective of the restoration is to adjust the land degraded by extraction to forest land, water body, land with recognized value or to any other kind of land that can be used for beneficial purposes. To what extent the restoration project needs to consider GHG emissions reduction depends on concrete restoration conditions determined by the Environmental Board. However, all restoration projects related to peat extraction sites are indirectly reducing GHG emissions as after peat has been completely removed from the extraction site, there will be no remarkable GHG emissions.

Currently a few changes are planned to Earth’s Crust Act (ECA). According to Nature Conservation Development Plan until 2020, further drainage of natural peatlands must be

⁵ <https://www.riigiteataja.ee/akt/13132958>

avoided, preferring additional peat extraction from sites already disturbed by drainage. Therefore with Earth's Crust Act bill a change to a principle that in peat extraction only yearly quantities of usage that must not be exceeded determined by Sustainable Development Act need to be taken into account when planning peat extraction. In ECA bill it is intended to determine disturbed areas that are acceptable for extraction according to economic and ecological aspect. After adopting ECA and respective legal act extraction permits will not be given for undisturbed peatlands.

In addition, it is planned in ECA bill to determine a peat mining allotment throughout the thickness of the layer which provides sustainable use of peat and restoration of the site after extraction.

EU Cohesion Fund

EU Cohesion policy aims to support economic, social and territorial cohesion across the EU. It plays a significant role in supporting sustainable, social and economic restructuring across Europe. The policy adds to socio-economic development and employment growth - helping the economy while protecting natural resources.

Estonian Environmental Strategy 2030

The Ministry of the Environment has coordinated the preparation of the Estonian Environmental Strategy 2030, which builds upon the principles of the National Strategy on Sustainable Development "Sustainable Estonia 21" and serves as the basis for the preparation of all sector-specific development plans within the sphere of the environment as well as for the allocation of environmental funds from the state budget.

Overall goals of the Estonian Environmental Strategy 2030 related to climate change mitigation, are to increase the use of renewable energy sources (wood, wind, hydro) and decrease the use of fossil fuels, slow down and stabilise the consumption of energy, protect the ozone layer, and develop an efficient, environmentally sustainable and comfortable public transport system.

Climate Change Mitigation and Adaptation Action Plan in Agriculture sector 2012 - 2020

In addition to other policies and regulations supporting LULUCF actions, the Climate Change Mitigation and Adaptation Action Plan in Agriculture sector 2012-2020 was approved in 2012. In 2011 Minister of Agriculture formed a working group to draft a climate change action plan. The working group consisted of officials of the Ministry and representatives of different agencies, universities and research institutions. The action plan was approved by the Minister in 2013.

The main purposes of the action plan are as follows:

- Mapping the relations between agriculture and climate change;
- Creating input for policies, strategies and measures;
- Input to officials of the Ministry participating in various working groups;
- Input for Research and Development.

The main goals of the action plan are as follows:

- Limiting the increase of GHG emissions from the agriculture sector;
- Analysis of the climate change assessment methodology and statistics;
- Increasing the sequestration of GHGs;
- Hedging the risks of climate change to agriculture.

General Principles of the Climate Policy until 2050

General Principles of the Climate Policy sets a vision for all sectors aimed at setting Estonia on a pathway consistent with the 2015 Paris Agreement and the EU targets to 2050. The General Principles do not stipulate specific measures to achieve these goals but are expected to be implemented through sector-specific development plans including agriculture and LULUCF.

The guidelines for agriculture sector are as follows:

- Soil carbon stock is enhanced and maintained, and land areas with significant carbon stock are created and maintained.
- Fostering efficient and environmentally friendly use of agricultural land while avoiding its falling out of agricultural use. Agricultural production potential and area will be preserved.
- Encourage the replacement of mineral fertilizers with organic fertilizers and biochar. Avoid the removal of organic matter from the field if not necessary.
- Bioenergy production and use is strongly promoted in particular instead of using non-renewable energy intensive fuels.
- Increasing the productivity of the agricultural sector and resource efficiency to reduce greenhouse gas emissions per unit of production.
- In limiting greenhouse gas emissions from agriculture sector, research and development directions which will increase the sustainability of agriculture are preferred. For promoting innovation, research will be closely linked to agricultural production through education, information dissemination and counselling.

The guidelines for forestry and land use sector are as follows:

- Forest growth and ability of carbon sequestration is increased by productive and sustainable forest management, and in the long run, forest carbon stocks are maintained.
- The use of wood is consistently promoted and carbon stocks in wood products and buildings are increased, in this way replacing the use of non-renewable natural resources.
- Preservation of the existing forest area is promoted and in other land use categories the techniques are preferred that increase carbon sequestration and emission reduction.
- Maintain and increase carbon stocks combined in peat of bogs/swamps. Avoid further drainage of peat lands and, if possible, restore water regime of already drained peat lands close to natural water regime or avoid further degradation of those areas.
- Research and development directions which would help to increase carbon sequestration and find alternative uses of wood are preferred in land use and forestry sector.

6. Timetable for the adoption and implementation of the measures

Timetable for the adoption and implementation of the measures.

Nr	Measure	Source	Adoption	Implementation
1	<i>Measure: Support for growing plants of local varieties Under Agri-environmental support</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
2	<i>Measure: Support for environmentally friendly management Under Agri-environmental support</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
3	<i>Measure: Organic farming</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
4	<i>Measure: Support for environmentally friendly horticulture.</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
5	<i>Measure: Crop diversification measure</i>	CAP Greening	2014	2015-2020 continues until 2022
6	<i>Measure: Ecological focus area protection</i>	CAP Greening	2014	2015-2020 continues until 2022
7	<i>Measure: Support for the maintenance of semi-natural habitats Under Agri-environmental support</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
8	<i>Natura 2000 support for agricultural land</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
9	<i>Measure: Preservation of permanent grassland</i>	Commission Regulation (EC) No 73/2009	2005	2015-2020 continues until 2022
10	<i>Measure: Support for advisory systems and services</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
11	<i>Measure: Regional support for soil protection</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022

12	<i>Measure: Mitigating the negative impacts of climate change on biological diversity</i>	Estonian Nature Conservation Development Plan until 2020	2012	2020 continuously
13	<i>Measure: Ensuring the favourable conservation status of habitats.</i>	Estonian Nature Conservation Development Plan until 2020	2012	2012-2020
14	<i>Measure: Restoration of the land degraded by extraction</i>	Earth's Crust Act - §48	2004	continuously
15	<i>Measure: Restoration of contaminated sites and water bodies</i>	EU Cohesion Funds	2013	2014-2020
16	<i>Measure: Promotion of regeneration of forests in managed private forests with the tree species suitable for the habitat type</i>	Estonian Forestry Development Plan (EFDP) until 2020	2011	2012-2020, continues until 2021
18	<i>Measure: Increasing forest increment and ability to sequester carbon through timely regeneration of forests for climate change mitigation.</i> Activity: Developing forest biomass and carbon flux assessment models that fit Estonian ecological conditions and systematic compilation of forest carbon balance. Activity: Monitoring of forest soils in order to estimate carbon flux changes in soil. Activity: Developing the functionality of Forest Registry as to better predict maturity ages of forest stands and to plan forest management. Activity: Analysing possibilities for trading the carbon sequestered in forests. Activity: Developing forestry measures to adapt climate change.	Estonian Forestry Development Plan (EFDP) until 2020	2011	continuously Adopted Adopted 2015 2015
19	<i>Measure: Development and maintenance of infrastructure for agriculture and forest management.</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022

20	<i>Measure: Improvement of forest economic and ecological vitality.</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
21	<i>Measure: Natura 2000 support for private forest land</i>	Rural Development Programme 2014-2020	2014	2014-2020 continues until 2022
22	<p><i>Measure: Improving forest health condition and preventing the spreading of dangerous forest detractors.</i></p> <p>Activity: Finding out and monitoring the most important damages of forest in the course of forest inventory and monitoring in order to predict changes in forest condition.</p> <p>Activity: Implementation of biological preventive control methods to limit the damages of fungus causing root rot during summer cuttings. Supporting purchase of devices and preparations for treating stumps.</p> <p>Activity: Analysis of the economic loss due to root rots, preparation of guiding materials and implementation of preventive forest management measures to avoid damage.</p> <p>Activity: Discovery and monitoring of dangerous invasive alien species that are of threat to spread to Estonia, and development and implementation of preliminary defence measure system.</p> <p>Activity: Executing a pan-European forest monitoring programme to gather adequate data on the overall condition, damages and biological diversity of forests and its nutrient cycle concentrating on most important nutrient elements (N, P, K, Ca, Mg) and accumulation of microelements and carbon.</p> <p>Activity: Restoring damaged</p>	Estonian Forestry Development Plan until 2020	2011	<p>Continuously</p> <p>Continuously</p> <p>2016-2019</p> <p>Implemented</p> <p>Continuously</p> <p>Continuously</p> <p>Continuously</p> <p>2014-2020 continues until 2022</p>
		Rural Delopment plan	2014	2014-2020 continues until 2022

	forests and preventing forest fires.			2014
23	<i>Measure: Obligations of owner in forest management.</i>	Forest Act	2006	continuously
24	<i>Measure: Reducing the environmental impact related to the use of fossil fuels and non-renewable natural resources by increasing timber production and use in Estonia.</i> Activity: Organising information campaigns for promoting timber use; Activity: Developing and implementing a methodology to assess carbon content of buildings; Activity – asendustegevus – ehitiste – kajastub tegevuse Eesti ökoloogilistele tingimustele vastavate metsa biomassi ja süsiniku voogude hindamise mudelite arendamine ja regulaarne metsade süsinikubilansi koostamine. Activity: Encouraging timber use by environmentally friendly public procurements (in public buildings, for energy production, etc.).	Estonian Forestry Development Plan until 2020	2011	continuously 2015 continuously continuously
25	Restoration of the natural water-regime of drained peatlands	Estonian Nature Conservation Development Plan until 2020/Management plan for protected mires	2012	continuously (jätkub vähemalt kuni 2023)

26	<i>Measure: Broader use of renewable energy sources for power production.</i>	National Renewable Energy Action Plan until 2020	2010	as of 2009
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